ORIGINAL ARTICLE

Prevalence of Frailty in ICU and its Impact on Patients' Outcomes

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Abstract

Introduction: Frailty describes a state or syndrome of reduced physical, physiologic, and cognitive reserve that increases vulnerability to acute illness. To study the prevalence of frailty in critically ill patients and find its association with resource utilization and short-term intensive care unit (ICU) outcomes.

Material and methods: This was a prospective observational study. All adult patients ≥50 years admitted to the ICU were included and frailty was assessed by the clinical frailty score (CFS). Data were collected on demography, coexisting illness, CFS, Acute Physiology and Chronic Health Evaluation II (APACHE-II), and Sequential Organ Failure Assessment Score (SOFA) scores. Patients were followed for 30 days. Outcome data were collected on organ supports provided, duration of ICU and hospital length of stay (LOS), and ICU and 30-day mortality.

Results: 137 patients were enrolled in the study. The prevalence of frailty was 38.6%. Frail patients were older and had a more comorbid illness. APACHE-II and SOFA scores were 22.1 ± 7.0 and 7.2 ± 3.29, significantly higher in frail patients, respectively. There was a trend towards higher requirement for organ supports in frail patients. Median ICU and hospital LOS were 8 vs 6 and 20 vs 12 (frail vs nonfrail) days, respectively ($p < 0.05$). Intensive care unit mortality in frail and nonfrail patients was 28.3% and 23.8%, respectively ($p = 0.56$). Thirty-day mortality in frail patients was 49%, significantly higher compared with nonfrail patients (28.5%).

Conclusion: The prevalence of frailty in ICU patients was high. Frail patients were quite ill on ICU admission, and they had a prolonged ICU and hospital LOS. Increasing frailty score was associated with higher mortality at 30 days.

Keywords: Critically ill, ICU outcomes, Frailty, Prevalence.

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Highlights

Frail patients are vulnerable to acute illness. Frail patients admitted to the ICU require more organ support, and have higher ICU and hospital LOS and higher 30-day mortality. Interventions and decision-making regarding management of frail patients in the ICU should be tailored to their requirements.

Introduction

Frailty describes a state of reduced physical, physiological, and cognitive reserve. The decrease in reserve makes frail patients susceptible to acute illness.[1] Critically ill frail patients face multiple problems, including vulnerability to critical illness, adverse perioperative complications, more resource utilization, prolonged intensive care unit (ICU), and hospital stay.[2–7] Recognition of frailty would help physicians to provide appropriate care to frail patients to recover from the stress of the ICU.

The concept of frailty was originally used in geriatrics but is now used in acute care settings to predict patient outcomes.[1–5] A number of validated tools have been used previously to screen and identify frailty.[8–13] Of these tools, the clinical frailty score (CFS) is a simple-to-use 9-point scale score (2007) to identify frail patients in critical care.[2–4,13] A clinical frailty score of more than four is frail.

Frailty in ICU patients has been linked to worse outcomes, a longer stay in the ICU and hospital, and increased resource use.[2–7] Identification of frailty will help us to modify treatment strategies to improve patient outcomes and appropriate utilization of limited ICU resources. Interventions like judicious use of sedation, early weaning, adequate nutritional support, delirium screening, early mobilization, post-illness rehabilitation, and early tracheostomy to liberate from the ventilator can be attempted to help in early recovery from acute illness.

Previously, frailty was considered as a disease of elderly, though frailty is more prevalent in older individuals, frailty and aging are not the same and frailty does occur in younger patients admitted to the ICU.[14,15] Most of the studies on frailty were focused on elderly population (≥65 years), and very few studies were done to assess frailty in the younger and relatively younger (≥50 years) group of patients.[14,15] Frailty in ICU patients has not been previously studied in the Indian population, so this study was conducted to determine the prevalence of frailty in ICU patients (≥50 years). The secondary objective of this study was to find the association of frailty with

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30-day mortality and resource utilization (organ supports provided and ICU and hospital ALOS) in ICU.

Material and Methods

This was a prospective observational study, done in a 20-bedded multidisciplinary tertiary care ICU over a period of 12 months (July 2021–June 2022). The study was approved by the Institutional Ethics Committee and was registered with the Clinical Trial Registry of India (CTRI) (CTRI/2021/01/030562). Prior to being enrolled in the study, informed consent was obtained from the patients or their surrogates. The study included all patients older than 50 years, who were admitted to the critical care unit during the study's time frame. Patients, ICU length of stay (LOS) ≤24 hours, readmitted to the ICU and with no surrogate available, were excluded from the study.

