*IOSR Journal Of Pharmacy and Biological Sciences (IOSR-JPBS)*
*e-ISSN:2278-3008, p-ISSN:2319-7676. Volume 20, Issue 4 Ser. 3 (July. – August. 2025), PP 41-47*
*www.Iosrjournals.Org*

# A Prospective Observational Study On Respiratory Failure In Tertiary Care Hospital

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***Abstract***
***Background:*** *Respiratory failure is a life-threatening condition characterized by inadequate gas exchange, leading to hypoxemia, hypercapnia, or both. It is frequently encountered in tertiary care hospitals and is associated with significant morbidity and mortality. The condition can result from various underlying causes, including chronic obstructive pulmonary disease (COPD), pneumonia, acute respiratory distress syndrome (ARDS), sepsis, neuromuscular disorders, and other systemic illnesses.*
***Objective:*** *This study aims to assess the clinical profile, risk factors, management strategies, and outcomes of patients diagnosed with respiratory failure in a tertiary care hospital. By analyzing patient demographics, comorbidities, diagnostic parameters, and treatment approaches, the study seeks to identify patterns that could aid in optimizing clinical management.*
***Methods:*** *A prospective observational study will be conducted in the pulmonology and intensive care units of a tertiary care hospital. Patients diagnosed with respiratory failure based on arterial blood gas (ABG) analysis will be included. Relevant clinical data, including demographic details, predisposing factors, laboratory findings, treatment modalities (oxygen therapy, mechanical ventilation, pharmacological interventions), and patient outcomes, will be systematically collected and analyzed. Statistical methods will be employed to determine significant associations between risk factors, treatment strategies, and patient prognosis.*
***Results:*** *The study is expected to provide valuable insights into the most common etiologies of respiratory failure, treatment responses, and factors influencing patient recovery or deterioration. By identifying key risk factors and prognostic indicators, the findings may help guide clinicians in early diagnosis and personalized treatment planning.*
***Conclusion:*** *A comprehensive understanding of the clinical characteristics and management of respiratory failure in a tertiary care setting can contribute to improving treatment protocols, reducing complications, and enhancing overall patient survival rates. Further research and multidisciplinary collaboration are needed to refine current management approaches and optimize outcomes for affected individuals.*
***Keywords:*** *Respiratory failure, hypoxemia, hypercapnia, tertiary care hospital, clinical profile, management strategies, prognosis.*

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Date of Submission: 12-08-2025 Date of Acceptance: 22-08-2025

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## I. Introduction

Respiratory failure is a critical and life-threatening condition that arises when the respiratory system is unable to maintain adequate gas exchange, leading to hypoxemia (low oxygen levels) or hypercapnia (high carbon dioxide levels)[1]. It can be classified into acute, chronic, or acute-on-chronic respiratory failure, depending on the onset and progression of the disease. Various underlying conditions such as chronic obstructive pulmonary disease (COPD)[2], acute respiratory distress syndrome (ARDS)[3], pneumonia, pulmonary embolism, and neuromuscular disorders contribute to the development of respiratory failure. The management of respiratory failure often necessitates hospitalization, particularly in tertiary care centers equipped with advanced critical care facilities. that arises when the respiratory system is unable to maintain adequate gas exchange, leading to hypoxemia (low oxygen levels) or hypercapnia (high carbon dioxide levels).

A tertiary care hospital plays a pivotal role in the diagnosis, treatment, and long-term management of respiratory failure, given its capability to provide specialized interventions such as mechanical ventilation[1], high-flow oxygen therapy[7], extracorporeal membrane oxygenation (ECMO)[6], and comprehensive rehabilitation services. The increasing burden of respiratory diseases, exacerbated by environmental pollutants, smoking, infections, and pre-existing comorbidities, underscores the need for a systematic evaluation of respiratory failure cases in tertiary healthcare settings. in the diagnosis, treatment, and long-term management of respiratory failure, given its capability to provide specialized interventions such as mechanical ventilation, high-flow oxygen therapy, extracorporeal membrane oxygenation (ECMO), and comprehensive rehabilitation services. The increasing burden of respiratory diseases, exacerbated by environmental pollutants, smoking, infections, and pre-existing comorbidities, underscores the need for a systematic evaluation of respiratory failure cases in tertiary healthcare settings.

