# 2021 Best Research Poster Award

Barwon Health

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## Lean mass as a risk factor for Intensive Care Unit admission: an observational study

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### INTRODUCTION

Survivors of ICU are reported as having persistent physical impairments in the years following discharge[1]. it is not clear whether these impairments are completely or partially attributable to a lack of adequate recovery of the acute skeletal muscle wasting acquired during their time in the ICU[2], or to a continuation of pre-admission functional impairment caused by chronic disease or general frailty. ICU patients may have pre-existing low muscle mass which contributes to post-ICU impairments.

### OBJECTIVES

- Examine the association between lean mass and ICU admission risk in participants from a population-based cohort study
- Examine the relationship between pre-ICU lean mass and ICU outcomes including mortality and length of stay

### METHOD

A retrospective observational study was performed using all participants from the Geelong Osteoporosis Study (GOS)[3], a population-based cohort study. GOS participants undergo 1-5 yearly whole-body dual x-ray absorptiometry (DXA) scanning, which accurately measures lean mass; a surrogate for muscle mass. Admissions to University Hospital Geelong (UHG) ICU between June 1, 1998, and February 1, 2019, were identified among GOS participants. Cox proportional hazard regression models estimated hazard ratios (HR) for ICU admission across T-score strata and continuous values of DXA-derived lean mass measures of skeletal mass index (SMI, lean mass/body mass %) and appendicular lean mass corrected for height (ALM/$h^2$, kg/$m^2$). Multivariable regression analysis was used to determine the relationship between lean mass and ICU outcomes.

### RESULTS

One hundred and eighty-six of 3126 participants enrolled in GOS were admitted to UHG ICU during the follow up period, with 115 males, median age 66.6 {IQR 59.8, 73.6], and high proportion of surgical or cardiothoracic surgery patients (73.7). In adjusted models, lean mass was not predictive of ICU admission (Table 2) after adjustment for age and sex. However, greater appendicular lean mass was related to reduced 28-day mortality (ALM/$h^2$ adjOR: 0.25, 95%CI 0.10 to 0.63, p=0.003, SMI adjOR: 0.91, 95%CI 0.82 to 1.02 p=0.09).

**Table 1.** ICU admission risk based on lean mass: results from age and sex adjusted Cox models

| | T score | AdjHR (95%CI) | SE | P value |
|---|---|---|---|---|
| **SMI** | T >-1 | 1.00 | - | - |
| | -2< T ≤-1 | 1.00 (0.71-1.40) | 0.17 | 0.99 |
| | T ≤-2 | 1.51 (0.86 – 2.64) | 0.43 | 0.15 |
| **ALM/$h^2$** | T >-1 | 1.00 | - | - |
| | -2< T ≤-1 | 0.95 (0.67 – 1.34) | 0.17 | 0.75 |
| | T ≤-2 | 0.95 (0.49-1.83) | 0.32 | 0.88 |

### DISCUSSION

In this retrospective observational study lean mass was not a predictor of admission to ICU, indicating ICU patients had muscle mass comparable to non-ICU patients prior to admission. However, increased lean mass was associated with improved 28-day mortality, which could be due to protective factors of muscle during critical illness or improved physical reserve and lower frailty.

### CONCLUSION

Lean mass was not associated with ICU admission in this population-based cohort study, however greater appendicular lean mass was associated with reduced mortality. This suggests pre-ICU muscle status may not predict development of critical illness but is associated with better survival after critical illness occurs.

### REFERENCES

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