

CORRECTION

Correction: Risk factors of post-intubation hypotension in severe pneumonia patients

Pan Pan^{1,*}, Qing Hu², Yanwu Yang¹, Tao Cheng¹, Yu Cao¹

¹Department of Emergency Medicine, West China Hospital, Sichuan University, 610041 Chengdu, Sichuan, China

²Department of Hematology, West China Hospital, Sichuan University, 610041 Chengdu, Sichuan, China

*Correspondence

panpan@wchscu.cn (Pan Pan)

In the originally published article [1] (DOI: 10.22514/sv.2024.071), post-publication review by the Editorial Office identified several inappropriate or irrelevant citations in the Discussion section. These citations, particularly those used to support speculative interpretations regarding body weight and mechanistic explanations, were not sufficiently relevant to the topic of post-intubation hypotension in patients with severe pneumonia and may have caused confusion in the evidence chain supporting certain interpretive statements.

Additionally, the statement in the “Ethics Approval and Consent to Participate” section was inaccurate due to an inadvertent retention of a standard template phrase that did not apply to this study.

In collaboration with the authors, the following corrections have been made:

1. The speculative discussion related to the “obesity paradox” has been removed entirely from the corrected Discussion text.

2. Several inappropriate or unrelated references have been removed from the corrected Discussion text: [11], [12], [13], [14], [15], [17], [24], [25].

3. Additional references [26] and [27] were also removed as a consequence of the substantial rewriting of the Discussion (no replacement needed, as they were no longer applicable).

4. The following inappropriate references have been replaced with more relevant and directly supportive literature in the corrected Discussion text:

Original [11] replaced by: de Matos DG, de Santana JL, Aidar FJ, Cornish SM, Giesbrecht GG, Mendelson AA, *et al.* Cardiovascular regulation during active standing orthostatic stress in older adults living with frailty: a systematic review. *Archives of Gerontology and Geriatrics.* 2025; 136: 105894.

Original [12] replaced by: Choudhary MK, Holmström K, Bouquin H, Saarinen TP, Koskela JK, Pietilä E, *et al.* Impact of aging on cardiovascular dynamics and heart rate variability during passive head-up tilt. *Physiological Reports.* 2025; 13: e70477.

Original [13] replaced by: Zhou L, Cai G, Xu Z, Weng Q, Ye

Q, Chen C. High positive end expiratory pressure levels affect hemodynamics in elderly patients with hypertension admitted to the intensive care unit: a prospective cohort study. *BMC Pulmonary Medicine.* 2019; 19: 224.

Original [14] replaced by: Ralston MR, McCreath G, Lees ZJ, Salt IP, Sim MAB, Watson MJ, *et al.* Beyond body mass index: exploring the role of visceral adipose tissue in intensive care unit outcomes. *BJA Open.* 2025; 14: 100391.

Original [15] replaced by: Donckels F, Antonelli M, Arvaniti K, Creagh-Brown B, Conoscenti E, de Lange DW, *et al.*; Abdominal Sepsis Study AbSeS group on behalf of the Trials Group of the European Society of Intensive Care Medicine. Body mass index and mortality: the “obesity paradox” in critically ill patients with intra-abdominal infection or sepsis—an international cohort study. *Intensive and Critical Care Nursing.* 2026; 93: 104281.

Original [17] replaced by: Deulkar P, Singam A, Mudiganti VNKS, Jain A. Lactate monitoring in intensive care: a comprehensive review of its utility and interpretation. *Cureus.* 2024; 16: e66356.

5. The Discussion section has been revised to focus strictly on conclusions supported directly by the clinical data and topic-relevant literature. As a result, the revised Discussion cites fewer but more relevant references overall.

The corrected Discussion section is as follows:

“Discussion

The main finding of this study was that PIH was common, predictable, and clinically important in patients with SP. Advanced age, lower body weight, higher pre-intubation lactate levels, pre-intubation use of induction/sedative agents, COPD, and sepsis were identified as independent risk factors for PIH.

