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Original Article

# The Clinical Frailty Scale to assess patients referred for intensive care therapy

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## ABSTRACT

**INTRODUCTION.** Decisions to admit patients to intensive care units are often complex, and assessing patients is essential but difficult. In recent years, the Clinical Frailty Scale has been highlighted as a potential assessment tool for triaging patients for admission to the intensive care unit. This study aimed to investigate the clinical differences and Clinical Frailty Scale scores between patients who are refused and those who are admitted to the intensive care unit.

**METHODS.** All patients assessed for intensive care therapy at a Danish hospital from December 2020 to December 2021 were prospectively registered. The patients' descriptive data, Clinical Frailty Scale scores, three-month mortality rates and reasons for refusal were retrospectively extracted from hospital records.

**RESULTS.** During the study period, 571 patients were admitted to the intensive care unit, whereas 106 were refused admission. Patients who were refused had a significantly higher median age, a higher (poorer) Clinical Frailty Scale score and a significantly higher three-month mortality rate than patients who were admitted to the intensive care unit.

**CONCLUSIONS.** The results indicate that the Clinical Frailty Scale may be one of several useful tools when assessing patients for intensive care therapy. However, this assessment is a multifactorial task, and further research needs to be conducted to examine the usefulness of this scale.

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**TRIAL REGISTRATION.** Not relevant.

Decisions to admit a patient to an intensive care unit (ICU) are often complex, involving both the ward physician and the intensivist. Such decisions are typically made under time pressure, and collaboration between the two physicians is essential when assessing a patient for intensive care therapy (ICT) [1]. ICT is expensive life-sustaining care with potential adverse effects such as iatrogenic complications and infections, and it is a scarce resource in most settings [2]. ICT holds no guarantee for recovery, thus emphasising the importance of not initiating or continuing futile treatments [3]. Consequently, ICU triage includes allocating patients to the most appropriate level of care based on their treatment needs and an assessment of whether they will benefit from ICT [2]. Most intensivists consider factors such as the severity and potential reversibility of the acute illness, the presence and severity of the patient's comorbidities, age, functional status and wishes when assessing patients for ICT. Furthermore, the physician's level of experience and bed availability have been shown to affect their decisions [2].

 

Another way of triaging patients is to assess their frailty. Frailty is defined as a reduced ability to maintain homeostasis and, therefore, an increased vulnerability to stressors such as infections, surgery and trauma [4]. One of the most commonly used scoring tools for frailty is the Clinical Frailty Scale (CFS) by Rockwood et al. [5]. CFS is based on the accumulation of deficits and the loss of function. It is simple, quick to use and does not require any equipment. Several studies have found good interrater reliability among healthcare professionals with varying degrees of clinical experience [4, 6], suggesting that the CFS is a valid tool for assessing a patient's habitual health state. The CFS has also been investigated as an assessment tool for determining whether elderly patients (65 years and older) should be placed in the ICU or the emergency department. Thus far, the scale shows good potential for assessing this patient group [7-9].

The objectives of this study were to investigate and compare CFS scores and clinical differences between patients who were refused ICT and patients who were admitted to an ICU.

## Methods

### Study design, participants and setting

Data were collected at Kolding Hospital, a Danish regional university hospital. The hospital has 320 beds, and the ICU is a multidisciplinary, 12-bed adult ICU. An intensivist is always present to assess patients referred to the ICU. All patients assessed for ICT from 1 December 2020 to 30 November 2021 were included in the study.

### Data collection

During the study period, the intensivists registered when a patient was refused ICT. Furthermore, all patients admitted to the ICU based on an intensivist's assessment were identified via the ICU hospital records.

Data retrospectively extracted from patients' hospital records included age, sex, comorbidity, CFS score and three-month mortality. Furthermore, the reasons why ICT was not granted and the seniority of the refusing intensivist were recorded.

The reasons for refusal were divided into six categories (**Table 1**).