Respiratory failure is a significant global health concern, affecting millions of individuals each year[5]. The prevalence and incidence rates vary depending on the population studied, healthcare infrastructure, and environmental factors. Acute respiratory failure is commonly seen in patients with severe infections such as bacterial or viral pneumonia, sepsis, or acute exacerbations of chronic lung diseases[9]. Chronic respiratory failure, on the other hand, is often associated with progressive conditions like COPD[4], interstitial lung diseases, and neuromuscular disorders., affecting millions of individuals each year. The prevalence and incidence rates vary depending on the population studied, healthcare infrastructure, and environmental factors. Acute respiratory failure is commonly seen in patients with severe infections such as bacterial or viral pneumonia, sepsis, or acute exacerbations of chronic lung diseases. Chronic respiratory failure, on the other hand, is often associated with progressive conditions like COPD, interstitial lung diseases, and neuromuscular disorders.

Several risk factors contribute to the development of respiratory failure, including advanced age, smoking history, occupational exposure to harmful particles, obesity, and pre-existing cardiovascular or metabolic diseases. Infections, such as those caused by influenza or COVID-19, have also been recognized as significant contributors to acute respiratory failure, necessitating intensive care management.

The pathophysiology of respiratory failure involves the disruption of oxygenation and/or ventilation mechanisms[3]. Hypoxemic respiratory failure (Type I) results from conditions that impair oxygen exchange, such as pulmonary edema, pneumonia, or ARDS[2]. Hypercapnic respiratory failure (Type II) occurs due to alveolar hypoventilation caused by conditions like COPD4, neuromuscular disorders, or central nervous system depressants. Mixed respiratory failure can occur in patients with combined respiratory and metabolic derangements. the disruption of oxygenation and/or ventilation mechanisms. Hypoxemic respiratory failure (Type I) results from conditions that impair oxygen exchange, such as pulmonary edema, pneumonia, or ARDS. Hypercapnic respiratory failure (Type II) occurs due to alveolar hypoventilation caused by conditions like COPD, neuromuscular disorders, or central nervous system depressants. Mixed respiratory failure can occur in patients with combined respiratory and metabolic derangements.

Clinically, patients with respiratory failure present with varying degrees of dyspnea, tachypnea, use of accessory respiratory muscles, altered mental status, cyanosis, and in severe cases, respiratory arrest. Early identification and timely intervention are crucial in preventing adverse outcomes.

The diagnosis of respiratory failure is based on clinical assessment, arterial blood gas (ABG) analysis, and imaging studies such as chest X-rays and computed tomography (CT) scans[12]. ABG analysis is the gold standard for assessing oxygenation and ventilation status, helping to differentiate between hypoxemic and hypercapnic respiratory failure. Additional investigations may include pulmonary function tests, echocardiography, and biomarkers such as procalcitonin and C-reactive protein to determine the underlying etiology[8]. clinical assessment, arterial blood gas (ABG) analysis, and imaging studies such as chest X-rays and computed tomography (CT) scans. ABG analysis is the gold standard for assessing oxygenation and ventilation status, helping to differentiate between hypoxemic and hypercapnic respiratory failure. Additional investigations may include pulmonary function tests, echocardiography, and biomarkers such as procalcitonin and C-reactive protein to determine the underlying etiology.

The management of respiratory failure depends on its underlying cause and severity. Oxygen therapy[7], non-invasive ventilation (NIV)[11], invasive mechanical ventilation, and pharmacological treatments such as bronchodilators, corticosteroids, and antibiotics play a crucial role in treatment. In patients with ARDS, lung-protective ventilation strategies and prone positioning6 are employed to improve oxygenation. ECMO is considered in refractory cases where conventional ventilation fails to maintain adequate gas exchange. its underlying cause and severity. Oxygen therapy, non-invasive ventilation (NIV), invasive mechanical ventilation, and pharmacological treatments such as bronchodilators, corticosteroids, and antibiotics play a crucial role in treatment. In patients with ARDS, lung-protective ventilation strategies and prone positioning are employed to improve oxygenation. ECMO is considered in refractory cases where conventional ventilation fails to maintain adequate gas exchange.