Studies have reported a PIH incidence of approximately 20%–52% [6, 7]. In the present study, 40.47% (170/420) of SP patients developed PIH, which is consistent with previous reports. ETI with mechanical ventilation is an essential intervention for airway protection and respiratory support in SP patients, particularly in the context of the increased burden of critical respiratory infections during the COVID-19 era [8]. Despite advances in airway management, ETI remains an invasive procedure and may lead to complications such

as airway injury, local bleeding, laryngeal edema, arrhythmia, and hemodynamic instability, including hypotension [9]. Importantly, PIH is not merely a transient post-procedural event; it reflects an acute mismatch between cardiovascular reserve and the physiological stress introduced by induction and positive-pressure ventilation. Therefore, identifying high-risk patients before ETI is clinically meaningful for peri-intubation preparation and early intervention.

Limited studies have explored predictors of PIH specifically in SP patients. Our results indicated that age was an independent risk factor. Advanced age is associated with reductions in pulmonary elasticity, respiratory muscle strength, and overall cardiopulmonary reserve, which may increase vulnerability during acute respiratory decompensation. Furthermore, aging is often accompanied by altered immune function and decreased host defense capacity [10], which may contribute to more severe infection and higher physiological stress at the time ETI becomes necessary. Beyond respiratory factors, elderly individuals may also have diminished cardiovascular compensatory mechanisms, such as reduced ability to augment cardiac output or vascular tone in response to sudden changes in preload and afterload [11, 12]. When sedation is administered and positive-pressure ventilation is initiated, venous return and sympathetic tone may decrease, making older patients more susceptible to hemodynamic deterioration [13]. These considerations suggest that elderly SP patients may require a more conservative peri-intubation strategy, including closer blood pressure monitoring, proactive optimization of intravascular volume when appropriate, and earlier use of vasoactive support when indicated.

This study also identified lower body weight as an independent risk factor for PIH. Clinically, body weight may reflect baseline nutritional status, physiological reserve, and tolerance to intravascular volume shifts in critically ill patients. Patients with lower body weight may be more vulnerable to the vasodilatory and myocardial depressant effects of sedative/induction agents and may have less buffering capacity against abrupt reductions in venous return following initiation of positive-pressure ventilation. Additionally, low body weight in severe infection may be a marker of frailty or chronic illness burden, which can further reduce the ability to compensate for peri-intubation stress. Although the association is clear in our cohort, the mechanisms linking low body weight to PIH remain uncertain. Future studies incorporating body mass index, body composition, and standardized hemodynamic management protocols are needed to further clarify whether low body weight is a modifiable risk marker or primarily a surrogate of reduced physiological reserve [14, 15].

Elevated lactate levels before intubation were also identified as an independent predictor of PIH. Lactate is widely recognized as an important biomarker in sepsis management and is commonly interpreted as a marker of tissue hypoperfusion and illness severity [5]. In SP, elevated lactate may result from hypoxemia, tissue hypoxia, metabolic stress, and impaired systemic perfusion [17, 18]. From a hemodynamic perspective, a higher lactate level prior to intubation may indicate that the patient is already near the limit of compensatory reserve. In such patients, even modest reductions in sympathetic tone or

venous return after induction and positive-pressure ventilation may precipitate hypotension. Therefore, lactate can serve as a practical pre-intubation signal of vulnerability and may help clinicians anticipate PIH risk. Previous observations have suggested that, even in hemodynamically stable patients with suspected infection, clinical deterioration and progression may occur and may be reflected by metabolic markers [19]. In addition, clinical use of lactate monitoring has been emphasized as a tool for risk stratification and evaluating response to resuscitation in critically ill patients [20]. Taken together, these findings support incorporating lactate assessment into pre-intubation evaluation and highlight the importance of optimizing perfusion status before ETI whenever feasible.

Another important finding was the association between pre-intubation use of induction/sedative agents and PIH. In critically ill patients, sedatives and induction agents may reduce sympathetic tone, cause vasodilation, and depress myocardial contractility, thereby increasing the likelihood of hypotension in patients with limited cardiovascular reserve. Moreover, the hemodynamic response may vary by the timing and regimen of medications administered during induction, and peri-intubation physiological instability may be influenced by these factors [16]. In SP patients, this issue may be particularly relevant because many are already hypoxemic, tachycardic, and physiologically stressed at baseline. Thus, cautious medication selection and dosing, consideration of individualized induction strategies, and early preparation for circulatory support may help mitigate PIH risk in susceptible patients.