**TABLE 1** Definitions of "Reasons for refusal".

| Reason | Description |
|---|---|
| Too well to benefit | The patient was not deemed sick enough to need ICT and would therefore continue treatment in the hospital ward<br>The ward physicians were informed that they could refer the patient to ICT again if the patient's health declined |
| Too sick to benefit | The patient was assessed as having limited rehabilitation potential either during this admission or prior admissions, and there was a reasonable expectation that the patient would not be able to recover after ICT to live a meaningful or dignified life<br>The patient would continue treatment in the hospital ward |
| Treatment futile | The patient was nearing the end of life and there were reasonable expectations that the patient would not improve sufficiently to survive outside of the acute care setting<br>ICT was therefore considered inappropriate [10], and the patient would continue active treatment in the hospital ward or transition for palliative treatment |
| Admission to ICU against patient's wish | The patient did not wish to receive ICT<br>The patient was informed of the potential consequences of refusing ICT and made an informed decision to refuse ICT after assessment and confirmation of their capability to do so |
| Bed availability | The patient was refused due to a lack of bed availability at the ICU in the current hospital and would either continue treatment in the hospital ward or in a different ICU at a nearby hospital |
| Other | The refusal was registered as "Other" if the reason for refusal was not described in the patient journal or if the patient was transferred to another hospital to receive specialised treatment |

ICT = intensive care therapy.

To assess frailty, the patients were scored using the nine-point CFS version 1.2 in Danish [10], which ranges from 1, indicating that a patient is *very fit*, to 9, indicating that the patient is *terminally ill*. Patients who scored 1-3 were considered not frail, those who scored four were considered pre-frail or vulnerable, and those who scored

 

5-9 were considered increasingly frail [7] (**Table 2**).

**TABLE 2** The Clinical Frailty Scale source instrument [11].

| Category, no.: level | Description |
|---|---|
| 1: Very fit | People who are robust, active, energetic and motivated<br>These people commonly exercise regularly<br>They are among the fittest for their age |
| 2: Well | People who have no active disease symptoms, but are less fit than category 1<br>Often, they exercise or are very active occasionally, e.g. seasonally |
| 3: Managing well | People whose medical problems are well controlled but are not regularly active beyond routine walking |
| 4: Vulnerable | While not dependent on others for daily help, symptoms often limit activities<br>A common complaint is being "slowed up" and/or feeling tired during the day |
| 5: Mildly frail | These people often have more evident slowing and need help in high-order instrumental activities of daily living: finances, transportation, heavy housework, medications<br>Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework |
| 6: Moderately frail | People need help with all outside activities and with housekeeping<br>Inside, they often have problems climbing stairs and need help with bathing and might need minimal assistance: cuing & standby, with dressing |
| 7: Severely frail | Completely dependent on personal care, from whatever cause: physical or cognitive<br>Even so, they seem stable and not at a high risk of dying within ~ 6 mos. |
| 8: Very severely frail | Completely dependent, approaching the end of life<br>Typically, they would not recover even from minor illness |
| 9: Terminally ill | Approaching the end of life<br>This category applies to people with a life expectancy < 6 mos., who are not otherwise evidently frail |

ICT = intensive care therapy.

In this study, the CFS scores were divided into five groups indicating the patient's condition: 1-3 (not frail); 4 (vulnerable but not yet dependent on others); 5 (having some frailty and needing help with chores); 6 and 7 (increasingly frail and depending on others); and 8 and 9 (severely frail and nearing end of life) (**Table 3**).

**TABLE 3** Characteristics of refused and admitted patients to intensive care therapy.

| | Refused ICT | Admitted ICU | All patients assessed for ICT | p value[a] |
|---|---|---|---|---|
| Total, N (%) | 105 (16) | 571 (84) | 676 | - |
| Females, n (%) | 50 (47) | 248 (43) | 298 (44) | 0.48 |
| Age, median (IQR), yrs | 78 (71-86) | 68 (55-77) | 70 (58-78) | < 0.001 |
| *Clinical Frailty Scale score, n (%)* | | | | < 0.001 |
| 1-3 | 9 (9) | 221 (38) | 230 (34) | |
| 4 | 7 (7) | 139 (24) | 146 (22) | |
| 5 | 7 (7) | 73 (13) | 80 (12) | |
| 6-7 | 60 (57) | 117 (20) | 177 (26) | |
| 8-9 | 21 (20) | 15 (3) | 36 (5) | |
| Unknown | 1 (1) | 6 (1) | 7 (1) | |
| *Number of comorbidities, n (%)[b]* | | | | 0.004 |
| 0 | 0 | 33 (6) | 33 (5) | |
| 1 | 14 (13) | 61 (11) | 75 (11) | |
| 2 | 18 (17) | 80 (14) | 98 (15) | |
| 3 | 29 (28) | 128 (22) | 157 (23) | |
| 4 | 27 (26) | 99 (17) | 126 (19) | |
| 5 | 10 (10) | 64 (11) | 74 (11) | |
| > 5 | 7 (7) | 105 (18) | 112 (17) | |
| 3-mo. mortality, n (%) | 62 (59) | 158 (28) | 220 (33) | < 0.001 |

IQR = interquartile range; ICT = intensive care therapy; ICU = intensive care unit.
a) The $\chi^2$ test or Mann-Whitney U-test.
b) Different N due to missing data from 1 patient.

