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ORIGINAL RESEARCH

Prevalence of self-reported frailty in awake and alert critically ill patients

Prevalência de fragilidade autorreferida em pacientes criticamente enfermos acordados e alertas

Prevalencia de fragilidad autodeclarada en pacientes críticamente enfermos despiertos y alertas

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ABSTRACT | Critically ill subjects admitted to intensive care units (ICU) might experience physical and cognitive reserves losses that increase their vulnerability to adverse events – characterizing frailty syndrome. This study aimed to delineate the prevalence of self-reported frailty in awake and alert critically ill patients admitted to the ICU of a teaching hospital. We included adult subjects (≥18 years old), admitted for at least 48 hours in the ICU of a teaching hospital in the city of Uberaba, state of Minas Gerais (MG), Brazil, who were alert at the time of the assessment. Subjects were encouraged to report their level of frailty using the Clinical Frailty Scale (CFS). Subjects with a CFS of 1 to 3 were considered non-fragile, 4 vulnerable, and greater than 5 frail. 50 subjects aged 44 to 78 years, mostly males, were evaluated. The prevalence of frail subjects was null, one subject was considered vulnerable and the others were considered non-frail, in which category 3 prevailed in 64% of the population. When analyzing the demographic and clinical data in the different CFS scores, no statistically significant difference was observed between gender and age in the analyzed categories. The functional comorbidity index was increasing in the analyzed categories, (p=0.05). The prevalence of self-reported frailty was null in critically ill patients admitted to this teaching hospital in Uberaba-MG. Self-reported frailty assessment scales may be inaccurate to identify frail subjects.

Keywords | Critical Care; Inpatients; Teaching Hospitals; Muscle Weakness.

RESUMO | Indivíduos criticamente enfermos internados em unidades de terapia intensiva (UTI) podem apresentar perdas de reservas físicas e cognitivas que aumentam a vulnerabilidade frente a eventos adversos, caracterizando a síndrome da fragilidade. O objetivo do estudo foi delinear a prevalência de fragilidade autorreferida em pacientes criticamente enfermos acordados e alertas internados na UTI de um hospital escola. Foram incluídos indivíduos adultos (≥18 anos), internados por, pelo menos 48 horas nas UTI de um hospital escola de Uberaba-MG, que se se encontravam alertas no momento da avaliação. O indivíduo foi estimulado a referir seu nível de fragilidade utilizando a Escala de Fragilidade Clínica (EFC). Indivíduos com EFC de 1 a 3 foram considerados não frágeis, 4 vulneráveis e maior que 5, frágeis. Foram incluídos 50 indivíduos com idade entre 44 e 78 anos com predominância do sexo masculino. A prevalência de indivíduos frágeis foi nula, 1 indivíduo foi considerado vulnerável e os demais foram considerados não frágeis, havendo predominância da categoria 3 em 64% da população. Ao analisar os dados demográficos e clínicos nas diferentes pontuações da EFC não foi observada diferença estatisticamente significante entre sexo e idade nas categorias analisadas. O índice de comorbidade funcional foi crescente nas categorias analisadas, (p=0,05). A prevalência de fragilidade autorreferida foi nula em pacientes criticamente enfermos internados nesse hospital escola em Uberaba-MG. Escalas autorreferidas para avaliação de fragilidade podem ser incapazes de identificar acuradamente indivíduos frágeis.

Descritores | Unidades de Terapia Intensiva; Pacientes Internados; Hospitais de Ensino; Debilidade Muscular.