Measuring Frailty

Within 48 hours of ICU admission, eligible patients underwent frailty assessment using CFS (Appendix 1).[13] Clinical frailty score classifies patients into nine categories, ranging from very fit (CFS = 1) to terminally sick (CFS = 9). Patients' frailty status prior to admission was collected from patients or their surrogates. Clinical frailty score ≥5 is defined as frail patient.

Data Collection

Data were collected on demography, co-existing illness, admission category, CFS, and severity of illness scores at admission Acute Physiology and Chronic Health Evaluation-II (APACHE-II) and Sequential Organ Failure Assessment (SOFA) score. After admission to the ICU, patients were followed up for 30 days. Data on the use of mechanical ventilation, renal replacement therapy, and vasopressor support were gathered. Outcome data on 30-day mortality, need for tracheostomy, and length of ICU and hospital stay were recorded.

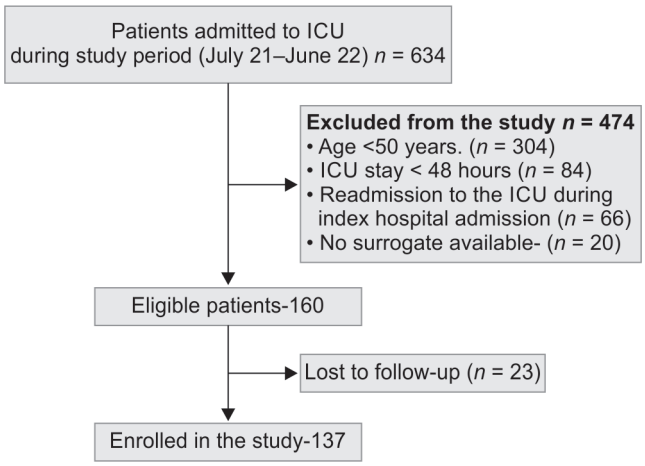
Sample Size and Statistical Methods

The minimum necessary sample size required to calculate the prevalence of frailty, with a 5% margin of error and a 5% level of significance, was 85 patients. The sample size was calculated based on earlier research by Bagshaw et al., who observed 32.8% prevalence of frailty in ICU patients.[2] While categorical variables were shown as numbers and percentages, continuous variables were reported as mean, standard deviation (SD), and median (IQR). Kolmogorov–Smirnov test was used to determine the normality of data. A nonparametric test was used if normality was rejected. The quantitative variables were compared between the two groups (frail vs. nonfrail) using the unpaired *t*-test/Mann–Whitney test as appropriate. The Fisher's exact test and Chi-square test were used to compare qualitative variables. Statistical significance was defined as a *p* value less than 0.05. The data were entered in MS EXCEL spreadsheet and the collected data were analyzed with IBM SPSS Statistics for Windows, Version 23.0 (Armonk, NY: IBM Corp.).

Results

All patients above 50 years or more admitted to the ICU during the study time frame were included in the study. About 634 patients were admitted to the ICU during the one-year study period. About 474 patients were excluded from the study as per the research protocol, and 160 patients were enrolled in the study. Of the 160 participating patients, complete data of 23 patients were not available for the study (lost to follow-up), so data of 137 patients were analyzed for the study (Flowchart 1).

Flowchart 1: Flowchart representing patients admission during the study period



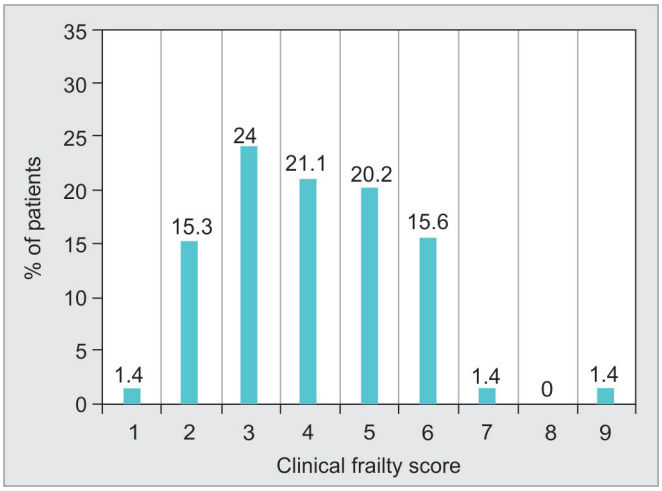


Fig. 1: Distribution of clinical frailty scale score among patients (%)