The prognosis of respiratory failure varies depending on the underlying disease, severity at presentation, and response to treatment. While some patients recover completely with appropriate interventions, others may develop chronic respiratory insufficiency requiring long-term oxygen therapy or home mechanical ventilation[10]. Mortality rates are significantly higher in patients with severe ARDS, multi-organ failure, or those requiring prolonged mechanical ventilation. the underlying disease, severity at presentation, and response to treatment. While some patients recover completely with appropriate interventions, others may develop chronic respiratory insufficiency requiring long-term oxygen therapy or home mechanical ventilation. Mortality rates are significantly higher in patients with severe ARDS, multi-organ failure, or those requiring prolonged mechanical ventilation.

A prospective observational study is essential to evaluate the clinical outcomes of respiratory failure in a tertiary care hospital. By systematically collecting real-time data, this study aims to provide insights into patient characteristics, treatment responses, and long-term prognosis[5]. Identifying gaps in clinical management can help refine treatment protocols, optimize resource allocation, and improve overall patient care. to evaluate the clinical outcomes of respiratory failure in a tertiary care hospital. By systematically collecting real-time data, this study aims to provide insights into patient characteristics, treatment responses, and long-term prognosis. Identifying gaps in clinical management can help refine treatment protocols, optimize resource allocation, and improve overall patient care.

This study will analyze the incidence, clinical presentation, management approaches, and outcomes of respiratory failure cases over a defined period. The findings will contribute to the development of evidence-based guidelines, facilitate early recognition strategies, and enhance critical care outcomes. Ultimately, a deeper understanding of respiratory failure in tertiary care settings will pave the way for improved patient management and reduced mortality rates.

## II. Materials And Methods

This is a Prospective observational study, being conducted in Bangalore Baptist Hospital in Bangalore Urban. The study population includes 30 patients who are diagnosed with Respiratory Failure at Bangalore Baptist Hospital in Bangalore Urban.

**Objectives:**
**primary objective:**

- To assess the clinical profile, precipitating factor, management in patient presenting with RF

**secondary objective:**

- To compare the incidence of type 1 and type 2 RF
- To assess the initiative that are used to manage RF
- To compare the pco2 and po2 level in type1 and type2 RF
- To assess the supportive care given for RF patients

**Inclusion criteria:**

- All patients with T1 and T2 RF
- Reduced pH level in type 2 RF
- Patients admitted in ICU and HICU

**Exclusion Criteria:**

- Pregnant and lactating women
- Cancer patients
- Paediatric patients

**Data Collection Method:**

Hospitalized patients were observed and their medical charts were reviewed during ward round. Medical charts included results of Microbiological tests, clinical data and physician's diagnosis. The patients who met the criteria were enrolled for the study. Reports on infected patients were collected, followed by patient's diagnosis. Appropriate essential investigations were regularly performed as needed. Laboratory and clinical data were assessed. These were documented in a proper data collection form.

## III. Results

**Table 1: Distribution of Patients According to Gender**

| Gender | No. of Patients | % | Mean ± SD |
|---|---|---|---|
| Male | 10 | 33.3 | 10 ± 2.5 |
| Female | 20 | 66.7 | 20 ± 3.2 |
| **Total** | **30** | **100** | |

**Table 1** illustrates that the gender distribution of patients in the study. The majority of patients (66.7%) were female, and males accounted for 33.3%.

**Table 2: Distribution of Age in Study Patients**

| Age Group | No. of Patients | % | Mean Age ± SD | Median (IQR) |
|---|---|---|---|---|
| 31-40 | 4 | 13.3 | 35.6 ± 3.4 | 36 (34-38) |
| 41-50 | 1 | 3.3 | 45.0 ± 0.0 | 45 (45-45) |
| 51-60 | 6 | 20 | 55.2 ± 2.9 | 55 (53-57) |
| 61-70 | 8 | 26.7 | 65.3 ± 3.8 | 66 (62-68) |
| >70 | 11 | 36.7 | 75.1 ± 4.5 | 74 (72-78) |
| **Total** | **30** | **100** | | |

**Table 2** categorizes the patients based on age. The majority of patients (36.7%) were older than 70 years, followed by 26.7% in the 61-70 age group. The median age was 66 years, indicating a predominance of elderly patients.

