Appendix 4

Clinical Frailty Scale in prediction of mortality, disability and quality of life for patients in need of intensive care (2020)

Appendix 4 Studies appraised as high risk för bias

Study (Author, year, country) Study design Setting	**Population** (Number, age, sex, Patient characteristics, Selection of data reported[1])	**Scale used Definition of frailty**	**Outcome Analyses**	**Results**[2]	**Aims Conclusions**	**Risk of bias Limitations Comments**
Montgomery et al 2019 **Canada** Design: Retrospective cohort study, from eCritical Alberta, 2016–2017 Setting: 17 ICUs in 7 cities, mixed medical/ surgical units, Alberta	Adult patients (≥18y) admitted to ICU **n=15.238 patients** Age: mean 58y (SD 17) 61% male **ICU diagnosis:** including respiratory (20%) cardiovascular (31%) **Selection of data reported:** diagnostic classification, surgical status, comorbidities, APACHE II score (19, SD8) SOFA score (6, SD 4) laboratory data ICU interventions (including: invasive ventilation (66%) non-invasive ventilation (12%) vasoactive therapy, renal replacement therapy)	CFS, 9point scale CFS ≥5 defined as frail **Frailty assessments:** CFS score assigned at ICU admission. 81% patients were assigned a CFS score at ICU admission.	Hospital mortality ICU mortality Length of stay, Organ support, discharge disposition. Independent risk factors for hospital mortality and selected organ supports identified by multivariate logistic regression using CFS score at ICU admission, age, sex, diagnostic category, pre-ICU duration of hospitalization, and APACHE II score as covariates.	28% (4199/15238) frail patients Prevalence of frailty: 9–43% across ICUs. **Frail patients:** Frail patients were older, mean 63y (SD 15) vs 56y (SD17), and had higher APACHE II scores 22 (SD 8) vs 17 (SD 8), compared with non-frail. Frail patients received less mechanical ventilation (62% vs 68%) and vasoactive therapy (24% vs 57%), but more non-invasive ventilation (22% vs 9%) **Mortality:** ICU mortality: 523/4199 (12%) of frail patients 1295/15238 (9%) overall deaths Hospital mortality: 982/4199 (23%) of frail patients 2019/15238 (13%) overall deaths. Frail patients had higher hospital mortality (23% vs 9%): aOR 1.83 (95% CI, 1.64 to 2.05) compared with nonfrail patients.	**Aim**: Following implementation of a validated frailty measure into a provincial ICU clinical information system, we describe the population-based prevalence and outcomes of frailty in patients admitted to ICUs. **Conclusion:** A validated measure of frailty can be implemented at the population level in ICU. Frailty is common in ICU patients and has implications for health service use and clinical outcomes.	High risk of bias **Limitations** Retrospective study **Comments:** Retrospective registry study with >15.000 patients. Stratifies by CFS score and age. Follows STROBE statement.

[2] This does not present all outcomes of the study, but the ones relevant for our PICOTS