In total, 53 of 137 patients were categorized as frail (38.6%) [CFS ≥ 5] and their median (IQR) CFS score was 6 (5–6) (Fig. 1). Frail patients were older (73.15 ± 10.25 years) (mean ± SD) as compared with nonfrail patients (62.9 ± 10.7) (mean ± SD) ($p = 0.005$) (Table 1). Major organ diseases like COPD, cardiac failure, and neurological diseases were significantly higher in frail patients compared with their counterparts. Frail patients were sicker on admission to the ICU as indicated by higher APACHE-II (22.1 ± 7.0) and SOFA (7.2 ± 3.2) (mean ± SD) scores as compared with nonfrail patients, their APACHE-II and SOFA scores were 20.0 ± 6.2 and 5.8 ± 2.8 (mean ± SD), respectively, and these values were statistically significant (Table 2).

There was a trend toward more organ supports in frail patients; however, they were not statistically significant (Fig. 2) (Table 2). About 28.3% of frail patients required tracheostomy compared with 22.6% of nonfrail patients in the ICU, however, these values were not significant.

Intensive care unit stay of frail patients was 8 (5–16) [median (IQR)] days, which was significantly higher than nonfrail patients 6 (4–12) [median (IQR)] days. After transfer from ICU, frail patients had a prolonged duration of hospital stay compared with nonfrail patients. Frail patients stayed in the hospital for 20 (10–24) [median (IQR)] days, on the contrary, nonfrail patients stayed for 12 (8–16)