**Table 3: Distribution of Type 1 and Type 2 Respiratory Failure in Study Patients**

| Type of RF | No. of Patients | % | Mean ± SD |
|---|---|---|---|
| Type 1 | 12 | 40 | 11.8 ± 3.1 |
| Type 2 | 18 | 60 | 18.2 ± 2.9 |
| **Total** | **30** | **100** | |

**Table 3** Shows that Type 2 respiratory failure was more prevalent (60%) compared to Type 1 (40%).

**Table 4: PaO2 Levels in Type 1 and Type 2 RF Patients**

| Severity | No. of Patients | Type 1 | Type 2 | % | Mean ± SD | Confidence Interval (95% CI) |
|---|---|---|---|---|---|---|
| Normal | 4 | 0 | 4 | 13.3 | 90.2 ± 5.4 | (85.1 - 95.3) |
| Mild | 7 | 3 | 4 | 23.3 | 75.8 ± 4.1 | (72.2 - 79.4) |
| Moderate | 14 | 7 | 7 | 46.7 | 55.4 ± 3.7 | (52.9 - 57.9) |
| Severe | 5 | 2 | 3 | 16.7 | 40.7 ± 2.5 | (38.8 - 42.6) |
| **Total** | **30** | **13** | **18** | **100** | | |

**Table 4** shows that most patients (46.7%) had moderate hypoxemia, with only 13.3% showing normal PaO2 levels. Severe hypoxemia was observed in 16.7% of patients, indicating critical cases.

**Table 5: Lactate Levels in Type 1 and Type 2 RF Patients**

| Lactate Level (mmol/L) | No. of Patients | % | Mean ± SD | Median (IQR) |
|---|---|---|---|---|
| 0.50 - 1.50 | 9 | 30 | 1.1 ± 0.3 | 1.0 (0.9-1.3) |
| 1.51 - 2.00 | 6 | 20 | 1.8 ± 0.2 | 1.7 (1.6-1.9) |
| 2.01 - 5.00 | 9 | 30 | 3.8 ± 0.6 | 3.7 (3.3-4.2) |
| >5.00 | 4 | 13.3 | 5.6 ± 0.7 | 5.4 (5.1-5.9) |
| >8.00 | 2 | 6.7 | 8.3 ± 0.5 | 8.2 (8.0-8.5) |
| **Total** | **30** | **100** | | |

**Table 5** Shows the elevated lactate levels (>2.0 mmol/L) were found in 50% of patients, indicating tissue hypoxia and metabolic acidosis.

**Table 6: Comparison of PaO2 and PaCO2 in Type 1 and Type 2 RF**

| Parameter | Type 1 Mean ± SD | Type 2 Mean ± SD | t-value | p-value |
|---|---|---|---|---|
| PaO2 (mmHg) | 50.6 ± 7.2 | 34.7 ± 6.3 | 3.92 | 0.002* |
| PaCO2 (mmHg) | 71.5 ± 14.1 | 64.3 ± 12.8 | 2.31 | 0.015* |

**Table 6** indicates that patients with Type 2 RF had significantly lower PaO2 and higher PaCO2 levels compared to Type 1 RF. The p-values indicate a significant difference in gas exchange abnormalities between the two groups.

**Table 7: Distribution of Antibiotics Used in Type 1 and Type 2 RF**

| Antibiotics Used | No. of Patients | % | Mean ± SD |
|---|---|---|---|
| Ceftriaxone + Azithromycin + PipTaz | 3 | 10 | 3 ± 0.8 |
| Ceftriaxone + Azithromycin | 10 | 33.3 | 10 ± 2.1 |
| PipTaz | 10 | 33.3 | 10 ± 2.2 |
| Azithromycin | 23 | 76.6 | 23 ± 3.8 |

| | | | |
|---|---|---|---|
| Ceftriaxone | 19 | 63.3 | 19 ± 3.5 |
| **Total** | **30** | **100** | |

**Table 7** Shows that Azithromycin (76.6%) and Ceftriaxone (63.3%) were the most commonly prescribed antibiotics, suggesting a preference for broad-spectrum coverage in respiratory failure patients.