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RESUMEN | Los individuos críticamente enfermos que ingresan en unidades de cuidados intensivos (UCI) pueden presentar pérdidas de reservas físicas y cognitivas, que aumentan su vulnerabilidad ante eventos adversos y caracterizan el síndrome de fragilidad. El objetivo de este estudio fue delimitar la prevalencia de fragilidad autodeclarada en pacientes críticamente enfermos despiertos y alertas hospitalizados en UCI de un hospital escuela. Participaron individuos adultos (≥18 años), hospitalizados por al menos 48 horas en las UCI de un hospital escuela de Uberaba (Minas Gerais, Brasil), que estaban alertas en el momento de la evaluación. Se estimuló al individuo a informar su nivel de fragilidad utilizando la Escala de Fragilidad Clínica (EFC). Los niveles de 1 a 3 de EFC evaluaban a los individuos como no frágiles; 4 como vulnerables; y superior a 5 como frágiles. Participaron 50 individuos de los 44 años a los 78 años, predominantemente hombres. La prevalencia de individuos frágiles fue nula, 1 individuo se evaluó como vulnerable, y los demás como no frágiles, con un predominio de la categoría 3 en el 64% de la población. Al evaluar los datos demográficos y clínicos en las diferentes puntuaciones de EFC no se encontró diferencias estadísticamente significativas entre sexo y edad entre las categorías analizadas. El índice de comorbilidad funcional tuvo un aumento en las categorías analizadas (p=0,05). La prevalencia de fragilidad autodeclarada fue nula en pacientes críticamente enfermos ingresados en un hospital escuela en Uberaba (Minas Gerais). Las escalas autodeclaradas para evaluar la fragilidad no parecen ser útiles para identificar con exactitud a los individuos frágiles.
Palabras clave | Unidades de Cuidados Intensivos; Pacientes Internos; Debilidad Muscular; Hospitales de Enseñanza.

INTRODUCTION

The frailty syndrome is considered as multidimensional and is characterized by loss of physical and cognitive reserves that increase an individual's vulnerability to adverse effects. It is manifested by changes in the musculoskeletal and metabolic systems, as well as biochemical and molecular alterations, besides social, cognitive, cultural and socio-demographic alterations[1,2].

The physiological mechanisms that predispose to a state of frailty comprise a vicious cycle in which comorbidities lead to a state of malnutrition, sarcopenia, osteopenia, decreased maximal oxygen consumption, decreased physiological reserves and reduced energy expenditure. These changes are mediated by hormonal alterations, exacerbated inflammatory process, increased insulin resistance, and finally, decreased levels of physical activity[3].

Intensive care unit (ICU) admission can act as a kind of "stressor", hindering the individual's ability to adapt to adverse effects or lowering the threshold of organic decompensation[3]. Thus, an individual who has normal functional reserves before admission can experience a decline caused by ICU admission, but is able to return to the initial state after discharge. However, the individual with functional dependence prior to admission to the ICU may not return to the initial state, even long after discharge from the ICU, implying a decrease in quality of life and an increase in health care costs[3].

There are several scales available that measure the frailty syndrome, in which clinical conditions such as comorbidities, daily and physical activities, as well as walking, are observed. The most commonly used scales are Fried phenotype and the clinical frailty scale (CFS)[1,4-6]. The latter has been widely used in critically ill patients because it allows their assessment through data prior to hospitalization without the need for additional tests[7].

The importance of knowing the extent of frailty syndrome in critically ill patients and its consequences is based on the search to understand the functional and cognitive deficits on designing strategies to prevent declines and improve the quality of life of these individuals. However, the prevalence of self-reported frailty in critically ill patients in Brazil is still scarce in the literature. Thus, the aim of this study was to identify the prevalence of self-reported frailty in critically ill awake and alert patients admitted to the ICU of a teaching hospital in Uberaba/MG.

METHODOLOGY

This was a cross-sectional study, conducted in two ICUs of a teaching hospital in Uberaba/MG, from August 2018 to December 2019. All volunteers signed the informed consent form.

Eligibility

The inclusion criteria were: (1) adult subjects (≥18 years old); (2) admitted to the general and coronary ICUs of the teaching hospital; (3) for at least 48 hours; (4) who were alert (able to respond 3 out of 5 simple

commands)[8]. As for exclusion criteria: (1) patients with spinal cord trauma; (2) central nervous system injury; (3) previous neuromuscular disease; and (4) those who refused to take part in the research. The sample was obtained by convenience.

