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Pulmonology Consultations in the ICU: Enhancing Outcomes for Respiratory Failure and ARDS Patients

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ABSTRACT

Introduction: Consultations with pulmonary physicians when a patient is in the Intensive Care Unit (ICU) is crucial when dealing with respiratory failure or ARDS. These conditions are complex, have high morbidity and mortality rates, making them difficult for healthcare practitioners to handle. Respiratory failure consists of an inability of the respiratory system to maintain adequate gas exchange resulting in hypoxia or hypercapnia. ARDS is a severe form of ARF due to inflammation, reduced oxygenation, and damage to alveolar-capillary membranes by trauma, pneumonia, or other causes. Each of these conditions requires prompt attention and management. As a critical illness, both respiratory failure and ARDS may require additional care to improve the patient's prognosis.

Aim of work: To explore the role of pulmonology consultations in improving outcomes for patients with respiratory failure and ARDS in the ICU.

Methods: We performed a comprehensive search in the MEDLINE database with the following search terms: Pulmonology, Consultations, ICU, Enhancing, Outcomes, Respiratory Failure, and ARDS Patients. The search was confined to publications from 2016 to 2024 to identify relevant information. We conducted a search on Google Scholar to identify and analyze scholarly publications relevant to my topic. The selection of articles was influenced by certain inclusion criteria.

Results: The publications analyzed in this study encompassed from 2016 to 2024. The study was structured into various sections with specific headings in the discussion section.

Conclusion: Pulmonology consultations in the ICU have been shown to reduce and improve the level of care and prognosis of patients with respiratory failure and ARDS. Such aspects include mechanical ventilation, pharmacological management, and innovative pulmonary techniques like ECMO and HFOV; outcome standardisation for the pulmonologists involve increased patient survival rate, low rate of complications and favourable long term prognosis. However, considerations, including restricted access to pulmonologists and collaboration problems, should be further discussed as obstacles to optimise potential advantages of pulmonology consultation in critical care. More to that, the employment of pulmonology specialty remains crucial for dealing

with elaborate respiratory problems and optimization of ICU experiences when patients have RF and ARDS.

Keywords: Pulmonology, Consultations, ICU, Enhancing, Outcomes, Respiratory Failure and ARDS Patients

INTRODUCTION

Consultations in the Intensive Care Unit (ICU) are essential particularly in patients with respiratory failure, ARDS (Acute Respiratory Distress Syndrome) (Fan et al., 2018). These conditions are well-recognized and constitute a major problem in health care because they are often multifactorial, associated with high morbidity and mortality. Respiratory failure is defined as a situation where the respiratory system is unable to meet the oxygen and/or co2 requirements of the body; resulting in hypoxia or hypercapnia (Lamba et al., 2016). Acute respiratory distress is a severe type of acute respiratory failure that stems from inflammation, decreased oxygen levels in the blood, alveolar-capillary membrane level, commonly caused by trauma, pneumonia, or other diseases. Respiratory failure as well as ARDS require close monitoring and specialized management to reduce patients' morbidity and mortality (Matthay et al., 2019).

Their job involves consulting in the ICU in the care of these serious conditions offering specialized information on recognition and treatment of complicated respiratory sicknesses. Pulmonologists may be involved in decisions with regard to triggering mechanical ventilation, choosing appropriate type of ventilation, and handling of complications such as ventilator associated pneumonia and barotrauma. These specialists come with a rich experience in pharmacologic and non-pharmacologic management of the patient, use of sedation, paralysis, and other techniques such as extracorporeal membrane oxygenation (ECMO) in some unyielding scenarios as underlined by Lunn et al. (2017).

ARDS contributes to a considerable global disease burden, with estimated incidence ranging from 3-7 cases per 100000 people every year (Parchanet et al, 2021). Among the patients in ICUs, those who developed ARDS had longer lengths of stay in ICU, a higher rate of requiring mechanical ventilation and more adverse outcomes in the long-term such as chronic respiratory morbidity and cognitive impairment (Bashar et al., 2018). It has been possible to demonstrate that earlier involvement of pulmonary consults in the ICU has benefits as it helps in achieving better outcomes for ARDS and / or respiratory failure. Consultations early enough can help in determining management strategies, choosing appropriate ventilator settings as well as the implementation of additional therapies including prone position and steroid therapy this even though it has shown to enhance outcomes and shortens the duration of mechanical ventilation (Bellani et al., 2016).

Furthermore, pulmonology consultations are indispensable in the continuous evaluation and supervision of patients with diverse, multisystem diseases to make sure that the approach to respiratory care complements the critical care plan. Both medical and surgical specialists, particularly intensivists and pulmonologists, should be involved in the management of patients in respiratory distress considering the systemic approach to the management of this condition. Intensive-care pulmonology expertise can also help to identify and manage early other complications like infections, fluid and electrolyte imbalances and other organ dysfunctions which are often associated with respiratory failure (Rickards & Kitts, 2018).