Darvall et al 2019 **New Zealand** Design: Retrospective population-based cohort, 2017–2018, Australian and New Zealand Intensive Care Society Adult Patient Database (ANZICS) Setting: 178 ICUs, includes data on > 80% of all admissions to ICUs in Australia and New Zealand	Patients ≥80y admitted to ICU **n=15.613 patients** Age: median 84.6y (IQR 82–88) 52.8% male **ICU diagnoses:** including Respiratory (12–16%) sepsis (7–12%) cardiovascular, gastrointestinal, neurological trauma, cardiac surgery, other **Selection of data reported:** Admission diagnosis, chronic diseases, APACHE II, APACHE III-j, Risk of Death (ANZROD- scores), limitations of medical treatment **Exclusions:** Patients admitted for organ donation or palliative care only	CFS, 8 point scale (not including level 9 from the CFS 9point scale). CFS ≥5 defined as frail (CFS 5–8) **Frailty assessment:** Since 2017, frailty has been a non-mandatory variable measured at the time of ICU admission, depending on the patient's level of physical function in the two months preceding admission. Scores were assigned by data collectors in each participating ICU from the clinical record; no specific education in CFS measurement was provided. Frailty scores available for 34% of included patients.	In-hospital mortality, Length of stay, Readmission to ICU during the same hospital admission, discharge destination. Unadjusted and adjusted associations between frailty and in-hospital mortality, results reported as odds ratios (OR) ANZROD: a locally derived mortality prediction model that includes: age, diagnosis, acute physiological disturbance, chronic comorbid conditions, and treatment limitations.	39.7% (6203/15613) frail **Frail patients:** Larger proportions of frail vs nonfrail patients were admitted with sepsis (12% *vs* 7%) or respiratory complications (16% *vs* 12%). Frail patients had more often higher illness severity scores, higher ANZROD scores, and more often treatment limitations on admission. **Mortality of frail patients:** ICU deaths: 554/6203 (9.0%) hospital deaths (incl ICU): 1090/6203 (17.6%) In-hospital mortality was higher for frail patients vs nonfrail (17.6% v 8.2%): OR, 2.40 (95% CI, 2.17 to 2.64), aOR 1.87 (95%CI, 1.65 to 2.11). AUC ROC univariate analysis: 0.61 (0.60 to 0.62) Multivariable analysis: 0.88 (0.88 to 0.89) Multivariable analysis: Frailty was associated with in-hospital mortality after adjusting for sex, severity of illness (ANZROD model), region, hospital type.	**Aim:** To explore associations between frailty (Clinical Frailty Scale score of 5 or more) in very old patients in intensive care units (ICUs) and their clinical outcomes (mortality, discharge destination). **Conclusions:** Mortality among frail patients, after adjusting for sex, severity of illness, and regional and hospital variation, was almost twice as high as for non-frail patients. Many very old critically ill patients in Australia and New Zealand are frail, and frailty is associated with considerably poorer health outcomes. Routine screening of older ICU patients for frailty could improve outcome prediction.	High risk of bias **Limitations** Retrospective study. High number of missing data. **Comments:** Retrospective registry study with >15.000 patients, includes data on > 80% of all admissions to ICUs in Australia and New Zealand.

Fernando et al 2019 **Canada** Design: Retrospective analysis of prospectively collected registry data, 2011–2016. Setting: ICUs in two hospitals within Ottawa Hospital Network	Consecutive ICU patients, ≥18y receiving invasive mechanical ventilation **n=8110** Age: mean 69.2y (SD 12) frail mean 57.6y (SD 18) nonfrail, 57% male **ICU diagnosis:** including infection/sepsis (15–17%), respiratory failure (8–23%) trauma, malignancy, intracranial hemorrhage, stroke, other) **Selection of data reported:** Comorbidity diagnoses, Comorbidity Score (Elixhauser), MODS (Multiple Organ Dysfunction Score) **Exclusions:** Patients who only received non-invasive mechanical ventilation or high flow nasal cannulae; chronic invasive ventilation requirement at admission, existing goals-of-care that did not allow for mechanical ventilation, patients with a CFS of 9 given their high likelihood of short-term mortality.	CFS 9 point scale, CFS ≥5 defined as frail **Assessments:** Pre-admission assessments prior to acute illness, within 24h of ICU admission, as completed by nursing staff or occupational therapy staff. Staff used medical records of patient pre-admission mobility and function assessments to retrospectively score each patient on the CFS, using a standardized abstraction tool.	In-hospital mortality, extubation failure, tracheostomy, ventilator-free days, ICU length of stay, hospital length of stay, disposition (home or long-term care center), readmission to ICU during hospitalization, readmission within 30 days from discharge. Adjustments: age, sex, illness severity [MODS], location of intubation, initiation of mechanical ventilation (ICU vs. non-ICU), most responsible diagnosis, comorbidity index.	31% (2529/8110) frail patients **Frail patients:** Respiratory failure more common admitting diagnosis among frail patients vs nonfrail (22.8% vs 8.2%). **Mortality:** In-hospital mortality: 1021/2529 (40%) frail 1617/5581 (29%) nonfrail In hospital death after extubation failure (33% vs 25%) In hospital death after tracheostomy (47% vs 31%) **Associations**: Frailty was associated with increased odds of: hospital death: aOR 1.24 (95% CI, 1.10 to 1.40), hospital death following extubation failure: aOR 1.18 (95% CI, 1.07 to 1.28), hospital death following tracheostomy: aOR 1.14 (95% CI, 1.03 to 1.25).	**Aim:** Evaluate the association between frailty, defined by the Clinical Frailty Scale (CFS), and outcomes of ICU patients receiving invasive mechanical ventilation. **Conclusions:** The presence of frailty among patients receiving mechanical ventilation is associated with increased odds of hospital mortality, discharge to long-term care, extubation failure, and need for tracheostomy.	High risk of bias **Limitations** CFS was retrospectively scored based on medical records **Comments:** Retrospective registry study. Specifically, patients receiving mechanical ventilation.

