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# Lung ultrasound and ARDS: global collaboration is the way to go

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## Abstract

We would like to extend our gratitude to Dr. da Hora Passos et al. for their interest in our recently published review and meta-analysis in *Critical Care*. In this response, we will elaborate on the points raised by the authors. We agree with the authors that LUS, like any other diagnostic technique, is valuable and safe only when utilized by trained operators. The authors expressed uncertainty regarding the sensitivity of LUS in detecting mild ARDS or ARDS at an early stage. This variance in sensitivity is more likely due to diversity in diagnostic thresholds. We advocate for global collaboration among LUS experts to align LUS methodologies and strengthen the evidence supporting LUS in the diagnosis of ARDS and its morphological subphenotypes.

## Reply to Da Hora Passos et al.

We would like to extend our gratitude to Dr. da Hora Passos et al. [1] for their interest in our recently published review and meta-analysis in *Critical Care* [2]. We appreciate that the authors share our enthusiasm for the clinical application of lung ultrasound (LUS) in diagnosing acute respiratory distress syndrome (ARDS) and concur that ongoing research remains imperative. In this

response, we will elaborate on the points raised by the authors.

We agree with the authors that LUS, like any other diagnostic technique, is valuable and safe only when utilized by trained operators. Although several studies have demonstrated that LUS is relatively quick to learn, there is a pressing need to standardize training protocols to ensure that current literature can be effectively applied in clinical practice. Efforts to establish international consensus on LUS and to estimate interobserver agreement for LUS diagnosis of ARDS among various groups of operators will guide future progress.

The authors express uncertainty regarding the sensitivity of LUS in detecting mild ARDS or ARDS at an early stage. We, however, question whether these concerns are indeed significant. While detecting mild ARDS is inherently more complex than severe ARDS, LUS is generally known to be a highly sensitive technique and is unlikely to be less sensitive than chest radiography or substantially less sensitive than chest computed tomography [3]. The variance in sensitivity found in our review is, in our view, more likely due to diversity in diagnostic thresholds rather than an inherent limitation of LUS. For instance, one of the larger studies included in our meta-analysis demonstrated that LUS can diagnose or exclude ARDS with certainty using different thresholds [4]. Future

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studies need to adopt coherent approaches to determine optimal diagnostic thresholds. Regarding early diagnosis of ARDS, our review included larger studies where LUS was performed early during the ICU stay [4] or even in the ward or emergency department settings [5, 6]. Thus, we are confident in the capacity of LUS to detect ARDS also at an early stage.

The ability of LUS to differentiate between focal and non-focal subphenotypes is highly promising, as demonstrated by current studies, one of which has been externally validated [7]. However, we agree with the authors that current retrospective studies necessitate prospective validation with an adequate sample size.

Finally, we advocate for global collaboration among LUS experts to align LUS methodologies and strengthen the evidence supporting LUS in the diagnosis of ARDS and its morphological subphenotypes.

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#### Abbreviations

ARDS Acute respiratory distress syndrome  
LUS Lung ultrasound

#### Author contributions

M.S. and P.R.T. wrote the main manuscript text. M.B. reviewed manuscript text and provided references. W.A. reviewed manuscript text and provided abstract.

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#### Declarations

##### Ethics approval and consent to participate

Not applicable.

##### Consent for publication

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##### Competing interests

The authors declare no competing interests.

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