Procedures

Demographic and clinical data were collected from medical and physical therapy records. Socioeconomic data were collected by means of a questionnaire applied directly to each subject or family member. The history of comorbidities was obtained through the functional comorbidity index (FCI), presenting 18 comorbidities, whose total score is the sum of comorbidities presented[9].

The assessment of frailty was carried out by using the CFS, at the moment each individual was alert [able to answer three out of five simple commands][8]. The scale consisted of texts and pictures composing nine categories in which the subject was asked to self-report his physical function immediately before ICU admission[1,5]. The evaluators were previously trained and standardized questions were applied to help understand the levels of the CFS. Individuals were classified as non-fragile (CFS1-3), vulnerable (CFS-4), mildly fragile (CFS-5), moderately fragile (CFS-6) or severely fragile (CFS≥7)[10]. The CFS present good reliability and validity in critically ill patients[11].

Statistical analysis

All data were analyzed with IBM SPSS version 15 software. The prevalence of frailty was estimated by percentage. The normality of the data was assessed by the Kolmogorov-Smirnov test. Since data distribution was non-parametric, Kruskal-Wallis (age, APACHE-II, SOFA, ICF, length of stay in ICU and hospital) and chi-square (other clinical and demographic data) tests were used to compare the CFS categories. Correlations among the CFS and clinical and demographic parameters were performed by Spearman's correlation coefficient. Data were expressed as median and interquartile range (IQR), or as described. Results with p≤0.05 were considered significant.

RESULTS

A total of 923 subjects were screened and 50 patients admitted to the two ICUs were included. The reasons for exclusion are shown in Figure 1.

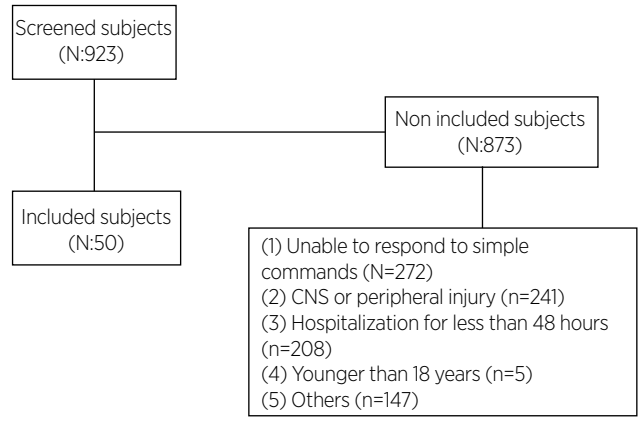

Figure 1. Flowchart of the study.
CNS: central nervous system; PO: postoperative.

The subjects were aged between 44 and 78 years, male predominance (64%). They presented a median of seven days of ICU stay and APACHE-II of 6. Only 12 patients required mechanical ventilation during ICU stay, as shown in Table 1.

Table 1. Demographic and clinical characteristics of the studied population

Sample characterization chart	Median/Interquartile interval
Age (years)	60 [52–68]
Sex F N (%)	18 (36%)
Smoking history (smokers) N(%)	17 (34%)
Body mass index	25 [22–29]
Alcoholism N(%)	8 (16%)
Length of stay in ICU (days)	7 [5–8]
Length of hospital stay (days)	12 [9.3–19]
Hospital mortality N(%)	4 (8%)
ICU mortality N(%)	3 (6%)
Number of patients who used MV N (%)	12 (24%)
MV time (days)	1,5/1,75
APACHE II	6 [4–9]
SOFA	2 [1–4]
Diagnosis Category N(%)	Cardiovascular: 39 (78%); Gastrointestinal: 6 (12%); Hematology: 1 (2%); Nefrology: 1 (2%); Pneumology: 2 (4%); Trauma:1 (2%).
Functional Comorbidity Index	3[2–6.5]

Values expressed as median – [Interquartile Range – IQR], or as described. M: masculino; ICU: Intensive Care Unit; MV: mechanical ventilation.