The patient's CFS score was assessed based on the patient's hospital record, including notes from physicians, nursing staff, physiotherapists and occupational therapists. To ensure compliance when assessing the CFS score, all refused patients were independently assessed by two or three authors, and their CFS scores were compared. If the authors disagreed on a score, the patient's hospital record was jointly reviewed, and the score was discussed until a consensus had been reached. Only a few cases (less than 10%) had disagreements requiring reviews, so having more than one author to assess the admitted patients was not considered necessary.

### Data analysis

All data were managed using the REDCap electronic data capture tool hosted by the Odense Patient Data Explorative Network (OPEN) and analysed using the statistical programme BE Stata 17.0. The results are presented using descriptive statistics with n (%) for categorical data and median and interquartile range for ordinal and continuous non-normally distributed data. The $\chi^2$ test and the Mann-Whitney U-test were used for group comparisons (refused versus admitted patients), and $p < 0.05$ was considered statistically significant.

### Ethics

Permission to access the hospital's records without patient consent was obtained from the hospital's management. The project was registered with the Danish Data Protection Agency (journal numbers 21/478 and

22/993). According to Danish legislation, the study did not require Regional Committee on Health Research Ethics permission.

For the reporting checklist, we used the STROBE cohort reporting guidelines [12].

*Trial registration:* not relevant.

## Results

During the study period, 571 patients were assessed by an intensivist and referred for ICT, whereas 106 patients were assessed and refused ICT. One of the refused patients was registered with an incorrect ID number, resulting in a total of 105 refused patients being included in the analyses. Two patients were referred and assessed twice during the period, and both were therefore registered twice in Table 3 and **Table 4**.

**TABLE 4** Comparing three-month mortality and Clinical Frailty Scale (CFS) score in patients admitted or refused admission for intensive care therapy, $p < 0.001$[a].

| | Patients, n (%) | |
|---|---|---|
| | **refused** | **admitted** |
| 1-3 | 2 (3) | 28 (18) |
| 4 | 4 (6) | 32 (20 |
| 5 | 4 (6) | 24 (15 |
| 6-7 | 34 (55) | 57 (36) |
| 8-9 | 18 (29) | 12 (8) |
| Unknown | 0 | 5 (3) |
| Total | 62 (100) | 158 (100) |

a) The $\chi^2$ test for distribution within CFS groups for refused and admitted patients, who died within 3 mos., "unknown" was omitted from the statistical calculation.

Table 3 presents the patient characteristics. The refused patients had significantly higher CFS scores than those admitted to the ICU. Among the refused patients, only 16% scored four or lower on the CFS, compared with 63% of the admitted patients. For seven patients, it was not possible to assess the CFS score due to insufficient information in their medical records. The number of comorbidities differed significantly between the two patient groups but with no consistency in the distribution. Admitted patients had the highest percentage of both patients with no comorbidities and patients with more than five comorbidities. Furthermore, the three-month mortality rate was significantly higher among patients who were not admitted to the ICU.

Table 4 shows the CFS scores of refused and admitted patients who died within three months after assessment.

More than a third (38%) of the non-surviving admitted patients scored four or less, whereas most of the non-surviving patients (84%), who were refused ICT, scored six or higher on the CFS.

The reasons for stopping patients from receiving ICT were categorised as follows: Patient was too well to benefit, 20 (19%); too sick to benefit, 53 (50%); treatment futile, 14 (13%); admission against patient wishes, 13 (12%); bed availability, two (2%); and other, three (3%).

Half of the patients refused ICT (53, 50%) were assessed by junior physicians/trainees, and 52 (50%) by senior physicians/consultants. Most patients (50%) were assessed as "Too sick to benefit" or "Too well to benefit" (19%). Thirteen patients (12%) did not wish to be admitted to the ICU, and treatment for 14 patients (13%) was assessed as futile.

Supplementary Table 5 shows the reasons for admission, referral and where the patients were discharged to.

