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Relevant Factors for Physical, Mental, and Cognitive Problems in ICU Survivors

To the Editor:

We were impressed by the article by Geense and colleagues, which clarified the baseline characteristics of patients admitted to the ICU (1). Their work will contribute to further epidemiological studies on post-intensive care syndrome (PICS). However, we would like to point out three concerns regarding this study.

First, there is insufficient information regarding ICU rehabilitation, although the authors emphasized the importance of rehabilitation for clinical practice in the discussion. Early mobilization may improve functional outcomes in patients admitted to the ICU (2). The long-term effects of early mobilization are unclear based on a previous systematic review (3). Did the prevalence of PICS differ between patients in the ICU who were provided early mobilization and those who were not? This information will help readers to acknowledge the importance of rehabilitation in the ICU.

Second, there is insufficient information about the disposition of participants, which may affect patient-reported outcomes (4). We would like to suggest including the following information to assess the significance of this study: 1) were the patients transferred or discharged? And 2) where did the participants live a year later (back in their original living place, or returning to work or not)?

Third, the authors did not report the number of cases imputed for missing values or conduct a complete case analysis. Imputation underestimates the SD, resulting in inappropriate confidence intervals (5). However, a complete case analysis assesses the significance of imputation by comparing each regression model. Addressing the aforementioned concerns can help readers interpret the results and further understand the importance of newly recognized physical, mental, and cognitive dysfunction in PICS. ■

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Author Contributions: All three authors contributed in the following ways: substantial contributions to the conception or design of the work; acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Originally Published in Press as DOI: 10.1164/rccm.202107-1714LE on August 24, 2021

Author disclosures are available with the text of this letter at www.atsjournals.org.

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Reply to Suzuki *et al.*

From the Authors:

We thank Suzuki and colleagues for their interest in our manuscript describing new long-term physical, mental, and cognitive health problems in ICU survivors 1 year after ICU admission, which was recently published in the *Journal* (1). In their letter, they pointed out three concerns regarding our study.

First, Suzuki and colleagues stated that there was insufficient information regarding ICU rehabilitation and questioned whether the prevalence of post-intensive care syndrome (PICS) would

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Originally Published in Press as DOI: 10.1164/rccm.202107-1778LE on August 24, 2021

differ between ICU patients who were mobilized early and those who were not. We agree that early mobilization might improve the long-term outcomes in ICU survivors. In our systematic review and meta-analysis, we found thin evidence that exercise programs, including early mobilization, might improve mental health outcomes in the long-term (2). Although we did not collect data regarding rehabilitation, early mobilization is common practice in most Dutch ICUs, at least in the MONITOR-IC (Multicenter Research Project: Measuring Consequences of Intensive Care for Intensive Care Unit Patients) participating centers. It is often a protocolized treatment and in line with the PADIS (Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption) guideline recommendations (3). Consequently, it is reasonable that most participants in this study were mobilized early during their ICU stay. Still, we cannot rule out that early mobilization affected our results, but it would be unlikely in view of the embedded intervention in our daily ICU care.

Their second concern was that we provided insufficient information regarding the disposition of participants, possibly affecting the patient-reported outcomes. This is a relevant comment, as mortality and, presumably, PICS rates are higher in patients being discharged to long-term care facilities than in patients being discharged home (4). However, discharge location data were not collected in the study, as Dutch ICUs are part of regional ICU networks for which patients could be transferred from an academic hospital to a peripheral hospital when academic care is no longer necessary and vice versa. Subsequently, data regarding transfers or discharge location are not reliable and less relevant. However, in response to the comments of Suzuki and colleagues, we performed additional analyses regarding participants' situations 1 year after ICU admission; 99% of the patients ($n = 2,255$) stated they were living at home and only 1% ($n = 26$) in a healthcare institution. Data of 64 patients were missing. In our study a total of 43% of the medical patients, 54% of the urgent surgical patients, and 34% of the elective surgical patients experienced work-related problems 1 year after ICU admission due to their critical illness (1).

Third, Suzuki and colleagues mentioned that we did not report the number of cases imputed for missing values and did not conduct a complete case analysis. We agree that imputing data may affect the outcome; however, we only imputed missing values according to the manuals of the used questionnaires using the half rule (5). Missing values of the revised Impact of Event Scale were replaced with the individual mean, provided that 75% of the items were completed, both accepted methods. Furthermore, to assess the direction and magnitude of possible participation

bias, various characteristics were compared between the complete cases and nonresponders (i.e., completed only the baseline questionnaire) and nonsurvivors (completed baseline questionnaire but died within the first year after ICU admission). As was reported, nonresponders and nonsurvivors differed significantly from the complete cases as they more often had a chronic condition, physical or mental health problems, and lower quality of life before ICU admission (Table E2 in our manuscript). The reported PICS rates in our paper might therefore indeed be an underestimation, as was considered as a limitation of our study (1). ■

Author disclosures are available with the text of this letter at www.atsjournals.org.

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