The prevalence of self-reported frailty was null for the population studied, since no subject scored between 5 and 9 on the CFS. One subject was considered vulnerable (CFS=4) and 49 non-fragile, with predominance in category 3, characterizing 64% of the population.

Analyzing the distribution of gender and age among the frailty categories, there was no statistically significant difference between women and men. The mean age of

subjects in categories 2, 3 and 4 was higher than those in category 1, with no statistical difference (p=0.08). The FCI and the APACHE-II showed an increasing increase in the different categories of the CPE, (p=0.05 and p=0.04, respectively), as well as the number of subjects that used mechanical ventilation, Table 2. Further, there was a positive correlation between CSE and FCI (R=0.38; p=0.006), Figure 2.

Table 2. Demographic and clinical characteristics and outcomes of critically ill patients stratified by CFS category

CFS		Clinical Frailty Scale				
		Category 1 N=2	Category 2 N=15	Category 3 N=32	Category 4 N=1	p
Age (years)		22 (21–)	62 (52–64)	60.5 (53–69)	69	0.08
Sex (F) N/%		0	3/20	14/44	1/100	0.15
Use of MV N/%		2/100	4/26.7	5/15.6	1/100	0.01
Apache-II		4.5 [2–]	8 [5–11]	5 [3–8]	9	0.04
SOFA		1.5 (1–)	4 (2–5)	2 (1–4)	1	0.22
FCI		1.5 (0–)	3 (2-3)	4 (2–7)	9	0.05
Marital status N/%	Single	2/100	2/13.3	6/18.8	0	0.02
	Married	0	13/86.7	23/71.9	0	
	Divorced	0	0	1/3.12	0	
	Widowed	0	0	0	1/100	
Income (≤1 minimum wage) N/%		2/100	5/33.3	16/50	1/100	0.39
ICU stay (days)		6 [5-]	9 [4–12]	7 [5–11]	31	0.36
Hospital stay (days)		12 (10–)	12 (10–23)	12 (7.3–[dd 18.5)	170	0.31
Hospital mortality N (%)		0	1/6.7	3/9.4	0	0.95

Values expressed as median and interquartile range.
M: male; F: female; EFC: Clinical Frailty Scale; EFC: Índice de Comorbidade Funcional.

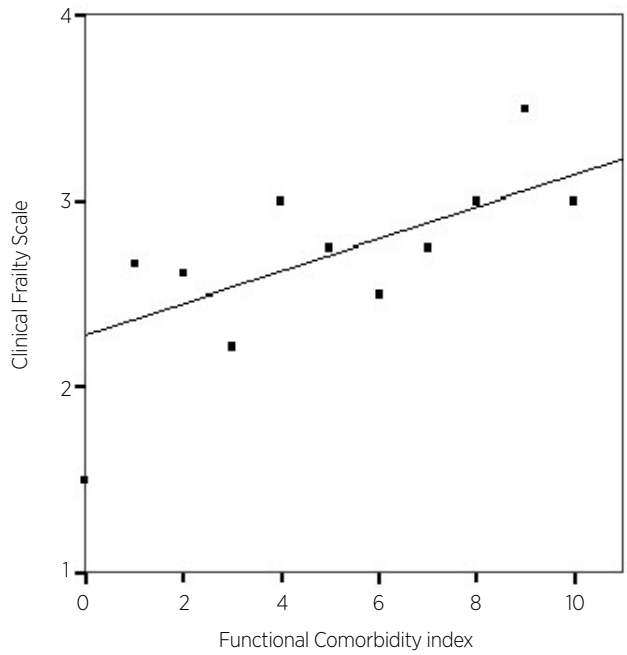

Figure 2. Correlation between clinical frailty scale (rating) and FCI (total comorbidities)

Regarding socio-demographic and economic data, 36 (72%) of the subjects were married, 10 (20%) single, three (6%) widowed, and one (2%) divorced. Relatively to education, 27 (54%) reported incomplete elementary school, 10 (20%) complete high school, seven (14%) complete elementary school, three (6%) incomplete high school, two (4%) of the subjects had no education, and one (2%) complete college education. Regarding income, 21 (42%) reported receiving from one to three minimum wages and 17 (34%) one minimum wage. In relation to the living arrangement, 18 (36%) lived only with their spouse and 13 (26%) lived with their spouse and children. Finally, with regard to work status 24 (48%) were retired and 11 (22%) were working full time.