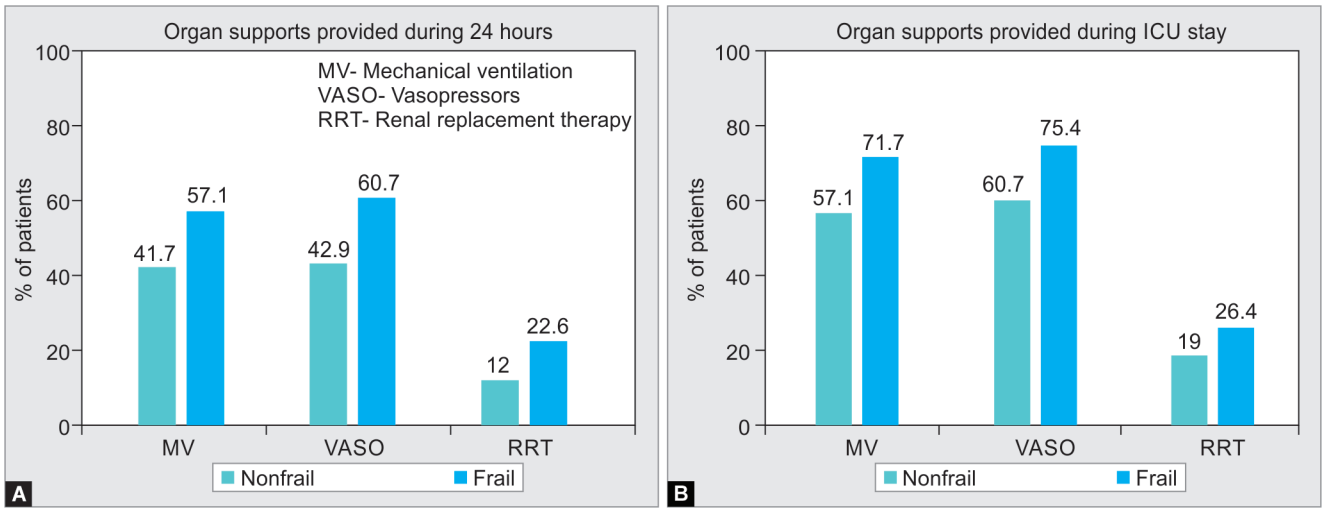
Table 1: Patient characteristics

	All patients (n = 137)	*Frail (≥5) (n = 53)*	*Nonfrail (≤4) (n = 84)*	*Statistical significance (p-value)*
Age, years (mean ± SD)	66.89 ± 10.57	73.15 ± 10.25	62.9 ± 10.7	0.005
Male, *n* (%)	90 (65.7)	32 (60.4)	58 (69)	0.45
Female, *n* (%)	47 (34.3)	21 (39.6)	26 (31)	0.45
Clinical frailty score (CFS) [median (IQR)]	4 (3–5)	6 (5–6)	3 (2–4)	
Admission type				
Medical admission, *n* (%)	106 (77.4)	40 (75.5)	66 (78.6)	0.26
Post-op surgical admission, *n* (%)	31 (22.6)	13 (24.5)	18 (21.4)	0.26
Co-existing illness				
Hypertension	60 (43.8)	24 (45.3)	36 (42.9)	0.78
Diabetes mellitus	72 (52.6)	25 (47.2)	47 (56.0)	0.69
Chronic obstructive pulmonary disease	27 (19.7)	21 (39.6)	6 (7.1)	0.004
Heart failure	30 (21.9)	20 (37.7)	10 (11.9)	0.005
Ischemic heart disease	23 (16.8)	11 (20.8)	12 (14.3)	0.32
Chronic kidney disease	10 (7.2)	7 (13.2)	3 (3.5)	0.06
Neurological disease	15 (10.9)	12 (22.6)	3 (3.5)	0.005
Chronic liver disease	12 (8.8)	6 (11.3)	6 (7.1)	0.27
Malignancy	2 (1.5)	2 (3.8)	0	0.07

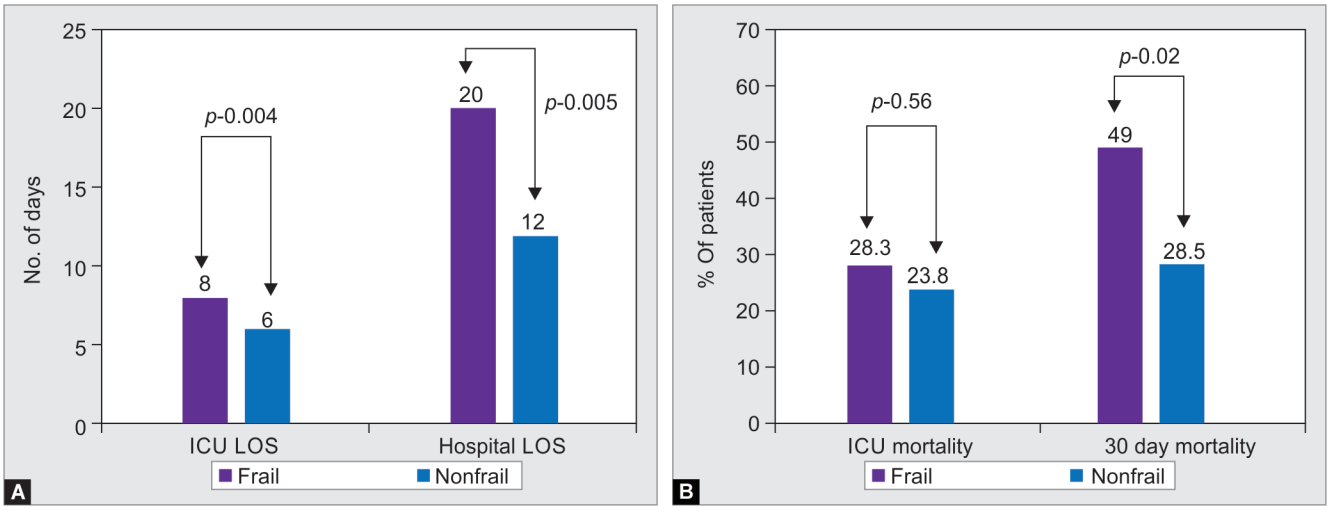
Table 2: Admission severity of illness score and organ support provided to patients

	All patients (n = 137)	*Frail (n = 53)*	*Nonfrail (n = 84)*	*Statistical significance (p < 0.05)*
APACHE-II[a] (mean ± SD)	20.8 ± 5.8	22.1 ± 7.0	20.0 ± 6.2	0.001[§]
SOFA[b] (mean ± SD)	6.34 ± 3.0	7.2 ± 3.2	5.8 ± 2.8	0.001[§]
Organ support at admission and first 24 hours				
Mechanical ventilation (MV), *n* (%)	65 (47.4)	30 (57.1)	35 (41.7)	0.22[†]
Vasopressors, *n* (%)	68 (49.6)	32 (60.7)	36 (42.9)	0.24[†]
Renal replacement therapy (RRT), *n* (%)	22 (16.0)	12 (22.6)	10 (12.0)	0.70[†]
Organ support during ICU stay, *n* (%)				
Mechanical ventilation (MV), *n* (%)	86 (62.8)	38 (71.7)	48 (57.1)	0.43[†]
Vasopressors, *n* (%)	91 (66.4)	40 (75.4)	51 (60.7)	0.36[†]
Renal replacement therapy (RRT), *n* (%)	30 (21.8)	14 (26.4)	16 (19.0)	0.57[†]
Tracheostomy, *n* (%)	34 (24.8)	15 (28.3)	19 (22.6)	0.30[†]