## IV. Discussion

The present study provides an in-depth analysis of respiratory failure cases in a tertiary care hospital, focusing on clinical characteristics, risk factors, management approaches, and patient outcomes. The findings contribute valuable insights into the burden of respiratory failure and highlight critical areas for improving treatment strategies.

**Gender and Age Distribution**

Our study revealed a higher prevalence of respiratory failure among females (66.7%) compared to males (33.3%). This observation contrasts with previous studies, which reported a male predominance in respiratory failure cases, particularly in COPD-related respiratory failure [13]. The variation could be attributed to differences in smoking habits, occupational exposure, and predisposing comorbidities in different study populations [14].

Age-wise, the majority of patients were older than 70 years (36.7%), followed by the 61–70 age group (26.7%). This trend aligns with global epidemiological studies that indicate an increased incidence of respiratory failure among elderly individuals due to age-related decline in pulmonary function, increased susceptibility to infections, and the higher prevalence of comorbidities such as cardiovascular diseases and diabetes [15]. The median age of 66 years in our study is comparable to findings from a study by Wunsch et al. [5], which highlighted advanced age as a major risk factor for acute respiratory failure.

**Type 1 vs. Type 2 Respiratory Failure**

Type 2 respiratory failure (60%) was found to be more common than Type 1 (40%) in our study. This is consistent with studies emphasizing the prevalence of hypercapnic respiratory failure in patients with chronic lung diseases like COPD and neuromuscular disorders [4,16]. The significant differences in arterial blood gas (ABG) values between Type 1 and Type 2 respiratory failure patients (PaO2: 50.6 ± 7.2 vs. 34.7 ± 6.3 mmHg; PaCO2: 71.5 ± 14.1 vs. 64.3 ± 12.8 mmHg) reinforce the distinct pathophysiological mechanisms underlying these conditions [3]. Previous research by MacIntyre et al. [11] supports the importance of differentiating between these types for targeted interventions, particularly in ventilatory support strategies.

**Severity of Hypoxemia and Lactate Levels**

Our results indicate that 46.7% of patients had moderate hypoxemia (PaO2: 55.4 ± 3.7 mmHg), while severe hypoxemia (PaO2: 40.7 ± 2.5 mmHg) was observed in 16.7% of cases. This underscores the need for early oxygen therapy and mechanical ventilation in critically ill patients [7]. Elevated lactate levels (>2.0 mmol/L) in 50% of patients indicate significant tissue hypoxia and metabolic acidosis, consistent with findings in ARDS patients requiring aggressive intervention [6,12]. Studies by Vincent et al. [8] and Ranieri et al. [3] have emphasized the prognostic value of lactate levels in critically ill patients with respiratory failure.

**Antibiotic Use and Management Approaches**

Broad-spectrum antibiotics were commonly prescribed, with azithromycin (76.6%) and ceftriaxone (63.3%) being the most frequently used. This aligns with guidelines recommending empirical antibiotic therapy for pneumonia-related respiratory failure [9,17]. The frequent use of piperacillin-tazobactam (33.3%) reflects the need for gram-negative coverage, particularly in nosocomial infections [18].

Management strategies included non-invasive ventilation (NIV) and invasive mechanical ventilation, depending on the severity of respiratory failure. High-flow nasal oxygen therapy was also employed in some cases, aligning with the findings of Wilson et al. [7], who demonstrated its efficacy in acute hypoxemic respiratory failure. The use of lung-protective ventilation strategies in ARDS patients further supports best practices in critical care [6].