There was no difference among the categories of the CFS in relation to mortality (p=0.95), smoking history (p=0.52), alcoholism (p=0.82), education (p=0.28), family income (p=0.8) and work status (p=0.94).

DISCUSSION

This study evidenced that the self-reported prevalence of frailty in alert adult subjects admitted to the ICU of a teaching hospital as null. Our results suggest that self-reported frailty scales may be unable to detect frail subjects in this population. This is a pioneer study, as studies that assess self-reported prevalence of frailty in critically ill subjects in Brazil are still scarce.

Recently, a systematic review on self-reported frailty assessment tools in elderly people from a community

indicated frailty prevalence between 3.9% and 23.1%, depending on the tool used. In this study it is possible to verify that the use of different frailty scales resulted in quite diverse prevalence for the same population, which suggests limitations of these instruments in accurately identifying frailty in community-dwelling elderly[12].

This study showed that no ICU patients identified themselves as frail, although the sample was predominantly composed of elderly individuals with multiple comorbidities, which are important risk factors for frailty. It is possible that by the time they awakened from sedation, their judgment about their health was affected, and thus the use of self-reported instruments to assess frailty was not accurate enough.

A study with 196 critically ill patients (mean age 76 years) in four French ICUs showed a frailty prevalence of 23%, with frail individuals presenting more severe illnesses, comorbidities, disabilities, and memory impairment as compared to non-frail ones. Frailty was independently associated with ICU, in-hospital mortality within up to six months. The authors showed that an increase in CFS was associated with an increase in in-hospital mortality rate within six months. Interestingly, this study evaluated the frailty syndrome also through Fried phenotype and concluded that the CFS is able to predict outcomes more effectively than the former in critically ill patients[13].

A research conducted with 316 elderly people evaluated anthropometric indicators that could determine frailty in this population. The BMI was indicated as the highest sensitivity marker for frailty syndrome (59.7%), as subjects with low BMI values were more likely to present frailty, which can be explained by the fact that BMI is influenced by factors such as sarcopenia during aging[14].

A study in a Sydney ICU hospital indicated that frail patients who were older, with prevalence of females had higher rates of ICU admissions. It was observed that delirium was common in frail patients as compared to non-frail ones (17% versus 10%), and ICU and hospital length of stay were longer (three days versus two days in ICU and 11 days versus nine days of hospital stay, respectively). In addition, frail patients had higher rates of in-hospital and ICU death (10% versus 3% in the ICU and 19% versus 7% in the hospital)[15].

A multicenter study that evaluated the frailty syndrome in 129,680 critically ill patients in Brazil showed that 31.4% of the population was considered not frail, 49.7% pre-frail and 18.9% frail. In this study, frailty was associated with higher in-hospital mortality, especially in patients admitted with lower SOFA scores. Moreover, when compared to non-fragile individuals, frail patients were less likely to be discharged, stayed longer in the ICU and hospital, and were more likely to receive intensive care treatments, such as invasive and non-invasive mechanical ventilation, vasopressors, dialysis and transfusions[13]. In this study, we showed a positive correlation between the FCI and the CFS, which is in line with what Maguet et al.[4] and Zampieri et al.[16] indicated.

A study of 1,300 patients observed that those with planned and unplanned ICU admission who were frail before admission changed their frailty levels after admission, as they were frailer at discharge and less frail over the course of the following months. Although subjects with unplanned admission were less frail before admission, it was observed that they became frailer in the following months as compared to those with planned admission [17].