[a]APACHE-II, Acute physiology and chronic health evaluation II; [b]SOFA, Sequential organ failure assessment score; [§]Mann–Whitney test; [†]Chi-square test



Figs 2A and B: Organ support provided during first 24 hours and ICU stay



Figs 3A and B: Outcomes in frail and nonfrail patients

Table 3: Outcome data

	All patients (n = 137)	*Frail (n = 53)*	*Nonfrail (n = 84)*	*Statistical difference p-value*
ICU LOS median (IQR) days	7 (4–14)	8 (5–16)	6 (4–12)	0.004[§]
Hospital LOS median (IQR) days	14 (10–20)	20 (10–24)	12 (8–16)	0.005[§]
Mortality				
ICU mortality % (*n*)	25.5 (35)	28.3 (15)	23.8 (20)	0.56[†]
30-day mortality % (*n*)	36.4 (50)	49.0 (26)	28.5 (24)	0.02[†]

[§]Mann–Whitney test; [†]Chi-square test

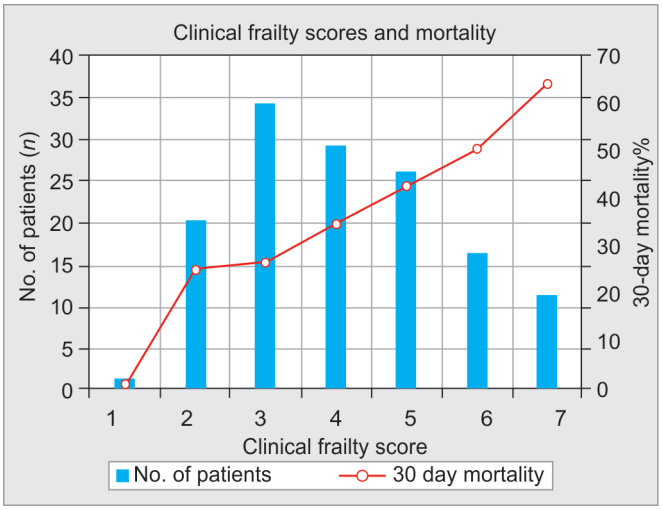


Fig. 4: Association of clinical frailty scale score and 30-day mortality

[median (IQR)] days, and these values were statistically significant (Fig. 3 and Table 3). Intensive care unit mortality among frail and nonfrail patients were 28.3% and 23.8%, respectively, and these values were not statistically significant. When compared with nonfrail patients (28.5%), mortality at 1 month was significantly higher in frail patients (49%) (Fig. 3 and Table 3). As the clinical frailty score increases, mortality at 1 month also significantly increases (Fig. 4).

Discussion

Frailty was common among critically ill adults aged ≥50 years. Frail patients admitted to the ICU were older and had more coexisting illness. They were quite ill, as indicated by higher APACHE-II and SOFA scores on admission. Frail patients had a prolonged ICU and hospital length of stay. Intensive care unit mortality was comparable in frail and nonfrail patients, but mortality at 1 month was significantly higher in frail patients compared with nonfrail patients.

Prevalence of Frailty

In this study, the prevalence of frailty was 38.6%, but the data vary widely, and it ranges from 23.6% to 60%.[2–8] This depends on the type of screening tool used to identify frailty and also on the age group of the population studied. Systematic reviews of frailty in ICU patients showed a pooled prevalence of 30% (>18 years) and 37% in elderly ICU patients.[6,7] Frailty is not synonymous with older age, frailty does occur in younger patients. Brummel et al. in his study showed that one in three patients above the age of 18 years admitted to the ICU were frail.[14] Frail patients had more coexisting illness compared with nonfrail patients in this study. Similarly, Bagshaw et al. found more comorbid illness in frail patients more than 50 years admitted to the ICU.[2]

Organ Support in Frail and Nonfrail Patients

Frail patients were quite sick on admission to the ICU as reflected by their high APACHE-II (22.1) and SOFA (7.2) scores. The findings of this study were consistent with those of studies by Montgomery et al. and Bagshaw et al., they reported APACHE-II scores of 22 and 21, respectively.[2,16] Patients with a higher frailty class had higher SOFA scores, this could be because of prior comorbidities that progressed into organ failure at ICU admission. Although not statistically significant, this study shows a trend toward more use of organ support in frail patients, this might be because major organ diseases like COPD, heart failure, and neurological diseases

were more common in frail patients. This explains the higher requirement of organ support required in frail patients in contrast to their counterparts.

