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Original Article

Quality of life of critically ill patients in a developing country: a prospective longitudinal study

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Abstract. [Purpose] To evaluate the quality of life of critical illness survivors in a developing country over the time after hospital discharge and to assess the influence of clinical variables on quality of life. [Subjects and Methods] A prospective longitudinal study was conducted in a large, tertiary, public hospital in Sao Paulo, Brazil. We included patients ≥18 years old, hospitalized in the intensive care unit with ≥24 hours of invasive mechanical ventilation. Quality of life was assessed using the Medical Outcomes Study 36-Item Short Form Health Survey, which was applied by telephone interview at the first, third and sixth months after hospital discharge. [Results] 75 patients were included in the study. Quality of life improved progressively after hospital discharge; role-physical was the most compromised domain. The physical component was influenced by the age. Quality of life was not influenced by Apache II categorization, length of invasive mechanical ventilation, intensive care unit stay or hospital stay. [Conclusion] Survivors of critical illness in a developing country present poor quality of life, which improves over time. Age influenced the physical component of quality of life.

Key words: Critical care, Quality of life, Patient outcome assessment

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INTRODUCTION

Critically ill patient may suffer functional, social and mental alterations including impairment of cognition, memory and concentration after intensive care unit (ICU) and hospital discharge[1, 2)]. The recovery is often slow and prolonged and alterations may persist after leaving the hospital. Patients frequently need continuous support from family and caregivers after coming back home, mainly those who have received prolonged invasive mechanical ventilation (IMV)[3, 4)]. In addition to all the alterations from ICU stay, ICU survival comes along with impact in the short and the long-term quality of life (QoL) after discharge[1, 5)].

In a study conducted in a Scottish Teaching Hospital, ICU survivors presented lower scores of physical aspects of SF-36 three months after ICU discharge when compared to their score before admission to ICU. A slow improvement of the physical aspects up to six months was observed, and baseline score was achieved after 12 months[6)]. In The United States of America (USA), 66 patients who survived acute respiratory distress syndrome (ARDS) presented low score in the SF36 questionnaire in all domains except social functioning, role-emotional and mental health one year after discharge[7)]. In another study in the USA, ARDS survivors presented decreased QoL in physical functioning, physical ability to maintain their roles, bodily pain, general health and vitality one year after recovering[8)]. Reduction in QoL caused by ICU admission was also pointed in ICU

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survivors in Netherlands[9].

In the United Kingdom, older ICU survivors presented higher score for the mental component of SF-36 but not for physical component[10]. A Spanish study showed that 61% of elderly patients who survived ICU persisted with lower QoL score 12 months after hospital discharge[11].

The knowledge of physical and mental alteration due to ICU stay is important to improve the assistance of critical patients. However, the QoL of critically ill patients after ICU and hospital discharge has been addressed mostly in developed countries[6–11]. In the few studies conducted in developing countries, QoL was reported as declined in survivors of critically ill patients after acute respiratory distress syndrome (ARDS) due H1N1 virus, acute kidney injury and severe sepsis[12–14]. On top of that, the percentage of mortality in tertiary hospital in India was reported still high for elderly patients[15].

Under particular realities of life habits, health care system and rehabilitation settings for each country, the recovery of post critically ill patients may be looked considering this particular scenario.

Therefore, the objective of this follow-up study was to evaluate the QoL of critically ill survivors in a developing country over the time after hospital discharge and to assess the influence of clinical variables on quality of life.

SUBJECTS AND METHODS

This was a prospective longitudinal study, which was approved by the Ethics Committee from Clinical Hospital, Medical School of University of Sao Paulo (No. 1159/07) and conducted in a large tertiary public hospital in Sao Paulo, Brazil. Patients or close relatives were contacted during hospital stay and received oral and written information about the study; a signed consent form was obtained while patients were still in the hospital. Some patients could not be reached before hospital discharge. Since patients were interviewed by telephone call, those patients who were not contacted during hospital stay received information about the study and were invited to participate in the study when the telephone contact was made. We consulted the Ethics Committee from Clinical Hospital of Medical School of University of Sao Paulo, who stated that once the patient had agreed to answer the telephone call and respond the questionnaire, it implied that he/she consented to participate in the study.

