

## To: Ultrasonographic assessment of the muscle mass of the rectus femoris in mechanically ventilated patients at intensive care unit discharge is associated with deterioration of functional status at hospital discharge: a prospective cohort study

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### TO THE EDITOR

We read with interest the article by Quadros et al. on the relationship between the Barthel index (BI) and the cross-sectional area (CSA) of the rectus femoris muscle (RFM) and the thickness (TQ) of the quadriceps femoris muscle (QFM) in patients who required mechanical ventilation > 48 hours at discharge from the intensive care unit (ICU).<sup>(1)</sup> Of the 35 patients examined with muscle ultrasound, 20 were discharged with a BI < 60, and in these patients, the BI was positively correlated with the CSA of the RFM and the TQ of the QFM.<sup>(1)</sup> In a multivariate analysis, the CSA of RFM was a predictor of outcome in ventilated ICU patients.<sup>(1)</sup> The study is noteworthy, but several points should be discussed.

The first point is that muscle mass and volume depend not only on BI, but also on numerous other influencing factors. These include pre-hospital comorbidities, pre-hospital medications, physical activity, diet, length of hospital stay, duration of immobility and mechanical ventilation, and previous surgery on the lumbar spine, hips, pelvis or thighs.<sup>(2)</sup> In addition, muscle mass and volume may also depend on height, weight (BMI) and orthopaedic conditions (lumbar spine, hip, knee, thigh).<sup>(3)</sup> It is also important to know how many of the included patients had developed a critically ill neuropathy or myopathy during their stay in the ICU.<sup>(4)</sup> As long as these influencing factors are not included in the analysis, the results may not be reliable.

The second point is that measuring the TQ can be challenging to perform. Since the quadriceps consists of four muscles, it should be explained how it was possible to measure the thickness of all four parts of the quadriceps simultaneously in the same plane. At what height level was the CSA measured? Furthermore, the way the TQ was measured is not convincing. How did the authors define the “highest point of the thigh and superficial fascia”?<sup>(1)</sup>

The third point is that according to the method section, three measurements were performed, but only two were analyzed. Why was one measurement discarded? What was the variability between the three measurements? What was the coefficient of variance?

The fourth issue is that the six muscles on which the Medical Research Council (MRC) muscle force was assessed were not reported. When correlating CSA or TQ with MRC, it is important to know the muscle on which the MRC was determined. Weak limb muscles give a different correlation than those with normal muscle strength. It should also be noted that muscle weakness does not necessarily correlate with muscle atrophy and vice versa.

The fifth point is that it remained unclear why the TQ increased between Day 1 and Day 5 and decreased thereafter.

The sixth point is that the minimum sample size was calculated to be 59.<sup>(1)</sup> However, only 35 patients were ultimately included in the analysis. Therefore, the reported results may not be reliable due to the small sample size, and the analysis should be repeated with enough patients to obtain more reliable results.

Finally, the CSA and TQ should be compared with other ICU outcome parameters,<sup>(5,6)</sup> and we should know each patient's indication for ICU admission.

In conclusion, this fascinating study has limitations that affect the results and their interpretation. Addressing these limitations could strengthen the conclusions and support the study's message. The RFM CSA and QFM TQ cannot be used as outcome parameters of ventilated ICU patients until their validity has been confirmed by appropriate studies with an appropriate study design.

## AVAILABILITY OF DATA AND MATERIAL

All data are available from the corresponding author

## AUTHORS' CONTRIBUTION

J. Finsterer was responsible for the design and conception, discussed available data with coauthors, wrote the first draft, and gave final approval. F. A. Scorza and C. A. Scorza: contributed to literature search, discussion, correction, and final approval.

## Publisher's note

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