Fernando et al 2019 **Canada** Design: Retrospective analysis of prospectively collected registry data, 2011–2016 Setting: Two hospitals within a single tertiary care level hospital system, Ottawa	Patients ≥65 y with suspected infection at ICU admission. **n=1510** Age: mean 72.9 y non-frail mean 80.3 y frail 56% male **ICU diagnosis:** 48% suspected pulmonary infection **Selection of data reported:** Suspected source of infection, comorbidity diagnoses, Elixhauser Comorbidity Score, MODS, SIRS - Systemic Inflammatory Response Syndrome, qSOFA scores, resource utilization (including: invasive mechanical ventilation, noninvasive mechanical ventilation) **Exclusions:** Patients with missing data related to outcome or baseline functioning	CFS 9 point scale, CFS ≥5 defined as frailty**.** **Frailty assessment:** Staff used medical records of patient pre-admission mobility and function assessments to retrospectively score each patient on the CFS, using a standardized abstraction tool. Screen for frailty using FI-LAB, (23-item index), calculated using ICU admission laboratory values. Modified FI-LAB for acutely ill patients.	In-hospital mortality Resource utilization ICU length of stay, total hospital length of stay, survivors discharged to long-term care, survivors with hospital readmission within 30 days, hospital costs Adjusted for predefined confounders: age, sex, MODS, origin from long-term care, Elixhauser comorbidity index.	Prevalence of frailty: 507 (33.6%) frail using CFS 829 (54.9%) frail using FI-LAB. **Frail patients:** Invasive mechanical ventilation: 53.3% frail vs 51.9% nonfrail Noninvasive ventilation: 17.6% frail vs 16.3% nonfrail. **In hospital Mortality:** 37% (558/1510) patients overall 52% (264/507) frail 29% (294/1003) nonfrail **Associations:** Frailty was associated with increased risk of in-hospital death: OR 1.81 [95% CI 1.34–2.49] The combination of frailty and quick SOFA ≥ 2 further increased the risk of death aOR 7.54 (95% CI, 5.82 to 9.90) The combination of frailty and SIRS ≥2 resulted in aOR 2.22 (95% CI, 1.40 to 3.48) for in-hospital mortality.	**Aim:** To evaluate the association between patient frailty (CFS ≥5) and outcomes of critically ill patients with suspected infection. To evaluate the association between frailty and the quick Sequential Organ Failure Assessment (SOFA) score. **Conclusion:** The presence of frailty among older ICU patients with suspected infection is associated with increased mortality, discharge to long-term care, hospital readmission, resource utilization, and costs.	High risk of bias **Limitations** CFS was retrospectively scored based on medical records **Comments:** Specifically patients with suspected infection
Darvall et al 2019 **Australia** Design:	Patients ≥50 y admitted to ICU **n=160 patients** Age: mean 70y (SD 10) 43.8% male	CFS CFS ≥5 defined as frail Edmonton Frail Scale (EFS) EFS ≥8 defined as frail	In-hospital mortality, 6-month mortality Length of stay,	**Frail patients:** Frailty diagnosed in 54/160 (33.8%) using CFS 58/160 (36.3%) using EFS **Mortality of frail patients:**	**Aim:** To compare the Clinical Frailty Scale (CFS) with a multi-dimensional validated tool, the Edmonton Frail Scale	High risk of bias **Limitations** Not consecutive sample. Less than 100 events (deaths)