The inclusion criteria for this study were medical and/or surgical patients living in the city of Sao Paulo, admitted to the ICU at the Clinical Hospital of the University of Sao Paulo between May 2010 and January 2011, who were 18 years old or older, and who were submitted to at least 24 hours of IMV. Patients with cognitive deficit, aphasia and tracheotomy, patients with previous neurological condition, neurological deficit after ICU and amputation of limbs were excluded. From the patients' records, the following data were collected: age, gender, severity of disease score (*Acute Physiology and Chronic Health Evaluation* score − APACHE II score), type of ICU admission (clinical or surgical), duration of IMV, ICU length of stay and hospital length of stay. The APACHE II measures the severity of disease within the first 24 hours following patient's ICU admission[16].

The evaluation of the QoL was performed by using the Medical Outcomes Study 36–Item Short Form Health Survey (SF-36). The SF-36 is validated in Brazil, has good acceptance, reliability, validity in ICU patients and has good adaptability to be applied by telephone call[6, 17–19]. The SF-36 comprises eight domains: physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional, and mental health. The domains physical functioning, role-physical, bodily pain and general health compound the physical component and the domains vitality, social functioning, role-emotional and mental health compound the mental component. The SF-36 score ranges from 0 to 100, and 0 is the worst and 100 is the best score for QoL[7, 20]. Patients' QoL was assessed by telephone calls at the first, third and sixth month after hospital discharge.

Data was analyzed using Minitab® Statistical Software version 15 (Minitab Inc., State College, Pennsylvania, USA). The quantitative variables are described as median and interquartile range (IQR) or mean and standard deviation (SD) and the qualitative variables are presented as frequency and percentage. The assessment of SF-36 over time was performed for Physical and Mental Component using ANOVA with repeated measures and Tukey post-hoc test; time of assessment, age category (< 60 years old or ≥ 60 years old), and Apache II category (≤ or >14) were used as factors. Age was categorized according to the Brazilian law for elderly people, and Apache II was categorized according to the median calculated for the Apache II for the studied population. The significance level was set at $p \leq 0.05$.

RESULTS

According to inclusion criteria, 431 patients were initially assessed for this study. 142 (32.9%) patients were excluded during their ICU stay. In the ward 142 (49.1%) were lost: seven patients due to refusal, 26 patients transferred to other hospital, 58 were transferred to long-term care hospitals, and 51 died. Among the 147 (50.9%) patients who received hospital discharge and therefore were considered eligible for this study, the follow-up was completed for 75 patients at the first month, 71 at the third month and 68 at the sixth month.

Out of the 147 eligible patients, 72 patients did not complete the first follow-up: six died, two refused to participate, 17 were readmitted to the hospital, and 47 patients could not be contacted. The reasons for failing contact included incorrect or nonexistent telephone number in the patient's records and absence of response.

The descriptive analysis of age, length of IMV, length of ICU and hospital stay and APACHE II of the studied population is shown in Table 1.

Due to the large number of lost patients, a complementary analysis was performed between the studied population and the lost patients in the ward by applying the Mann-Whitney U test to compare quantitative data and χ^2 test to compare qualitative data. Statistically differences were found for the following variables: Type of admission (p=0.002), IMV length of time (p=0.001) and ICU length of stay (p=0.002). The clinical and demographic characteristics for the studied population and for those who were lost after ICU discharge and before hospital discharge are also reported in Table 1.

The mean score of each domain of the SF-36 of all subjects at the first, third and sixth month is illustrated in Fig. 1, which shows a progressive increase on the score of all domains after hospital discharge; it is noteworthy that the domain

Table 1. Demographic and clinical characteristics of the studied population and lost patients after ICU discharge

Characteristics	Studied population	Lost (in the ward)
	n=75	n=142
Age, mean ± SD	50.2 ± 17.1	53.25 ± 18.3
< 60 years, n (%)	46 (61.4)	90 (63.4)
≥ 60 years, n (%)	29 (38.6)	52 (36.6)
Gender - male, n (%)	45 (60.0)	91 (64.1)
APACHE II score, median (IQR)	14.0 (11.0–17.0)	15.0 (11.0–19.0)
Type of Admission, n (%)		
Clinical	32 (42.7)	32 (22.5)*
Surgical	43 (57.3)	110 (77.5)
Neurosurgery	13 (30.2)	38 (34.5)
Abdominal	12 (27.9)	20 (18.2)
Vascular	8 (18.6)	10 (9.1)
Others	10 (23.3)	42 (38.2)
IMV length of time (days), median (IQR)	4.0 (3.0–8.0)	7.0 (3.7–15.0)*
ICU length of stay (days), median (IQR)	13.0 (7.0–17.0)	16.5 (10.0–28.0)*
Hospital length of stay (days), median (IQR)	29.0 (20.0–48.0)	35.5 (22.0–55.2)

