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Point-of-Care Ultrasound Frailty Assessments: Reply

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In Reply:

We thank Raveh *et al.*[1] and Ben-Menachem and Ashes[2] for their interest in our research. We are pleased that our article on preoperative point-of-care ultrasound to identify frailty[3] has generated discussions on best practices for measuring and reporting muscle mass as a predictor of patient outcomes. Increasing awareness of the varied approaches to measuring muscle mass and creating a collective body of work by different investigatory groups are paramount to moving research forward from associations to defining targeted interventions to improve patient outcomes.

Raveh *et al.*[1] question the utility of point-of-care ultrasound in general over dual-energy x-rays or computer tomography of psoas muscles or total appendicular muscle mass, given the vast number of publications supporting these more invasive assessments. Although we agree with Raveh *et al.*[1] that the current standard for measuring total appendicular muscle mass includes radiation emitting techniques that require scheduled time in the scanner, the goal of our pilot project was to explore a bedside model that would allow the clinician to perform assessments at the bedside to (1) allow rapid risk stratification, (2) provide a radiation-free methodology, and (3) not be limited by resource (scanner) utilization.

In addition, Ben-Menachem and Ashes[2] point out the lack of standardization regarding how to adequately account for indexation of muscle size to different body shape, sex, and ethnicity. We reported raw data in addition to indexed values specifically because of the varied reporting practices. Ideally, a study adequately powered to account for ethnicity, body shape, sex, and frailty status should be undertaken. This information would be high yield as more of us explore sarcopenia, muscle loss, and health outcomes.

We also thank Raveh *et al.*[1] for bringing up the false discovery rate, which we inadvertently omitted from the article. Using a *P* value threshold of 0.05 for table 3 (40 possible tests), the false discovery rate was estimated to be 25%, meaning that of the six tests we are

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Competing interests

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calling significant, it is likely that around two are false positives (using the methods of false discovery rate described by Storey[4]). It is also true we did not analyze whether differences in the AUC between the frailty surrogates were statistically significant. We felt that given the exploratory nature of this study and the relatively small sample size/event rates, this would be a somewhat underpowered endeavor. For your curiosity, we have now computed these comparisons for you (table 1). As expected, none of the differences were statistically significant.

We could not agree more with Raveh *et al.*[1] and Ben-Menachem and Ashes[2] that more work needs to be done to standardize measurement and reporting strategies. Our goal with the pilot study was to determine feasibility and hope that further work by us and other groups will bring us closer to identifying best practices for measurements and reporting strategies.

References

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Table 1.

Paired-sample Area Difference under the Receiver Operating Characteristics Curves

Characteristic	Area under the Curve (95% CI)
1 Quadriceps depth, cm	0.80 (0.64, 0.97)
2 Rectus femoris cross-sectional area, cm^2	0.70 (0.49, 0.91)
3 Psoas muscle area, cm^2	0.88 (0.76, 1.00)
4 Rectus femoris circumference, cm	0.67 (4.46, 0.88)

1 *versus* 2, $P = 0.088$; 1 *versus* 3, $P = 0.346$; 1 *versus* 4, $P = 0.106$; 2 *versus* 3, $P = 0.133$; 2 *versus* 4, $P = 0.439$; 3 *versus* 4, $P = 0.090$.