Prospective cohort study, Feb–June 2017 Setting: Royal Melbourne Hospital Intensive Care Unit, a tertiary metropolitan ICU	**ICU diagnosis:** Medical (62,5 %) Surgical (37,5%) **Selection of data reported:** Admission source and type Charlson comorbidity score, Katz ADL APACHE 3 (mean 70 (SD24)) SAPS2 (mean 40 (SD14)) ICU interventions (incl. mechanical ventilation) limitation of treatment **Exclusions:** Patients admitted for organ retrieval	**Frailty assessments:** Pre-illness frailty and all study assessments were measured by one of two study investigators (medical student or specialist intensivist) through interviews with the participants or surrogates. Pre-illness frailty was defined as the baseline patient state prior to the onset of acute illness precipitating hospital admission.	readmission to ICU, discharge destination Compared CFS and EFS using Spearman correlation and Kappa coefficients, assessing frailty status across health domains, and examining outcomes including mortality.	In-hospital death: 14/54 (25.9%) 6month mortality: 21/52 (40.4%) Frail patients had greater in-hospital mortality vs nonfrail (25.9% vs. 8.5%): aOR 3.31 (95% CI, 1.17 to 9.39), and greater 6-month mortality (40.4% vs. 17.3%): aOR 2.84 (95% CI, 1.18 to 6.83). **Correlations:** CFS and EFS were highly correlated: Spearman correlation coefficient: 0.85 (95% CI, 0.81 to 0.88), and with high agreement: kappa coefficient 0.78 (95% CI, 0.68 to 0.88)	(EFS) and investigated which health domains are affected by frailty in ICU. **Conclusions**: Frailty in the critically ill affects a range of health deficits, adequately measured via the CFS.	
Silva-Obregón et al 2020 **Spain** Design: Retrospective cohort study, 2009–2017 Setting: A mixed ICU of a university-affiliated	Patients ≥70 years admitted to ICU. Routinely collected data. **n=285 patients** Age: mean 77.56 y ± 4.11 58.2% male **Diagnosis at admission:** infectious disease (39%) respiratory (19%) cardiovascular, cardiac arrest, neurological, other **Selection of data reported:** Comorbidities,	CFS, 9 pt scale CFS ≥5 defined as frail **Frailty assessments:** Frailty stage was prospectively collected since October 2013. Prior this date, investigators used patient/proxy interviews and medical records to determine CFS score.	Mortality: ICU mortality, hospital mortality, short-term mortality (30d), long-term mortality (3-, 6-, 12-months) ICU length of stay (LOS), hospital length of stay	18.6% (53/285) frail patients 81% (232/285) nonfrail patients **Frail patients:** Respiratory diagnosis: 26% frail vs 18% nonfrail **Mortality:** frail vs nonfrail: Hospital mortality: 30/53 (56.6%) vs 88/232 (37.9%) 30 day mortality: 28/ 53 (52.8%) vs 72/ 232 (31,0%) 90 day mortality:	**Aim:** Assess the impact of frailty on short- and long-term mortality exclusively in critically ill older medical patients. **Conclusions:** Frailty (CFS ≥5) was independently associated with short- and long-term mortality in older patients admitted to ICU	High risk of bias **Limitations** Both prospective and retrospective. Some information missing regarding analysis and results **Comments:** Possible selection bias resulting from ICU triage decisions. In order to assess the relationship