The requirement of organ support in frail patients has been inconsistent across studies because the limitation of care in frail patients could potentially confound the results of the studies. Zampieri et al. and Montgomery et al. in a large population-based frailty screening found significantly higher requirement of organ support in frail patients,[5,16] whereas systemic review by Muscedere et al. and Xia et al. found no difference in organ support requirement in frail patients.[6,7]

ICU and Hospital Length of Stay

Intensive care unit LOS of frail patients in this study was 8 (median) days, this was significantly higher compared with nonfrail patients (6 days). The increased ICU LOS in frail patients could be attributable to multiple reasons that include the requirement of organ support, more ICU complications, like delirium, cardiac complications, new infections, cognitive impairment, weakness, and sarcopenia, however, this study did not look into these aspects. Sanchez et al. in their study from Australian adults >50 years admitted to the ICU showed that in comparison to nonfrail patients, frailty is associated with a 60% greater risk of delirium, longer hospital stays, and higher risk of mortality.[17] Bagshaw et al. compared the effect of frailty on outcomes in patients (>50 years) admitted to the ICU and found frailty was associated with longer durations of ICU stay (7 vs 6 days) (frail vs nonfrail).[2] Similarly, Zampieri et al. and Hewitt et al. found a prolonged duration of ICU stay in frail patients.[5,18] Adequate measures like screening frail patients for delirium, appropriate use of sedatives, nutritional support, and early mobilization infection control measures can reduce the ICU LOS in these patients.

Hospital LOS in this study was 20 (median) days in frail patients, which was higher when compared with nonfrail patients, where it was 12(median) days. Sarcopenia and muscle wasting secondary to the stress of ICU stay in frail patients would result in prolongation of hospital stay. Similar to the results of our study, studies on frailty from Canada and Brazil ICUs found longer hospital LOS in frail patients.[2,5,16]

Mortality in Frail and Nonfrail Patients

Intensive care unit mortality in frail patients was 28%. Despite having higher severity of illness, ICU mortality between frail and nonfrail patients was not different. Similarly, previous studies by López Cuenca et al. and Bagshaw et al. found no difference in ICU mortality between frail and nonfrail patients.[2,4] Frail patients who survived from ICU had higher in-hospital mortality, and this effect was more pronounced with increasing frailty scores.[2,4,15,16] Hospital mortality in frail patients varies from 27 to 73.1%.[2,4,14–16,19] The reason for such variation could be due to diverse patient population, use of different frailty screening tools, and varying age groups selection in different studies.

Mortality at 1 month in frail patients was 49%, which was significantly higher compared with nonfrail patients (29%). López Cuenca et al. similarly reported higher mortality at 30 days compared with nonfrail patients.[4] Pre-admission frailty has been linked to 30-day mortality as well as in-hospital mortality.[2,4,17–19] De Geer et al. had similarly predicted a higher 30-day mortality in frail patients using ROC curve, they found that combining CFS and SAPS3 improved predictive ability.[20] This study showed that CFS increased risk of mortality at 1 month. We did not know the intensity of treatment provided to frail patients after ICU discharge, there could be a limitation of care in patients with expected poor outcomes, which would explain the higher mortality at 1 month.

Long-term functional impairment is a common sequela in patients discharged from the ICU.[21] Most of the patients discharged from the ICU develop new impairments, but these problems were more common in frail patients, and this disability can affect long-term outcomes.[2]

Implication of Frailty in ICU

In ICU patients, frailty is associated with worse outcomes and higher resource usage. The COVID-19 pandemic increased the number of patients being admitted to the intensive care unit, which caused a shortage of beds. The COVIP study showed frailty as a prognostic indicator in patients with COVID-19.[22] During the COVID-19 pandemic, patients' degree of frailty was used as a tool for triaging to ICU admissions and decisions regarding treatment limitations.[22–24] ISCCM published clinical frailty as one of the criteria to be considered for ICU admission in COVID-19 patients.[25]

Intensive care unit is a valuable and limited resource, especially in developing countries. The first step is to screen the patient for frailty prior to ICU admission and goals of care must be clearly communicated to families and included in patients' decision-making. Triage for ICU admission based on frailty is ethically complex, and the decision for DNI and limitation/withdrawal of life support is still a gray area.[26]

Along with goals of care, special integrated bundles of care could be implemented in frail critically ill patients to prevent complications that include cautious use of sedation, screening of delirium, early assessment of weaning from mechanical ventilation, early mobilization, adequate nutritional support, and precautions to prevent pressure ulcers. Although these are standard ICU practices, they should be done more frequently in frail patients.