This role will assume even more significance in the future as new ICU management modalities are developed in the future through adopting therapy and treatment protocols for respiratory diseases. This combined strategy does not only increase chances of survival in the initial days but

also prevents the development of subsequent chronic lung diseases, thus improving the quality of life for patients who survive severe respiratory illnesses. This review will discuss the importance of pulmonology consult in the ICU, advantages of consulting pulmonologist in the management of acute respiratory failure and ARDS and the measures that have been known to enhance the poor prognosis in these conditions (Fan et al., 2018).

AIM OF WORK

The purpose of this review is to define the various aspects of the patterns and practices of pulmonary consultation in the ICU, as well as to discuss the means by which pulmonology consultations may enhance the care of patients with respiratory failure and ARDS. The pathophysiology of these conditions is reviewed, along with the reasons for involving pulmonologists, how pulmonologist consultation may help in the care of such patients, and issues related to specific settings such as the ICU. Further, it also analyses the effects of other lung treatments: mechanical lung ventilation techniques, medicinal treatment supervised by pulmonologists, and extracorporeal support methods. Last of all, it describes the possibilities for the further development of pulmonology consultations in the ICU.

METHODS

A comprehensive search was conducted on prominent scholarly platforms, including Google Scholar and PubMed, using specific keywords such as Pulmonology, Consultations, ICU, Enhancing, Outcomes, Respiratory Failure, and ARDS Patients. The objective was to gather all relevant research publications. Articles were selected based on certain criteria. After doing a thorough examination of the abstracts and significant titles of each publication, we excluded case reports, duplicate papers, and publications without complete information. The reviews used in this study were published between 2016 and 2024.

RESULTS

The current investigation concentrated on the role of pulmonology consultations in improving outcomes for patients with respiratory failure and ARDS in the ICU between 2016 and 2024. As a result, the review was published under many headlines in the discussion area, including: Respiratory Failure and ARDS: Pathophysiology and Clinical Challenges, The Role of Pulmonology Consultations in the ICU, Advanced Pulmonary Therapies and Extracorporeal Support, Improving Outcomes for Respiratory Failure and ARDS Patients, Challenges and Barriers in Pulmonology Consultations.

DISCUSSION

The care of patients requiring ventilation for respiratory failure remains one of the most demanding areas across modern critical care practice with particular emphasis on the management of these patients in the intensive care units. These consultants are very important, particularly when there are issues to do with Acute Respiratory Distress Syndrome (ARDS) and other disorders with respiratory failure. These consultations are critical in enhancing proper assessment on aspects of ventilation, assessment on the lung protective processes as well as coming up with specialized approaches to patients which has a way of changing patient outcomes. Respiratory failure is defined as the failure of the respiratory system to sustain proper delivery of oxygen or removal of carbon dioxide, which normally requires clinical intensive care in the ICU. ARDS a severe form of acute lung injury, further confounds the management,

making it imperative to involve allied healthcare professionals pulmonologists (Angus et al., 2023).

Respiratory Failure and ARDS: Pathophysiology and Clinical Challenges

Respiratory failure is classified into two main types: We distinguished two types of respiratory failure, hypoxemic (type 1) and hypercapnic (type 2). Hypoxemic respiratory failure is defined as an arterial partial pressure of oxygen (PaO2) of less than 60 mm Hg while breathing supplemental oxygen to fulfill that criterion, such as in cases of acute respiratory distress syndrome, pneumonia, and pulmonary thromboembolism (Villgran et al., 2022). Hypercapnic respiratory failure, in contrast, is characterized by condition, when PaCO2 is greater than 50 mmHg and it is ususually in diseases that affect the respiratory center or the ability of the lungs to remove CO2, including COPD, asthma or in patients with neuromuscular diseases (Keyt & Peters, 2018).

Originally reported by Ashbaugh et al. in 1967, ARDS is a life-threatening systemic disease which is characterised by diffuse alveolar damage, increased vascular permeability and non-cardiogenic pulmonary oedema. Most important in diagnosing ARDS is support for the finding that the principal feature of this disorder is a reduction in oxygenation which is not responsive to treatment. It is a clinically destructive condition with respect to its mortality and morbidity; more so when it develops in the context of critical illness in the ICU (Casey & Ware, 2020).

ARDS is a process which has been postulated to go through an initial inflammatory phase, neutrophil activation and cytockine release leading to further damage to alveolar epithelial and capillary endothelial cells. This leads to protein extravasation into the alveoli forming edema and a distortion of the normal architectural framework of the lung. In the later phases of the disease, areas of fibrosis and atelectasis may develop, which will only increase the challenge in the provision of adequate gas exchange. According to the Berlin definition, ARDS is divided into three degrees of severity depending on the level of the PaO2/FiO2 ratio and the amount of required PEEP (Sehgal et al., 2020).

Several challenges are associated with the management of patients with respiratory failure and ARDS including; adequacy of oxygenation, prevention of ventilator lung injury and addressing the etiologic factor of ARDS. In such a situation, pulmonologists are helpful doctors who can deliver particular details in airway management, mechanisms of mechanical ventilation, drugs, and other modern intercessions (Bos et al., 2018).