reference hospital.	APACHE II, SAPS II, SOFA, ICU procedures, complications (incl. ARDS) **Exclusions:** Acute coronary syndrome, arrhythmia, elective surgery, urgent surgery prior to ICU admission, acute ischemic or hemorrhagic stroke patients, patients admitted for organ donation		Four different models with different adjustment levels: adjusting for: gender, comorbidities, severity scores, treatment intensity and complications.	30/ 53 (56.6%) vs 90/ 232 (38,8%) **Analyses:** Cox proportional hazard models demonstrated: HR in frailty group for: death in hospital: HR 1.81 (95% CI, 1.19 to 2.74) death at 30 days: HR 2.0 (95% CI, 1.29 to 3.10). In model 4, after adjustment for gender, comorbidities, severity scores, treatment intensity and complications: death in hospital: aHR 4.4 (95% CI, 1.72 to 11.45) death at 30 days: aHR 6.07 (95% CI, 1.76 to 20.89)	exclusively due to a medical reason.	between frailty and mortality in the two periods of data collection (2009 to October-2013 vs. November-2013 until 2017) an additional analysis was performed to rule out the possibility of a major selection bias.
Kara et al 2018 **Turkey** Design: Prospective observational cohort study, 2015–2016 Setting: A medical ICU of a university hospital.	Adults >50y with hypercapnic respiratory failure admitted to ICU **n=103 patients** Age: mean 73 y ± 11 55% male **Diagnosis at admission:** Hypercapnic respiratory failure, chronic obstructive pulmonary disease (51%), cardiopulmonary edema (42%) pneumonia (40%). Home NIV (21%)	CFS CFS ≥5 defined as frail Edmonton Frailty Scale (EFS) EFS ≥8 defined as frail **Evaluation of NIV success and NIV failure:** *Noninvasive ventilation success:* success in at least two of the followings: PaO2 >60 mmHg, PaCO2 <50 mmHg,	Frailty among patients with noninvasive ventilation (NIV) NIV success NIV failure	41% frail patients (CFS ≥5); 36% frail patients (EFS ≥8) NIV failure group: 30 (29%) NIV success group: 73 (71%) **Frail patients:** NIV failure & CFS ≥5: 60% (18/30 patients) NIV success & CFS ≥5: 33% (24/73 patients) **In hospital Mortality:** 18 patients (17%) died: CFS ≥5: 83% (15/18) EFS ≥8: 72% (13/18)	**Aim:** To evaluate the frailty prevalence with two different frailty scores among the NIV population of a medical intensive care unit (ICU). Evaluate the impact of frailty on NIV success and mortality and its association with NIV application problems. **Conclusion:** Frailty is associated with higher NIV application	High Risk of bias **Limitations** No information regarding missing data. Low number of events **Comments:** Specifically, patients with hypercapnic respiratory failure.

	Selection of data reported: APACHE II score (mean 21 ± 6) SOFA score (mean 4 ± 3) **Exclusions:** hemodynamic instability and life threatening arrhythmias, massive gastrointestinal bleeding and excessive respiratory secretions, hypoxemic respiratory failure and end stage disease, immediate endotracheal intubation (decreased level of consciousness (GCS of <8), progression to cardiac or respiratory arrest	pH 7.35–7.45, improvement of respiratory effort, recovery of consciousness. *Noninvasive ventilation failure:* endotracheal intubation or death.		NIV failure: 94% (17/18**)** NIV application problem: 83% (15/18 patients)	problems, failure and mortality risk in elderly ICU patients. The CFS and EFS frailty scores can be used to predict NIV success and outcomes in ICUs.	
Tipping et al 2019 **Australia** Design: Secondary analysis of a Prospective observational study, 2015–016 Setting: 2 ICUs in Melbourne, Australia	Adults ≥50 y admitted to ICU under a trauma medical unit, expected to have an ICU length of stay of >24h **n=100 patients** Age: mean 69.2 y (10.4) 81% male **Selection of data reported:** APACHE II score, Functional Comorbidity Index, Injury Severity Score, Premorbid IMS score, **Exclusions:** Second or subsequent ICU admission during an indexed hospital admission,	CFS, 9point scale CFS ≥5 defined as frail Frailty Phenotype (FP) FP ≥3 defined as frail **Frailty assessments:** Frailty data were collected from the participant (n=40) or their surrogate (n=60).	Compare CFS 9 with Frailty Phenotype (FP) regarding concordance, floor and ceiling effects, construct, and predictive validity.	CFS ≥5: 13% (13/100) frail FP ≥3: 22% (22/100) frail **Mortality:** Mortality at ICU: 23.1% (3/13) frail CFS ≥5 5.7% (5/87) nonfrail CFS ≥5 Mortality in hospital: 30.8% (4/13) frail CFS ≥5 9.2% (8/ 87) nonfrail CFS ≥5 **Correlations:** Correlations between FP and CFS were excellent for: participant-reported frailty rs=0.74 (95% CI, 0.57 to 0.86) and surrogate-reported frailty rs=0.79 (95% CI, 0.65 to 0.88).	**Aim:** To compare 2 frailty measures with regard to concordance, floor and ceiling effects, and construct and predictive validity and to determine which is more valid and clinically applicable in a critically ill trauma population. **Conclusion:** Measuring frailty in a trauma ICU population was feasible, with excellent correlation between the 2 frailty measures. Both showed	High Risk of bias **Limitations** Some information missing regarding analysis and results. Low number of events. **Comments:** Specifically trauma patients.

