

Exploring the Threshold: ICU Duration and Post-Intensive Care SyndromeArpan Muniyal¹, Dhruv Sethi², Kaushiki Saha³, Jaskaranjeet Kaur⁴^{1,2,3,4}Senior Resident, Esic Medical College, Faridabad

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Abstract:

Introduction: Indeed, concentrating only on patients who require extended stays in the intensive care unit may miss crucial information about how patients who require shorter stays recover. Following a brief ICU stay, recovery might bring new considerations and problems. For example, even brief episodes of severe illness and ICU admission can result in functional limits, psychological discomfort, cognitive decline, and physical weakening. A patient's quality of life and capacity to reintegrate into regular activities may be greatly impacted by these problems.

Materials & Methods: Routine data gathering included access to retrospective information about the ICU stay. Some of these were length of stay in the intensive care unit and amount of time on mechanical ventilation. Notably, the study sample purposefully included patients who had brief stays in the intensive care unit. The data showed in the table are represented as “n” which is number of patients and (%) percentage calculated.

Results: Sixty two of the 232 participants had at least one post-ICU impairment that was identified six months after they were released from the ICU. Of these, 39 patients (17%) had only been in the ICU for less than 72 hours.

Conclusion: Six months after being discharged, a number of patients who were in the ICU for less than 72 hours are reporting post-ICU impairment. Research and treatments pertaining to this group are sometimes neglected. Further research on post-ICU damage in patients who stay shorter periods is warranted.

Keywords: Critical care, ICU duration, Post intensive care syndrome, post ICU impairment, patient care.

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Introduction

As more patients successfully navigate the ICU, attention in academia and clinical practice has turned towards ensuring the quality of their survival. Up to 80% of individuals leaving the ICU encounter persistent cognitive, psychological, or physical challenges, collectively termed post-intensive care syndrome (PICS), which can endure for years, posing significant burdens on patients, families, and society [1]. Despite more than a decade of research, understanding the causes and identifying the most effective prevention and treatment approaches for PICS remains a challenge and a continued focus [1]. Enhancing recovery is not just a moral obligation but also an economic necessity.

Two main obstacles need to be overcome in order to progress evidence-based prevention and treatment techniques [2] that are intended to improve outcomes. First and foremost, we must identify the traits of ICU patients who are susceptible to PICS, including both changeable and immutable risk factors [3]. We also need to figure out how these things get in the way of the healing

process. Owing to the complicated and varied character of PICS, patient selection and therapy have an inherent impact on our understanding [4]. A recent systematic review found that an ICU length of stay (LoS) of at least 24, 48, or 72 hours was a requirement for inclusion in nearly half of the relevant studies [3]. This shows that there may be a belief that PICS risk is low enough in patients who spend less time in the intensive care unit (ICU) to not require further research or treatment.

This viewpoint might originate from well-established data showing that prolonged ventilation and ICU bed use can exacerbate post-ICU recovery [5]. However, even if patients who stay longer in the intensive care unit (ICU) may be more susceptible to PICS, it is still necessary to look into the course of recovery after shorter ICU stays unless there is clear proof that there is no PICS burden among these individuals. The tracking outcomes post-intensive care (TOPIC) study [6], a prospective observational study that enrolled people who were released from specific intensive care units, served as the basis for the secondary

analysis used in this manuscript. Six months after being discharged from the intensive care unit, 132 individuals were assessed to determine any impairment using validated and standardized self-report tools. Physical impairment (EQ-5D-5L [7]), cognitive impairment (PROMIS-Cog-8a [8]), anxiety and depression (Hospital Anxiety and Depression Scale (HADS [9])), and post-traumatic stress disorder (PTSD) (Trauma Screening Questionnaire (TSQ [10])) were all evaluated as part of these tests.

Materials & Methods

According to our technique, thorough data collection required careful access to historical patient ICU data. Important factors were meticulously recorded, including the length of stay in the critical care unit and the amount of time on mechanical ventilation.

Notably, we purposefully included patients with short ICU stays in our study sample to increase diversity. In particular, 77 people, or 58% of the sample as a whole, were in the intensive care unit for less than 72 hours. With this intentional inclusion, we hope to offer a comprehensive picture of the experiences and results of patients who have had varying lengths of ICU hospitalizations. We aimed to incorporate a wide variety of ICU durations in order to fully represent the range of patient experiences and provide insight into the possible effects of varying ICU stays on outcomes related to post-intensive care, such as the emergence of Post-Intensive Care Syndrome (PICS), we included a wide range of ICU lengths in our study.