COPD and sepsis were also independent predictors of PIH. COPD is characterized by persistent airflow limitation and chronic respiratory symptoms, and it is frequently linked with smoking exposure [21]. Smoking has been associated with increased susceptibility to infections and adverse respiratory outcomes [22], which may contribute to the severity of pneumonia and the need for ETI. From a peri-intubation perspective, COPD patients may have reduced cardiopulmonary reserve and may be more vulnerable to the transition to positive-pressure ventilation. Additionally, COPD management may involve medications (including corticosteroids in some contexts) that could influence stress responses and overall physiological reserve; the combined burden of chronic lung disease and acute severe infection may therefore increase susceptibility to hemodynamic instability. The complex clinical interplay between COPD and pneumonia has been recognized, and pneumonia in COPD patients can present with higher severity and worse outcomes [23]. In our cohort, COPD likely functioned as both a marker of reduced reserve and a contributor to peri-intubation vulnerability. Regarding sepsis, sepsis-related vasodilation, capillary leak, and relative hypovolemia can reduce effective circulating volume and vascular tone, predisposing patients to hypotension during and after ETI [5]. In clinical practice, SP patients with concurrent sepsis or COPD may therefore warrant enhanced peri-intubation monitoring and proactive hemodynamic preparation.

Overall, these findings indicate that PIH development in SP patients is multifactorial. A practical implication is that risk stratification should integrate baseline vulnerability (age, low body weight, COPD), current illness severity and perfusion status (lactate, sepsis), and procedural factors (use of

induction/sedative agents). Identification of high-risk patients before ETI may allow clinicians to implement preventive measures, including optimized fluid management when appropriate, cautious induction strategies, and timely vasopressor support with close monitoring of hemodynamic trends.

This study had some limitations. First, its retrospective case-control design precludes causal conclusions regarding PIH development. Second, data were derived from electronic medical records, and several potentially relevant variables were unavailable, including detailed cardiac function measures, right ventricular function, ventilator settings (*e.g.*, PEEP), and medication exposures such as corticosteroids. These factors may influence peri-intubation hemodynamics and should be incorporated in future prospective studies. In addition, future work could explore whether integrating lactate with clinical indices and comorbidity profiles can improve prediction performance and inform standardized peri-intubation hemodynamic protocols.”

6. The statement in the “Ethics Approval and Consent to Participate” section has been corrected for accuracy.

The original incorrect statement (“All participants provided consent to participate in the study.”) was an inadvertent carry-over from a standard template and did not reflect the retrospective design of the study.

The corrected statement reads as follows:

“Ethics Approval and Consent to Participate

The study was approved by the Biomedical Ethics Review

Committee of West China Hospital of Sichuan University, Approval number: 493 in 2022. Informed consent was waived by the Biomedical Ethics Review Committee of West China Hospital of Sichuan University due to the retrospective design and use of anonymized medical records. All methods were performed according to the relevant guidelines and regulations.”

The authors confirm that these corrections do not affect the study’s methodology, statistical analyses, results, or the primary conclusions regarding the independent risk factors for post-intubation hypotension (age, low body weight, elevated lactate, inducer use, COPD, and sepsis).

The authors sincerely apologize to the editors, reviewers, and readers for this oversight and for any inconvenience caused. This Correction has been approved by the Editor-in-Chief. The corrected versions of the Discussion section and the “Ethics Approval and Consent to Participate” statement are provided in this Correction to maintain the accuracy and integrity of the scientific record. The original article PDF remains available as published and has not been altered. Readers are advised to refer to this Correction for the corrected Discussion section and ethics statement, where the deleted or replaced references are no longer cited or relied upon.

REFERENCES

- [1] Pan P, Hu Q, Yang YW, Cheng T, Cao Y. Risk factors of post-intubation hypotension in severe pneumonia patients. *Signa Vitae*. 2024; 20: 52–57.