This study has several limitations. First, this was a single-center study, so the hospital protocols related to ICU admissions and care may have influenced the results of the study. Second, this study did not look into complications during ICU stay, like delirium, new infections, and cardiac complications that would have prolonged the length of stay. Third, as the patient's degree of frailty was assessed by their treating physicians rather than by dedicated research staff, the decision regarding patient admission, treatment response, and treatment limitations was not blinded. Fourth, patients were not followed beyond the study period, so data on long-term outcomes were not available. This study on frailty in critically ill patients was done in patients with smaller sample size, we need studies with larger sample size or population-based frailty screening as done in Brazil and Canada to know the exact prevalence of frailty and its impact of resource utilization like organ supports provided and ICU outcomes.[5,16]

Conclusion

The prevalence of frailty in ICU patients was high. Frail patients were quite ill on ICU admission, these patients had a trend toward higher requirements of organ support on admission and during ICU stay, and they had a prolonged ICU and hospital LOS. Increasing frailty score was associated with higher mortality at 30 days after ICU admission.

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References

1. Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. Lancet 2013;381(9868):752–762. DOI: 10.1016/S0140-6736(12)62167-9.
2. Bagshaw SM, Stelfox HT, McDermid RC, Rolfson DB, Tsuyuki RT, Baig N, et al. Association between frailty and short- and long-term outcomes among critically ill patients: A multicentre prospective cohort study. Can Med Assoc J 2013;186(2): E95–E102. DOI: 10.1503/cmaj.130639.
3. Fisher C, Karalapillai DK, Bailey M, Glassford NG, Bellomo R, Jones D. Predicting intensive care and hospital outcome with the Dalhousie clinical frailty scale: A pilot assessment. Anaesth Intensive Care 2015;43(3):361–368. DOI: 10.1177/0310057X1504300313.
4. López Cuenca S, Oteiza López L, Lázaro Martín N, Irazabal Jaimes MM, Ibarz Villamayor M, Artigas A, et al. Frailty in patients over 65 years of age admitted to Intensive Care Units (FRAIL-ICU). Med Intensiva 2019;43(7):395–401. DOI: 10.1016/j.medin.2019.01.010.
5. 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):1512–1520. DOI: 10.1007/s00134-018-5342-2.
6. Muscedere J, Waters B, Varambally A, Bagshaw SM, Boyd JG, Maslove D, et al. The impact of frailty on intensive care unit outcomes: A systematic review and meta-analysis. Intensive Care Med 2017;43(8):1105–1122. DOI: 10.1007/s00134-017-4867-0.
7. Xia F, Zhang J, Meng S, Qiu H, Guo F. Association of frailty with the risk of mortality and resource utilization in elderly patients in intensive care units: A meta-analysis. Front Med 2021;8:637446. DOI: 10.3389/fmed.2021.637446.
8. 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):M146–M156. DOI: 10.1093/gerona/56.3.m146.
9. Rolfson DB, Majumdar SR, Tsuyuki RT, Tahir A, Rockwood K. Validity and reliability of the Edmonton Frail Scale. Age Ageing 2006;35(5):526–529. DOI: 10.1093/ageing/afl041.
10. Mitnitski AB, Mogilner AJ, Rockwood K. Accumulation of deficits as a proxy measure of aging. ScientificWorldJournal 2001;1:323–336. DOI: 10.1100/tsw.2001.58.
11. Rockwood K, Mitnitski A. Frailty in relation to the accumulation of deficits. J Gerontol Ser A: Biol Sci Med Sci 2007;62(7):722–727. DOI: 10.1093/gerona/62.7.722.
12. Rockwood K, Abeysundera MJ, Mitnitski A. How should we grade frailty in nursing home patients? J Am Med Dir Assoc 2007;8(9): 595–603. DOI: 10.1016/j.jamda.2007.07.012.
13. 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. Can Med Assoc J 2005;173(5):489–495. DOI: 10.1503/cmaj.050051.
14. Brummel NE, Bell SP, Girard TD, Pandharipande PP, Jackson JC, Morandi A, et al. Frailty and subsequent disability and mortality among patients with critical illness. Am J Respir Crit Care Med 2017;196(1):64–72. DOI: 10.1164/rccm.201605-0939OC.
15. 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.
16. Montgomery CL, Zuege DJ, Rolfson DB, Opgenorth D, Hudson D, Stelfox HT, et al. Implementation of population-level screening for frailty among patients admitted to adult intensive care in Alberta, Canada. Can J Anaesth 2019;66(11):1310–1319. DOI: 10.1007/s12630-019-01414-8.
17. Sanchez D, Brennan K, Al Sayfe M, Shunker S-A, 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.
18. Hewitt D, Booth MG. The FRAIL-FIT study: Frailty's relationship with adverse-event incidence in the longer term, at one year following intensive care unit treatment – A retrospective observational cohort study. J Intensive Care Soc 2019;21:124–133. DOI: 10.1177/1751143719838212.
19. Kizilarslanoglu MC, Civelek R, Kilic MK, Sumer F, Varan HD, Kara O, et al. Is frailty a prognostic factor for critically ill elderly patients? Aging Clin Exp Res 2016;29(2):247–255. DOI: 10.1007/s40520-016-0557-y.
20. De Geer L, Fredrikson M, Tibblin AO. Frailty predicts 30-day mortality in intensive care patients. Eur J Anaesthesiol 2020;37(11):1058–1065. DOI: 10.1097/EJA.0000000000001156.
21. Needham DM, Davidson J, Cohen H, Hopkins RO, Weinert C, Wunsch H, et al. Improving long-term outcomes after discharge from intensive care unit. Crit Care Med 2012;40(2):502–509. DOI: 10.1097/CCM.0b013e318232da75.
22. Jung C, Flaatten H, Fjølner J, Bruno RR, Wernly B, Artigas A, et al. The impact of frailty on survival in elderly intensive care patients with COVID-19: The COVIP study. Crit Care 2021;25(1):149. DOI: 10.1186/s13054-021-03551-3.
23. Hewitt J, Carter B, Vilches-Moraga A, Quinn TJ, Braude P, Verduri A, et al. The effect of frailty on survival in patients with COVID-19 (COPE): A multicentre, European, observational cohort study. Lancet Public Health 2020;5(8):e444–e451. DOI: 10.1016/S2468-2667(20)30146-8.
24. Bellelli G, Rebora P, Valsecchi MG, Bonfanti P, Citerio G. Frailty index predicts poor outcome in COVID-19 patients. Intensive Care Med 2020;46(8):1634–1636. DOI: 10.1007/s00134-020-06087-2.
25. Juneja D, Savio RD, Srinivasan S, Pandit RA, Ramasubban S, Reddy PK, et al. Basic critical care for management of COVID-19 patients: Position paper of Indian Society of Critical Care Medicine, Part-I. Indian J Crit Care Med 2020;24(Suppl 5):S244–S253. DOI: 10.5005/jp-journals-10071-23593.
26. Myatra SN, Salins N, Iyer S, Macaden SC, Divatia JV, Muckaden M, et al. End-of-life care policy: An integrated care plan for the dying. Indian J Crit Care Med 2014;18(9):615–635. DOI: 10.4103/0972-5229.140155.