	admitted for palliation, death deemed imminent and inevitable, informed consent unable to be obtained			Cohen kappa was moderate for frail and nonfrail groups for: participant-reported frailty: kappa=0.55 (95% CI, 0.13 to 0.85) Surrogate-reported frailty: kappa=0.56 (95% CI, 0.25 to 0.82)	aspects of construct and predictive validity; however, the FP identified frailty in more participants and was associated with more comorbidities and higher mortality at ICU discharge. Therefore, the FP might be more clinically relevant in this population.	
Le Maguet et al 2014 **France** Design: A multicenter, prospective, observational study, Nov 2011–May 2012 Setting: Four ICUs in university-affiliated hospitals in France	Patients ≥65 hospitalized for ≥24h in the ICU **n=196 patients** Age: mean 75 y (SD 6) 65% male **ICU diagnosis**: including infection (43%) brain injury (20%) cardiac arrest (8%) **Selection of data reported:** SAPS II score SOFA score Glasgow Coma Scale Life expectancy (McCabe), disability (Katz ADL), Charlson comorbidity index <u>Recorded during hospitalization:</u> severe sepsis, septic shock, acute renal failure,	CFS, 9 point scale CFS ≥5 defined as frail FP, frailty phenotype FP ≥3 defined as frail	ICU mortality, hospital mortality, 6 month mortality Length of stay (LOS), discharge location Cox proportional hazard model was performed to identify the independent factors associated with ICU and 6-month mortalities.	23% (46/196) frail with CFS ≥5 41% (80/196) frail with FP ≥3 **Mortality:** In patients with CFS ≥5: ICU mortality: 41% (17/41) hospital mortality: 35% (23/65) 6mo mortality: 38% (27/72) **Analyses:** Risk factors for ICU mortality: FP ≥3: HR 3.3 (95% CI, 1.6 to 6.6), male gender HR, 2.4 (95% CI, 1.1 to 5.3), cardiac arrest before admission HR, 2.8 (95% CI, 1.1 to 7.4) SAPSII ≥46: HR 2.6 (95% CI, 1.2 to 5.3) and brain injury before admission HR, 3.5(95% CI, 1.6 to 7.7) Risk factors for 6-mo mortality: CFS ≥5: HR 2.4 (95% CI, 1.49 to 3.87), SOFA ≥7:	**Aim:** To determine the prevalence of frailty in ICU patients and its impact on the rate of mortality. **Conclusions:** Frailty is a frequent occurrence and is independently associated with increased ICU and 6-month mortalities. Notably, the CFS predicts outcomes more effectively than the commonly used ICU illness scores.	High Risk of bias **Limitations** No information regarding missing data. Low number of events. **Comments:**

	acute respiratory distress syndrome (ARDS), number of acquired infections; need for dialysis, mechanical ventilation, discontinued treatment **Exclusions:** Patients with no proxies or could not be interviewed.			HR 2.2 (95% CI, 1.35 to 3.64)		
Hope et al 2017 **USA** Design: Prospective observational cohort study, 2014–2015 Setting: Tertiary hospital in Bronx, New York	Adults ≥18y admitted to ICU within 30 days of ER admission. **n=95 participants** Age: mean 57.1y (SD 17.5) 54% male **ICU diagnosis:** Acute respiratory failure (24%) Sepsis (21%) **Selection of data reported:** Prehospital disability (ADL), Charlson Comorbidity scores, APACHE IV, ICU procedures **Exclusions:** Patients expected to leave the ICU within 24h, patients with no surrogate available to provide baseline information about function.	CFS, 9 pt scale CFS ≥5 defined as frail **Frailty assessment:** Made by ICU physicians within 3 days of admission. Frailty markers: malnutrition, mobility, strength, physical activity, cognition, memory, sensory function	Disability at hospital, at discharge, at 6months Mortality Multivariate model adjusting for age, intubation status	35.8% (34/95) frail patients **Disability:** Hospital survivors at discharge: 41/77 (53%) with increased disability 36/77 (47%) with no increased disability **Mortality:** Mortality in hospital: 18.1% (17/95) patients Mortality at 6 months of hospital survivors: 18% (14/77) patients **Predictions:** Predicting disability at hospital discharge (CFS ≥5): aOR 1.8 (95% CI, 0,6 to 5,5). Predicting death or disability at 6 months after discharge (CFS ≥5): aOR 3.8 (95% CI, 1.2 to 11.7). AUC: 0.73	**Aims:** To assess the construct and predictive validity of a questionnaire- based approach to identifying frailty in adult ICU patients. **Conclusions:** Asking patients or surrogates about frailty markers may be a valid approach to identifying critically ill adults with a frailty phenotype associated with increased risk of adverse outcomes	High Risk of bias **Limitations** Primary research question is related to frailty markers and not CFS. Information missing in relation to results for CFS. Composite outcome of increased disability or death. Low number of events **Comments:** Focuses on disability outcomes.