Inclusion and Exclusion Criteria: We developed exact guidelines for including patients in our studies. Those patients considered were those who had been admitted to the intensive care unit (ICU)

and for whom prior records regarding their ICU stay were available. By adding patients with a range of lengths of stay in the intensive care unit, we were able to guarantee sample diversity. Individuals with known pre-existing cognitive impairments or those whose ICU stay data were insufficient or missing were not included.

Study design: In this study, a retrospective observational approach was adopted. Data was collected from electronic health records of patients admitted to the intensive care unit (ICU) within a specified time frame. Examining the connection between the length of stay in the intensive care unit and the onset of post-intensive care syndrome (PICS) was the primary objective. We made an effort to incorporate a wide variety of ICU durations in order to accurately reflect the spectrum of patient experiences.

Data Collection: Comprehensive data collection was made possible by access to historical patient information stored in the hospital's electronic medical records system. Important features that were documented included the duration of stay in the critical care unit, the amount of time spent on artificial breathing, demographic information, medical history, and relevant clinical outcomes. To ensure consistency and quality, the data was gathered by qualified research personnel.

Statistical Analysis: Statistical analysis was performed to assess the relationship between the length of stay in the critical care unit and the development of PICS. Descriptive statistics were used to summarise the characteristics of the patients and the ICU outcomes. The data showed in the table are represented as “n” which is number of patients and (%) percentage calculated.

Results

Table1: Relationship between Ventilation duration and impairment at 6 months.

Ventilation Duration	No. of patients (n) (%)		Post ICU Impairment (n) (%)	
Non- ventilated	42	18.13	21	9.05
1-8 hrs	56	24.13	14	6.03
8-16 hrs	21	9.05	7	3.01
16-24 hrs	10	4.31	5	2.15
24-32 hrs	9	3.87	0	0
32-40 hrs	5	2.15	0	0
40-48 Hours	4	1.72	0	0
>48 hrs	15	6.46	23	9.91
Total	162	69.82	70	30.17