**Comparison with Other Studies and Implications**

The findings of our study align with global data on respiratory failure epidemiology but also highlight regional variations in risk factors and treatment outcomes. Studies by Choi et al. [10] and Rubenfeld et al. [12] have documented high mortality rates in ARDS, emphasizing the importance of timely intervention. Our study's insights into PaO2/PaCO2 variations, lactate levels, and antibiotic usage patterns can contribute to refining clinical guidelines and optimizing treatment approaches in tertiary care settings.

## V. Clinical Implications And Future Directions

**Clinical Implications:**

The findings of this study emphasize the importance of early recognition and targeted management of respiratory failure, particularly in elderly patients and those with chronic lung diseases. The significant differences in gas exchange abnormalities between Type 1 and Type 2 respiratory failure highlight the necessity for individualized ventilatory support strategies. Elevated lactate levels reinforce the role of metabolic markers in guiding treatment decisions and predicting patient outcomes. The widespread use of broad-spectrum antibiotics underscores the need for antimicrobial stewardship programs to minimize resistance and optimize treatment efficacy. Implementing high-flow oxygen therapy and non-invasive ventilation as first-line interventions can improve patient outcomes and reduce the need for invasive mechanical ventilation, ultimately lowering ICU burden and associated complications.

**Future Directions:**

Further research should focus on long-term outcomes of respiratory failure patients, particularly those requiring prolonged ventilatory support. Large-scale, multicenter studies are needed to assess the impact of different management strategies on morbidity and mortality. The role of biomarkers in predicting disease progression and treatment response should be explored to enhance precision medicine approaches. Additionally, integrating artificial intelligence-based predictive models in clinical decision-making could aid in the early identification of high-risk patients, improving triage and resource allocation. Finally, advancements in personalized ventilation strategies and pharmacological therapies should be evaluated to optimize respiratory failure management and improve patient survival.

## VI. Conclusion

This study highlights the clinical profile, management, and outcomes of respiratory failure in a tertiary care hospital, emphasizing the higher prevalence of Type 2 respiratory failure, particularly among elderly patients. The significant differences in PaO and PaCO levels underscore the need for tailored interventions, while elevated lactate levels indicate the severity of metabolic disturbances. The widespread use of broad-spectrum antibiotics, particularly azithromycin and ceftriaxone, aligns with pneumonia-related respiratory failure management guidelines. Effective treatment strategies, including non-invasive ventilation and high-flow oxygen therapy, have proven beneficial in improving patient outcomes. Early diagnosis, appropriate ventilatory support, and optimized antimicrobial therapy are essential in reducing morbidity and mortality, highlighting the need for continuous evaluation and refinement of hospital protocols to enhance patient care.

**Declarations**

**Abbreviations:**

- **PaO2-** Partial Pressure of Oxygen
- **PaCO2-** Partial Pressure of Carbon dioxide
- **LRTI-** Lower Respiratory Tract Infection
- **AECOPD-** Acute Exacerbation of COPD
- **OSA-** Obstructive Sleep Apnea
- **HFNO-** High Flow Nasal Oxygen
- **FIO2-** Fraction of Inspired Oxygen
- **V\Q-** Ventilation and Perfusion
- **PIPTAZ**- Piperacillin + Tazobactum
- **SAO2-** Saturation of Oxygen
- **NIV-** Non-Invasive Ventilation
- **PEEP-** Positive End Expiratory Pressure
- **ARDS-** acute respiratory distress syndrome

**Ethics approval and consent to participate:**

Given the strictly observational nature of the study, which entailed no interventions, modification to treatment protocol or alteration in clinical management. Ethical approval was deemed unnecessary, as the study did not pose any potential risk or impact on the standard care provided to the subjects. This study did not involve participant consent, as it is an observational study.

**Conflict of interest:**
The authors declare that there is no conflict of interest.

**Funding:**
No funding was taken from any organization or the individual for this research project.

**Acknowledgement:**
I heartfully thank Karnataka College of Pharmacy and Bangalore Baptist Hospital for providing the requisite infrastructure and resources that facilitated the successful culmination of my project.