				A frailty phenotype, defined as at least 3 of 7 frailty markers, performed similarly to CFS in predicting death or increased disability at 6 months: aOR: 3.3 (1.2–9.0) vs. aOR 3.8 (1.2–11.7) for CFS.		
Fisher et al 2015 **Australia** Design: Prospective pilot feasibility study, Oct–Dec 2012 Setting: A tertiary referral, mixed medical surgical ICU at the Austin Hospital in Melbourne, Victoria.	Patients admitted to ICU. **n=205 patients** Age: mean 60y (±17.4) 59% male **ICU diagnoses:** 46% postoperative patients >1% respiratory disease **Selection of data reported:** APACHE III comorbidities, calculated chronic health scores, risk-of-death scores **Exclusions:** anticipated death within 24h, admission for palliative care, admission for organ donation	CFS 9pt scale CFS ≥5 defined as frail **Frailty assessment:** Within 24 hours of ICU admission, the next of kin or nurse in charge assigned a CFS score to the patient. Each patient was assessed on his or her first ICU admission only. CFS assessed by next of kin (n= 150) or nurse after review of medical record (n=55). **Feasibility:** Determined by number (%) of completed CFS forms	Moartality (hospital mortality, ICU mortality) Hospital and ICU length of stay, discharge destination	13% (28/205) frail patients CFS score obtained in 59% (205/348) patients. **Associations:** CFS score was not significantly associated with: ICU mortality: OR 0.98 (95% CI, 0.6 to 1.6) or hospital mortality: OR 1.07 (95% CI, 0.8 to 1.4)	**Aim**: To prospectively assess feasibility using the number (%) of completed DCFS scores, while the potential prognostic utility of the DCFS scores was determined by exploring the relationship between the DCFS, patient comorbidities, patient outcomes and length-of-stay (LOS). **Conclusion:** The DCFS was associated with patient age and comorbidities and potentially predicts increased hospital length-of-stay but not other outcomes.	**High Risk of bias** **Limitations** Not consecutive sample. Some information missing regarding analysis and results. Low number of events **Comments:** Pilot study.
Pugh et al 2017 **UK** Design:	**n=30 patients** Age: median 70.5 y 60% male	CSF **Frailty assessments:** Assessments were performed	Inter-rater reliability of CFS, between medical students and	Linear weighted kappa: 0.64 (95% CI, 0.40 to 0.87), suggesting a good level of agreement.	**Aim:** Inter-rater reliability of CFS assessments in critical care.	High risk of bias **Limitations**

Single center prospective study		independently by a medical student and a critical care doctor	critical care doctors			Not enough information presented **Comments:** Letter

ABBREVIATIONS: ADL = Activities of daily living; **aOR** = Adjusted odds ratio; **APACHE** = Acute Physiology and Chronic Health Evaluation; **AUC** = Area Under Curve; **CFS** = Clinical frailty scale; **CI** = Confidence interval; **CVC** = Central venous catheter; **d** = Days; **h** = Hours; **HR** = Hazard ratio; **HRQoL** = Health related quality of Life; **ICU** = Intensive care unit; **IQR** = Interquartile range; **LOS** = Length of stay; **LST** = Limitation of life-sustaining therapies; **mo** = Months; **NIV** = Non-invasive ventilation; **pt** = points; **QoL** = Quality of Life; **ROC** = Receiver operating characteristic; **RR** = Risk ratio; **RRT** = Renal replacement therapy; **SAPS** = Simplified Acute Physiology Score; **SD** = Standard deviation; **SOFA** = The sequential organ failure assessment; **y** = Years.