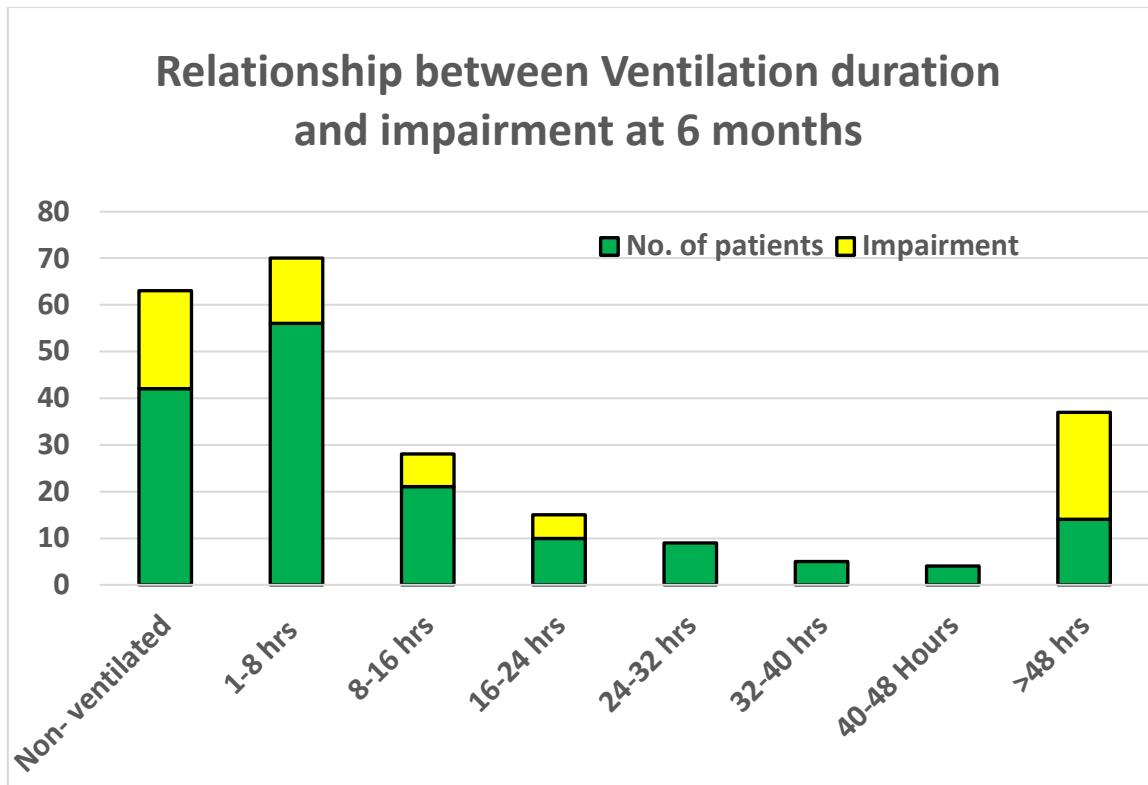


Figure 1: Relationship between Ventilation duration and impairment at 6 months

Interpretation (Table 1): Decreasing Impairment with Decreasing Breathing time: It seems that a trend exists indicating that a decrease in breathing time corresponds to a decrease in the percentage of people with post-ICU impairment. For instance, the percentage of patients with post-ICU impairment falls to 0% in the "24-32 hrs" and "32-40 hrs" categories from 9.05% in the "Non-ventilated" category.

Minimum Rate of Deterioration for Short-Duration Ventilation Types: The lowest rates of post-ICU impairment are seen in the groups "24-32 hrs" and

"32-40 hrs," where no patients reported impairment. This suggests that ventilation times within this range may be associated with a lower risk of post-ICU deterioration.

Increase in Impairment over 48 Hours: It's noteworthy to note that the percentage of patients in the ">48 hrs" category who have post-ICU impairment has somewhat increased compared to the previous categories. This implies that a ventilatory stay longer than 48 hours may be associated with a higher chance of impairment while in the intensive care unit.

Table 2: Relationship between ICU stay and impairment at 6 months

ICU length of stay	No. of patients (n) (%)		Post ICU Impairment (n) (%)	
<24	23	9.91	16	6.89
24-48 hrs	45	19.39	16	6.89
48-72 hrs	28	12.06	7	3.01
72-96 hrs	21	9.05	7	3.01
96-120 hrs	12	5.17	4	1.72
120-144 hrs	9	3.87	4	1.72
144- 168	5	2.15	2	0.86
168-192 hrs	2	0.86	0	0
192 -216 hrs	4	1.72	4	1.72
216 -240 hrs	0	0	2	0.86
>240 hrs	11	4.74	10	4.31
Total	160	68.96	72	31.03