Darvall et al.[18] evaluated the frailty of 15,613 ICU inpatients (mean age: 84.6 years) using the CFS and showed that 39.7% were classified as frail. Of these, 33.5% were between 80 and 84 years old, and 61.7% were 95 years old or older. Fragile individuals were more frequently admitted on emergency services as compared to non-fragile ones. Comparing our study to the work of Darvall et al.[18], we noticed a large difference in the age of the participants, (60 years versus 85 years). This may reflect the greater vulnerability and susceptibility to the development of the frailty syndrome that the elderly have as compared to younger subjects.

Although frailty is directly linked to aging[19], it is also closely associated with comorbidities and worsening of physical and social conditions. Bagshaw et al.[20] studied frailty in a group of non-elderly critically ill patients (age 50-64.9 years). The authors indicated a prevalence of frailty of 28% in this population using CFS. Female gender, connective tissue diseases, receiving disability assistance, needing help at home before hospitalization, and previous history of hospitalizations were factors associated with frailty. In addition, mortality within one year was independently associated with frailty (with increased mortality rates related to increased CFS) and the use of health care services one year before hospitalization was higher by frail subjects[20]. In this study the marital status of subjects was different according to the category of CFS (p=0.02) and mortality increased with the increase in CFS, although without statistical difference.

The subjects included in our study were supposed to be awake, conscious and oriented, which differs from the

studies previously related. This may be one of the reasons why the prevalence of frailty was null, while in other studies the prevalence ranged from 18.9% to 61.7% [16,18]. Furthermore, in those other studies the use of mechanical ventilation was more frequent (94.5% of the subjects included in the study by Bagshaw et al.[20] versus 24% in our study), for a longer time span (mean of 12 days in the study by Maguet et al.[4] and five days in our study).

However, our study presents some limitations. First, it was performed in a single location, including patients mostly hospitalized for elective cardiologic procedures. Due to this characteristic, it is possible that we selected less vulnerable patients, which may have influenced our results. Nevertheless, our study is the first to directly assess frailty in critically ill and alert patients, and this information fills an important gap in the literature. Furthermore, self-reported frailty of alert critically ill patients may have been underestimated, since subjects tend to minimize their own level of frailty. Finally, the small number of patients included in our study may have influenced the results.

The prevalence of self-reported frailty in critically ill, awake and alert patients admitted to the ICU of the teaching hospital studied was null. Therefore it is possible that self-reported instruments to assess frailty are not the most indicated to the identification of frail subjects in ICUs.