The Mann-Whitney U-test was applied for continuous variables and the χ^2 test for the categorical variables. APACHE II score: Acute Physiology and chronic Health Evaluation score; IMV: mechanical ventilation; ICU: intensive care unit; data expressed in mean, SD: standard deviation; median, IQR: interquartile range (25th–75th) and n (%). *Statistical significance

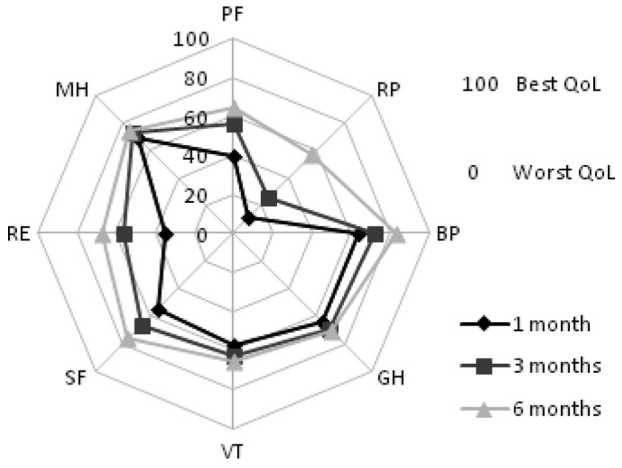

Fig. 1. Radar chart with the eight domains of the SF-36 after hospital discharge
This graph shows the evolution of the each SF-36 domain for all the patients 1, 3 and 6 months after hospital discharge. Notice that the score increases over time and that the Role-Physical was the most compromised component. SF-36: Study 36-Item Short Form Health Survey. PF: physical functioning, RP: role-physical, BP: bodily pain, GH: general health, VT: vitality, SF: social functioning, RE: role-fmotional, MH: mental health. QoL: quality of life

role-physical was the most compromised.

ANOVA and Tukey post-hoc test showed that both physical and mental component presented significant improvement over time, with p=0.01 for the comparison of mental component between third and sixth month and p<0.001 for all of other comparison, as demonstrated in Table 2.

The physical component was influenced by the age (p=0.03) but not by Apache II (p=0.825). The mental component was not influenced by age (p=0.736) or Apache II (p=0.594). Neither the physical component nor the mental components were influenced by the length of IMV, ICU length of stay and hospital length of stay.

DISCUSSION

The particular realities of life habits, health care system and rehabilitation settings for each country may interfere in the recovery of post critically ill patient[21]. While in developed countries QoL in post critical patients has been verified after six months to two years in general[1–8], in developing countries there are very few studies in this area[21] and the existent studies show results from specific population. Patients who survived ARDS due to H1N1 virus in Argentina presented decline in all domains of QoL after six months. In that study, lung function was also assessed and found to be compromised, but no correlation between lung function and QoL was found. However, the number of subjects was small, only 11 patients were included in that study.

A Brazilian study[13] assessed QoL of critically ill survivors who presented acute kidney injury. It was a large cohort study, which found that chronic kidney injury, septic shock, older age and longer ICU stay were related to worse QoL. In our study, we also found the influence of age on QoL, but not of other analyzed clinical variables. Another Brazilian study[14] evaluated QoL of sepsis survivors, and also found moderate decline in QoL, which was influenced by age.

Although single centered, our study included both clinical and surgical patients, with different diagnosis, thus our results reflect the outcome of a generalized population.

In our study both physical and mental components of SF-36 improved significantly over time after hospital discharge, as was also found by Cuthbertson et al[6]. The physical component was influenced by the age (elderly, i.e., ≥60 years old, vs. non-elderly, i.e., <60 years old) but not by APACHE II, IMV duration, ICU and hospital length of stay. This suggests that despite of socioeconomic differences with possible variations in health status and outcomes across the world[21, 22], physical component is more compromised than mental component as also reported by Hofhuis et al[9]. Moreover, the influence of age has been encountered in other studies, including those from developing countries[13, 14].