Appendix 1

CLINICAL FRAILTY SCALE

1 **VERY FIT** — People who are robust, active, energetic and motivated. They tend to exercise regularly and are among the fittest for their age.

2 **FIT** — People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g., seasonally.

3 **MANAGING WELL** — People whose **medical problems are well controlled**, even if occasionally symptomatic, but often are **not regularly active** beyond routine walking.

4 **LIVING WITH VERY MILD FRAILTY** — Previously "vulnerable," this category marks early transition from complete independence. While **not dependent** on others for daily help, often **symptoms limit activities**. A common complaint is being "slowed up" and/or being tired during the day.

5 **LIVING WITH MILD FRAILTY** — People who often have **more evident slowing**, and need help with **high order instrumental activities of daily living** (finances, transportation, heavy housework). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation, medications and begins to restrict light housework.

6 **LIVING WITH MODERATE FRAILTY** — People who need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.

7 **LIVING WITH SEVERE FRAILTY** — **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~6 months).

8 **LIVING WITH VERY SEVERE FRAILTY** — Completely dependent for personal care and approaching end of life. Typically, they could not recover even from a minor illness.

9 **TERMINALLY ILL** — Approaching the end of life. This category applies to people with a **life expectancy <6 months**, who are **not otherwise living with severe frailty.** (Many terminally ill people can still exercise until very close to death.)

SCORING FRAILTY IN PEOPLE WITH DEMENTIA

The degree of frailty generally corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

In **very severe dementia** they are often bedfast. Many are virtually mute.

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Rockwood K et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489–495.