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REFERENCES

1. Rockwood K, Song X, Macknight C, Bergman H, Hogan DB, Mcdowell I, et al. A global clinical measure of fitness and frailty in elderly people. CMAJ. 2005;173(5):489-95. doi: 10.1503/cmaj.050051.
2. Silveira MB. Prevalência de quedas em indivíduos frágeis fisicamente ativos [Internet] [master's thesis]. Canoas: Centro Universitário La Salle Canoas; 2015 [cited 2021 Sep 28]. Available from: https://bit.ly/3AS3N8H
3. Bagshaw SM, McDermid RC. The role of frailty in outcomes from critical illness. Curr Opin Crit Care. 2013;19(5):496-503. doi: 10.1097/MCC.0b013e328364d570.
4. Maguet PL, Roquilly A, Lasocki S, Asehnoune K, Carise E, Saint Martin M. et al. Prevalence and impact of frailty on mortality in elderly ICU patients: a prospective, multicenter, observational study. Intensive Care Med. 2014;40(5):674-82. doi: 10.1007/s00134-014-3253-4.
5. Pinto MJCP, Coutinho SCSN. Síndrome de fragilidade. Revista de Psicologia [Internet]. 2014 [cited 2021 Sep 28];2(1):171-6. Available from: https://bit.ly/39NgndM
6. Wallis SJ, Wall J, Biram RW, Romero-Ortuno R. Association of the clinical frailty scale with hospital outcomes. QJM. 2015;108(12):943-9. doi: 10.1093/qjmed/hcv066.
7. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J. et al. Frailty in older adults: evidence for a phenotype. J Gerontol A Biol Sci Med Sci. 2001;56(3):146-56. doi: 10.1093/gerona/56.3.m146.
8. Falvey JR, Ferrante LE. Frailty assessment in the ICU: translation to "real-world" clinical practice. Anesthesia. 2019;74(6):758-64. doi: 10.1111/anae.14617.
9. Fan E, Gifford JM, Chandolu S, Colantuoni E, Pronovost PJ, Needham DM. The functional comorbidity index had high inter-rater reliability in patients with acute lung injury. BMC Anesthesiol. 2012;12(21):1-8. doi: 10.1186/1471-2253-12-21.
10. De Jonghe B, Sharshar T, Lefaucheur J-P, Authier F-J, Durand-Zaleski I, Boussarsar M. et al. Paresis acquired in the intensive care unit: a prospective multicenter study. JAMA. 2002;288(22):2859-67. doi: 10.1001/jama.288.22.2859.
11. Shimura T, Yamamoto M, Kano S, Kagase A, Kodama A, Koyama Y, et al. Impact of the Clinical Frailty Scale on outcomes after transcatheter aortic valve replacement. Circulation. 2017;135(21):2013-24. doi: 10.1161/CIRCULATIONAHA.116.025630.
12. Shears M, Takaoka A, Rochwerg B, Bagshaw SM, Johnstone J, Holding A, et al. Assessing frailty in the intensive care unit: a reliability and validity study. J Crit Care. 2018;45(1):197-203. doi: 10.1016/j.jcrc.2018.02.004.
13. Ambagtshee RC, Thompson MQ, Archibald MM, Casey MG, Schultz TJ. Diagnostic test accuracy of self-reported screening instruments in identifying frailty in community-dwelling older people: a systematic review. Geriatr Gerontol Int. 2019;20(1):14-24. doi: 10.1111/ggi.13810.
14. Sampaio LS, Carneiro JAO, Coqueiro RS, Fernandes MH. Indicadores antropométricos como preditores na determinação da fragilidade em idosos. Cienc Saude Colet. 2017;22(12):4115-23. doi: 10.1590/1413-812320172212.05522016.
15. Sanchez D, Brennan K, Sayfe MA, Shunker SA, Bogdanoski T, Hedges S, et al. Frailty, delirium and hospital mortality of older adults admitted to intensive care: the Delirium (Deli) in ICU study. Crit Care. 2020;24(1):609. doi: 10.1186/s13054-020-03318-2.
16. Zampieri FG, Iwashyna TJ, Viglianti EM, Taniguchi LU, Viana WN, Costa R. et al. Association of frailty with short-term outcomes, organ support and resource use in critically ill patients. Intensive Care Med. 2018;44(9):1512-20. doi: 10.1007/s00134-018-5342-2.
17. Geense W, Zegers M, Dieperink P, Vermeulen H, Hoeven J, Boogaard M. Changes in frailty among ICU survivors and associated factors: Results of a one-year prospective cohort study using the Dutch Clinical Frailty Scale. J Crit Care. 2020;55(1):184-193. doi: 10.1016/j.jcrc.2019.10.016.
18. Darvall JN, Bellomo R, Paul E, Subramaniam A, Santamaria JD, Bagshaw SM, et al. Frailty in very old critically ill patients in Australia and New Zealand: a population-based cohort study. Med J Aust. 2019;11(7):318-23. doi: 10.5694/mja2.50329.

19. Anderson MS, Gilchrist A, Mondeika T, Schwartzberg JG. American Medical Association white paper on elderly health. Arch Intern Med. 1990;150(12):2459-72. doi: 10.1001/archinte.1990.00390230019004.

20. Bagshaw SM, Majumdar SR, Rolfson DB, Ibrahim Q, McDermid RC, Stelfox HT. A prospective multicenter cohort study of frailty in younger critically ill patients. Crit Care. 2016;20(1):175. doi: 10.1186/s13054-016-1338-x.