The impact of ICU stay in the QoL seems to be even stronger in elderly patients. Compared to young patients, older ICU survivors in the United Kingdom presented higher score in the mental component of SF-36 but not for physical component[10]. Besides having their QoL declined, older patients seem to be less resilient to the recovery; a Spanish study showed that elderly patients who survived ICU were discharged home with decline in QoL, 12 months afterwards the QoL score was worse than before hospital admission for 61% of patients[11].

In a recent research about social indicators in Brazil, the number of elderly and the life expectance are growing[23] following the global changes. The increase in elderly population has also provided an elevation in the number of ICU admission[11, 24]. Nevertheless, in this study we observed a considerable number of elderly patients. In Brazil, some studies describe that elderly account for 11–18% of total hospitalization. In our study, the included selected population presented 38.6% of patients aged above 60 years old[25, 26]. The focus in the physical activity in hospitalized elderly is on the rise[27]; our results corroborates and suggest that the process of holistic rehabilitation of elderly should be emphasized during the hospitalization stay, with the purpose of minimize the QoL impairment after hospital discharge.

Previous studies have shown that acute events such as hospitalization may lead to the development or the worsening of disability[28, 29] and that it occurs commonly. As shown in our results, the physical component of the SF-36 survey seems to be more compromised than the mental component. Therefore, aspects related to functional status and physical impairment may directly influence their QoL. Hospital care and should be focused in promoting the reduction of hospitalization-associated disability[30].

It has been reported that the care of the critical patient differs from country to country due to differences in the socioeconomic status, health care system and regions, and that people with worse socioeconomic status have poor health state

Table 2. Median values for the physical and mental components at 1st, 3rd and 6th month assessment for the total of subjects

Characteristics	1st month	3rd month	6th month
Physical component	43.0 (32.4–56.5)	55.0 (41.6–69.9)	74.4 (53.1–87.7)
Mental component	51.7 (36.4–72.4)	63.3 (48.0–87.3)	77.8 (60.6–89.2)

SF-36: Study 36-Item Short Form Health Survey, PC: physical component score, MC: mental component score. Statistical significance was obtained for all time assessment comparison by ANOVA with repeated measures and Tukey post-hoc test. Statistical significance of p=0.01 was obtained for comparison of mental component between third and sixth months. For all other comparison, statistical significance level was p<0.001.

compared to those with higher socioeconomic status[22, 31, 32]. Brazil is a huge country where these differences can be seen especially between states from north/northeast and south/southeast[23]. The fact that our study was conducted in the southeast, one of the most developed regions of Brazil[23], may have led to similar study results of developed countries, even though the study was conducted in a public hospital.

In our study, a large number of deaths was observed after ICU discharge; it is important to observe that our study included a selected population. Besides, more than half of patients who died had been readmitted to the ICU. Readmission in the ICU after discharge to the ward results in a high risk of hospital mortality[33–35]. Among other factors such as age and severity of the disease, early discharge from the ICU may be associated to the ICU readmission. However, the present study was not designed to evaluate this issue.

For the lost patients after ICU discharge in our study, the variables for IMV and ICU length of stay were higher than for the studied group. This finding may be explained by the fact that the number of surgical patients, specially neurosurgical, constitutes a larger proportion than in the studied group, and factors such as the need for sedation and clinical instability might have provided a higher IMV length of time and, hence, a higher ICU length of stay. However, despite that, the results obtained from the studied population showed that length of IMV, ICU stay and hospital stay did not influence SF-36 score.

This study was conducted in a tertiary hospital. In Brazil, the health system model allows that such hospitals receive patients from a large variety of regions, and sometimes it makes it difficult to contact patients. Besides the high percentage of losses in the hospitalization period, another limitation of this study was the missing data of patients after discharge. Reaching those patients was a challenge considering communication conditions due to the wrong/lack of telephone number. Unfortunately, this is a reality encountered in developing countries, which affects not only the health system itself but also affects the feasibility of clinical researches with longitudinal design. This fact has also been observed in previous Brazilian longitudinal studies[14].

Another limitation of the study was that although it seems that physical component persists with lower values than mental components in each time point of evaluation, we did not perform a specific analysis to compare the scores of physical and mental components. Finally, since we only included patients who received hospital discharge and who did not present neurological conditions, the studied population may have unintentionally included the ones with better profile for clinical resolution and QoL recovery, similarly to the developed countries.

Our findings suggest that survivors of critical illness in a developing country present a deterioration of QoL, which improves over time for both physical and mental component. QoL was not influenced by APACHE II, IMV length of time, ICU and hospital length of stay, but the physical component of QoL was influenced by age.

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