## Discussion

Patients who were not granted ICT scored higher on the CFS, had a higher mean age and had a higher three-month mortality than patients admitted to the ICU. Our results support the findings of three other studies [3, 7, 8], which found that frailty was associated with a significantly higher mortality rate.

Unsurprisingly, more patients who scored six or higher on the CFS died when they were refused ICT. However, significantly more patients admitted for ICT and who scored five or less on the CFS died within three months after assessment. This indicates that other factors, such as the severity of the acute illness, also affect the outcome, especially when patients score low on the CFS.

The group of patients admitted after assessment included more patients with no comorbidities and more patients with more than five comorbidities. This suggests that a patient's level of function may depend more on the severity of the comorbidities than on the number of comorbidities. Pintado et al. [12], who used the Charlson Comorbidity Index [13, 14], found the severity of comorbidity to be an independent variable associated with ICT refusal.

Most patients in our study were refused because they were assessed as "too sick to benefit" from ICT or because treatment was assessed as "futile" [15]. Unsurprisingly, the refused patients had a higher three-month mortality (59%), which was expected given the higher severity of their illnesses and higher CFS scores. Similar rates were reported by Pintado et al. [12], who found a mortality of 55.6% for patients assessed as "too sick to benefit," whereas prior studies have found higher rates for elderly patients (70-78%) [16, 17] and patients refused due to futility (90%) [18]. In our results, we did not remove the patients assessed as "too well to benefit," which we expect would have increased the mortality rate for patients who were not granted ICT.

Our results do not show a cut-off score by which the patients should be refused or admitted to the ICU. The assessment of patients referred for ICT is a difficult and multifactorial task that relies not only on the patient's illness but also on a combination of patient-related factors, such as functioning, rehabilitation potential and wishes, the assessing physician's experience and the setting.

Even though the CFS score was assessed retrospectively, and none of the authors saw the patients in the clinical setting, there were only a few cases with disagreement between the assessments of the CFS scores. This might indicate that the CFS score is easy to use and substantiates the possibility of using CFS as part of the assessment before admitting patients to the ICU.

### Strengths and limitations

The strengths of this study include a thorough review of hospital records, including all patients assessed for ICT

 

in an entire year. All intensivists were well informed about the study, and, in most cases, the reason for refusal was well described in the patient's hospital record. Furthermore, the CFS scores were validated by assessment and comparison among three authors to increase interrater reliability.

This study has several limitations. As all the data, including the assessment of the CFS, were based on a retrospective hospital record review, some relevant observations might not have been recorded by the attending physician or other relevant personnel. Therefore, some important clinical information may have been lost. Furthermore, using the new CFS version 2.0 may have increased the interrater reliability since the distinctions between the levels are considered more explicitly in the new version. Also, assessing the CFS score after refusing the patient's ICT might have affected the assessment, resulting in a higher CFS score.

Among patients refused ICT, the causes comprised both "Too well to benefit" and "Treatment futile", which may represent opposite ends of the CFS scale. However, probably relating to the limited number of patients who were considered too well, there were significantly higher CFS scores among refused patients, but with a considerable overlap. In line herewith, three-month mortality was significantly higher among refused patients, with the highest mortality being recorded among patients with a CFS score > 5.

Furthermore, we did not differentiate between the treatments that patients received at the ICU in this study. In some cases, agreement on treatment limitations may have been reached after admittance to the ICU, particularly with patients scoring high on the CFS. This could have provided a better understanding of the CFS score's contribution when assessing ICU patients.

Another limitation is that this was a single-centre study. As such, our results might not be transferable to other hospitals with different departments or patient compositions. Also, as we do not have data on exact bed availability in the ICU at the time of referral, it is impossible to determine whether bed availability influenced patient triage. Likewise, it remains unknown whether this reason for refusal was underreported.

Since the CFS has been validated in recent years as a reliable predictor for outcome and mortality, especially within elderly patients, we chose not to apply further frailty assessment tools in this study. However, comparing more frailty assessment tools would be interesting to determine if one is better than others at assessing patients' ICU admission.

## Conclusions

Patients who were refused ICT scored higher on the CFS, had a higher median age and had a higher three-month mortality than patients admitted to the ICU. The results indicate that the CFS may be one of several useful factors when assessing a patient for ICT, but the results also indicate that the CFS cannot be used alone when assessing patients for ICT. Further research is needed to investigate the potential of the CFS when assessing patients for ICT.

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