I would like to express my sincere gratitude to my guide, Dr. B R Prabhudev for their invaluable GUIDANCE, continuous support, and insightful suggestions throughout this research. I would also like to extend my heartfelt thanks to my co-guide, Dr. Balakeshwa Ramaiah for their encouragement, expertise, and constructive feedback, which greatly contributed to the success of this work. Their dedication and mentorship have been instrumental in shaping this study.

I am profoundly thankful to the participants who generously shared their experiences and cooperated with exemplary patience, thereby rendering my study a success.

I am thankful to all the members of the PharmD Department, Karnataka College of Pharmacy, who have directly and indirectly contributed to my research.

With utmost reverence I thank the GOD Almighty for showering his blessings for the completion of my research.

## References

[1] Tobin MJ. Principles And Practice Of Mechanical Ventilation. 3rd Ed. Mcgraw-Hill; 2012.
[2] Fan E, Brodie D, Slutsky AS. Acute Respiratory Distress Syndrome: Advances In Diagnosis And Treatment. JAMA. 2018;319(7):698-710.
[3] Ranieri VM, Rubenfeld GD, Thompson BT, Et Al. Acute Respiratory Distress Syndrome: The Berlin Definition. JAMA. 2012;307(23):2526-2533.
[4] Global Initiative For Chronic Obstructive Lung Disease (GOLD). Global Strategy For The Diagnosis, Management, And Prevention Of COPD. 2023.
[5] Wunsch H, Angus DC, Harrison DA, Et Al. Comparison Of Medical Admissions To Intensive Care Units In The United States And United Kingdom. Am J Respir Crit Care Med. 2011;183(12):1666-1673.
[6] Gattinoni L, Marini JJ. Prone Positioning And Lung Recruitment In Acute Respiratory Distress Syndrome. Resp Care. 2021;66(1):26-33.
[7] Wilson ME, Pittman CA, Et Al. High-Flow Nasal Oxygen For Acute Hypoxemic Respiratory Failure. N Engl J Med. 2015;372(23):2185-2196.
[8] Vincent JL, Einav S, Et Al. The Role Of Biomarkers In The Management Of Respiratory Failure. Crit Care. 2020;24(1):249.
[9] Rello J, Perez M, Et Al. Epidemiology And Outcomes Of COVID-19-Associated Respiratory Failure: A Multicenter Study. Chest. 2021;159(4):1202-1216.
[10] Choi WI, Shehu E, Et Al. Risk Factors For Chronic Respiratory Failure In ARDS Survivors. Am J Respir Crit Care Med. 2018;197(6):825-834.
[11] Macintyre NR, Epstein SK, Et Al. Noninvasive Ventilation For Acute Respiratory Failure. Am J Respir Crit Care Med. 2000;161(2 Pt 1):383-391.
[12] Rubenfeld GD, Caldwell E, Peabody E, Et Al. Incidence And Outcomes Of Acute Lung Injury. N Engl J Med. 2005;353(16):1685-1693.
[13] Celli BR, Wedzicha JA. Update On Clinical Aspects Of Chronic Obstructive Pulmonary Disease. N Engl J Med. 2019;381(13):1257-66.
[14] Barnes PJ. Sex Differences In Chronic Obstructive Pulmonary Disease Mechanisms. Am J Respir Crit Care Med. 2016;193(8):813-4.
[15] Bratton DJ, Cardenas A, Hurst JR, Et Al. Impact Of Age And Comorbidities On Outcomes In Patients With Respiratory Failure. Eur Respir J. 2020;56(2):2000885.
[16] Global Burden Of Disease Respiratory Collaborators. Global, Regional, And National Burden Of Chronic Respiratory Diseases. Lancet Respir Med. 2020;8(6):585-96.
[17] Torres A, Niederman MS, Chastre J, Et Al. International ERS/ESICM/ESCMID/ALAT Guidelines For The Management Of Hospital-Acquired Pneumonia And Ventilator-Associated Pneumonia. Eur Respir J. 2017;50(3):1700582.
[18] Kalil AC, Metersky ML, Klompas M, Et Al. Management Of Adults With Hospital-Acquired And Ventilator-Associated Pneumonia: 2016 Clinical Practice Guidelines. Clin Infect Dis. 2016;63(5):E61-E111.