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(Editorial for: Routine frailty screening in critical illness- a population-based cohort study in Australia and New Zealand)

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Abbreviation List

APACHE III – Acute Physiology and Chronic Health Evaluation III

CFS – Clinical Frailty Scale

ICU – Intensive Care Unit

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Editorial

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Frailty screening in critical care at scale

The concept of frailty as a determinant of outcome from critical illness has resonated hugely with the critical care community since its description a decade ago. [1] Having long appreciated the importance of "physiological" as opposed to "chronological" age, frailty is now widely understood to represent a state of diminished physiological reserve more prevalent with age, which is associated with increased vulnerability towards adverse outcomes, but which is distinct from co-morbidity. [2] The Clinical Frailty Scale (CFS) lends itself to screening for frailty in the critical care setting; it has "face validity," combines clinical judgement with objective measurement, can be readily applied without adaptation, and has demonstrable reliability [3] and predictive validity. [4] Given global demographic trends and potential critical care resource requirements of an ageing population, the added value of frailty assessment to clinical discussions and decision-making, and to risk-adjusted outcome reporting have been highlighted previously. [5] However, until now there has been no published research regarding the feasibility and prognostic value of population-scale screening for frailty in the critically ill.

Darvall and colleagues' study published in this edition of Chest is therefore an important addition to the literature. [6] In a well-designed study, they report successful implementation of routine frailty screening using the CFS across diverse ICUs in Australia and New Zealand. Frailty was common in this cohort, approaching 1 in 5 patients when assessed at the time of admission. Consistent with findings in other studies, increasing frailty was associated with higher hospital mortality. Furthermore, addition of CFS score to the APACHE III-j risk prediction model improved model performance as measured by discriminant function (area under the receiver operating characteristics curve).

Importantly, the authors looked beyond mortality and investigated whether frailty was associated with a number of additional person-centered outcomes. The presence of frailty increased length of ICU and hospital stay and increased the likelihood of discharge to a nursing home or chronic care facility. Furthermore, patients with frailty were more likely to experience delirium and pressure injuries within ICU. These findings provide a more complete picture of the likely consequences of ICU admission in the context of frailty to inform clinicians and patients.

A significant strength of the study was the extremely large sample size (n= 234,568). The authors were able to conduct analyses using the Australian and New Zealand Intensive Care Society Adult Patient Database, a bi-national audit database. This allowed associations to be reported with precision for each category of the CFS, rather than the dichotomization that other studies have needed to undertake. Furthermore, this larger sample size allowed subgroup analyses to be undertaken in a younger cohort of patients, confirming that the presence of frailty was associated with worse outcomes.

An important limitation was the proportion of missing data relating to CFS recording. With 1 in 3 observations missing a value for the primary exposure, the potential for bias could have been substantial. Ideally, evaluating the impact of missing data requires an understanding of the mechanism by which missing data has arisen, along with sensitivity

analyses to impute missing values if the mechanism of missingness is random. [7] However, the authors undertook a number of additional analyses which were reassuring, indicating that the likelihood of significant bias due to missing data was low. This included a comparison of baseline characteristics in those with and without missing data, and subgroup analyses on ICUs with low levels of missing data.

Training of assessors was not mandated and the accuracy of CFS recording was not evaluated. Although the authors have suggested that lack of individualized training was not a significant barrier to implementation, this may have contributed to measurement error. As long as such error is non-differential (not systematically biased towards over- or under-estimating CFS), this would tend to reduce the strength of association between exposure and outcome. [8]

Lastly, the CFS was originally developed for a cohort of patients aged 65 years or more. [9] The inter-relationship between age, frailty and comorbidity is complex, and identification of "frailty" may have different biological and clinical implications across the age spectrum. [10,11] As such, this study provides much needed insight into the implications of frailty for younger people in critical care. 23% patients were aged less than 50 years, among whom frailty was identified in 6% (versus 23% in those 50 years and over). With the exceptions of chronic cardiovascular disease and metastatic cancer, the distribution of chronic illness followed a similar pattern according to frailty among younger and older patients. Variations in processes of care were evident, with an apparent decreasing tendency to undergo invasive ventilation with increasing frailty not observed in the younger cohort. However, the relationship between frailty and main outcome measures (hospital mortality, length of stay and discharge disposition) appeared consistent between age cohorts. Interestingly, risk of readmission among frail patients was recently reported to decrease with age when frailty was identified using administrative data; [12] longer-term outcome data which might evidence rate and extent of recovery from critical illness according to CFS, age cohort and comorbidity is therefore still greatly needed.

As with all studies using data collected in critical care audit databases, generalizing findings to other settings requires an understanding of critical care service organization, admission practices and prevailing cultural attitudes in wider society to critical care admission. This means that the prevalence of frailty and its association with outcomes in Australia and New Zealand may not necessarily translate to other settings. Similarly, whilst a dose-response relationship was demonstrated between CFS and a range of outcomes, these should be interpreted as being associations rather than ascribing causal inference.

To conclude, Darvall and colleagues have answered important questions as to the feasibility and prognostic value of large-scale frailty screening in the critically ill. Crucially, they have been able to evaluate the implications of frailty assessment among younger patients and provide assurance of the validity of routine frailty assessment using CFS among unselected patients admitted to adult critical care units.

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