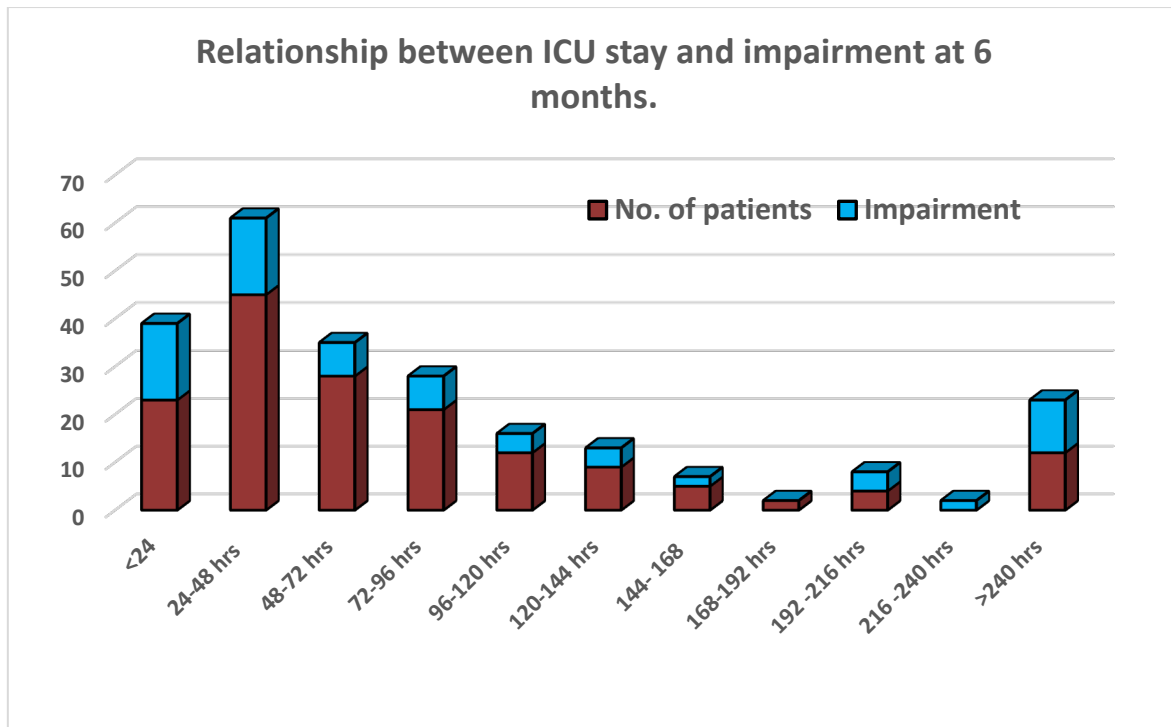


Figure 2: Relationship between ICU stay and impairment at 6 months

Interpretation (Table 2): Growing Impairment with Extended ICU Stays: A trend seems to be showing that the percentage of patients who experience post-ICU impairment increases as the length of ICU stay increases. For instance, the percentage of patients with post-ICU impairment rises from 6.89% in the "24-48 hrs" category to 31.03% in the ">240 hrs" group. Maximum Impairment percentage in Extended ICU Stays: ">240 hrs" represents 31.03% of patients, making it the category with the greatest percentage of post-ICU impairment. This implies that an increased risk of impairment during ICU hospitalization may be associated with stays in the intensive care unit (ICU) longer than 240 hours.

Minimum Level of Impairment for Short-Term ICU Admissions: Conversely, post-ICU disability rates are lowest in groups with shorter ICU stays. Given that 6.89% of patients in the "<24" hour category experienced post-ICU impairment, shorter ICU stays may be associated with a lower risk of this condition.

Discussion

The findings of our study demonstrate the significant prevalence of post-intensive care syndrome (PICS) among intensive care unit (ICU) patients with varying lengths of stay (LoS). Our results imply that a considerable portion of patients with post-ICU deficits, including those who stay longer and those who are released from critical care units (ICUs), during brief stays. The first thing to think about is the frequency of PICS in patients who have short stays in the intensive care unit [11].

While longer ICU stays have typically been associated with higher PICS risks, our results emphasise the need to better understand the morbidity that shorter ICU stays cause in patients [1,5,12,13]. We highlight the fact that over 50% of the patients in our study had an ICU LoS of less than 72 hours, suggesting that a significant number of patients may still be susceptible to post-ICU deficits even with brief ICU stays. We also discuss the common exclusion of patients with brief ICU stays from post-ICU research and follow-up care. This exclusion could lead to an underestimation and under treatment of post-ICU impairments in this sample. The study of AL Harbi et al 2024 explored that early mobilisation was evaluated as highly significant by 40.6 % of the respondents. [14,15]

We also look into the potential reasons why some patients who leave the ICU early develop PICS. While acknowledging that variables like immobilisation and ICU delirium may contribute to lengthier ICU stays, we suggest that the factors contributing to PICS among patients with shorter hospital stays may vary. Prescription medication, surgical procedures, the beginning of illness or injury, and external support systems are a few examples of pre-, intra-, and post-ICU elements.

All things considered, our study emphasises how important it is to recognise and address post-ICU impairments in patients with a range of ICU stays. We emphasise how crucial it is to involve patients with shorter ICU stays in future research and

therapy activities in order to mitigate the impact of PICS in this population.

Limitation

Acknowledging various constraints is crucial when evaluating the importance of the research outcomes. First off, the findings may not have been as applicable to other healthcare settings that deal with different patient demographics and behaviors due to the fact that our research was restricted to a specific healthcare context.

Moreover, our study design does not establish a cause and effect relationship, and confounding variables may have been missed in our analysis, despite the fact that our aim was to look into the relationship between post-ICU disability and ICU duration.

Conclusion

The frequency of Post-Intensive Care Syndrome (PICS) with varying ICU stay durations is highlighted in our study's conclusion. We emphasize the need of recognizing and treating deficiencies in patients receiving both short-term and long-term care in the intensive care unit. Moreover, we endorse a comprehensive approach to PICS management that prioritizes modifiable components such as delirium prevention and improving the patient's ICU stay. By addressing these problems, medical practitioners can decrease the impacts of PICS and enhance results. In the future, investigations and treatments should involve patients with a range of ICU stays in order to completely address the challenges presented by PICS and improve the quality of life for ICU survivors.

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