The Role of Pulmonology Consultations in the ICU

Pulmonologists' direct involvement in ICU patients with RF and ARDS is an important aspect of a modern integrated healthcare team. In other words, the care of such patients entails a comprehension of the functions of the lungs and how different procedures may be suitable to the unique client. Specialists in pulmonary diseases contribute to knowledge in respiratory biomechanics, respiratory supportive care, pulmonary pharmacology, and the strategies in the management of patients (Natanov & Haverich, 2023).

Among the critical areas where pulmonology consultations have potential of impacting patients' clinical processes it is in ventilation support. The management of patients with ARDS in the context of the ICU entails the use of invasive Mechanical ventilation most of the time. Pulmonologists also advise on the mechanical ventilation and make sure that un-harmful settings are used to avoid development of VILI. Low TVV (6 mL/kg of IWB) and high PEEP, and RM

are some of the practices performed under the supervision of pulmonist to improve lung compliance and reduced injury (Hurry; 2024).

Also, they are involved in determining the correct type of ventilation, volume controlled or pressure controlled depending on situation and response of the patient. In the same vein, taking of non-invasive ventilation (NIV) for the patients with hypoxic respiratory failure, especially in early stages of ARDS or in chronic illness flare-ups is another niche that benefits from the pulmonology consultation (Bang et al., 2021).

Another crucial domain where pulmonary physicians make their valuable input in the treatment of respiratory failure is through the pharmacological agents. Sedatives, Analgesia, Neuromuscular blockade, and corticosteroids in ARDS need titration with patient's clinical state (Molen van der et al., 2017). Pulmonologists have a role of weighing the benefits and harms of these drugs especially since complications attached to a long duration of ICU stay and even mechanical ventilation are well understood. For example, corticosteroids in ARDS are still under discussion, with some authors presenting their pros in easing inflammation and improving the overall outcome, while others stress the cons including higher infection rate and slower lung healing time (Sadhua et al., 2024).

Advanced Pulmonary Therapies and Extracorporeal Support

Some pulmonary therapies being needed in patients with severe respiratory failure or with refractory hypoxemia despite conventional therapy (Bein et al., 2016). Some of them are as follows: - Extra Corporeal Membrane Oxygenation – ECMO – this is a treatments which is used in coordinated with guidelines of pulmonologists in the Intensive Care Unit ICU -. High Frequency Oscillatory Ventilation – HFOV – this is also the treatment which is used in coordinated with guidelines of pulmonologists in the Intensive Care Unit ICU. Extracorporeal membrane oxygenation that uses venoarterial drainage permits oxygenation of blood outside of the body is being applied in patients with severe ARDS who are not responsive to mechanical ventilation. Pulmonologists play a critical role in determining who should be ECMO eligible and are intimately involved with issues pertaining to ECMO circuits, anticoagulation, et cetera (Cave et al., 2024).

Another technique applied in the ICU to care for the ARDS patients include high frequency oscillatory ventilation or HFOV.Opts for use when conventional ventilation therapies fall short. The HFOV delivers very small tidal volumes at high frequencies and has been found to enhance oxygenation by encouraging more alveoli to open and at the same time minimizing lung over expansion. Even though HFOV is not advised in most cases, pulmonologists determine the need for the treatment according to ARDS severity and patient's other conditions (Goligheret al., 2017).

The initiation of extracorporeal support such as ECMO is not a simple decision where pulmonologists have to analyze the benefits to risks ratio by patient prognosis and their conditions and the resource availability within the Intensive Care Unit. These leading-edge therapies can change mortality and late prognosis, always stressing the contribution of sup - portive pulmonology (DellaVolpe et al., 2020).

Improving Outcomes for Respiratory Failure and ARDS Patients

Pulmonologists' involvement in the management of patients with respiratory failure and ARDS has been linked with increased patients' survivals. Investigations done have indicated that any involvement by the pulmonologist at the ICU level can enhance the ventilator management,

shorter duration on the ventilator, and lower mortality in the patients with ARDS. Moreover, pulmonologists should also give advice on the management of other ancillary measures, which also deserve strong consideration as part of the rehabilitation process, including fluid therapy, enteral/nutritional support and liberation from CVE (Yeates et al., 2021).

In addition, pulmonologists are involved in the prevention of many of the complications observed in patients with respiratory failure, including ARDS: VAP, barotrauma, and atelectasis. Luyt and colleagues, 2020 argued that understanding of infection control, ventilation strategies and pulmonary rehabilitation by the pulmonologists can reduce these risks and improve recovery. They also participate in weaning procedures making recommendation on time of extrusion, assessment on the ability of the patient to maintain adequate oxyhemoglobin, and the nature of the disease that led to respiratory failure (Luyt et al., 2020).

Challenges and Barriers in Pulmonology Consultations

However, several barriers still exist hence the future challenges for pulmonology consults in ICU, which includes: The first challenge is the lack of adequate pulmonology specialists especially in the ICU context, especially in developing countries (Diaz et al., 2019). This may mean that primer requests for consultations may outcompete the capacity to get hold of such specialists especially in facilities that are minor or are located in rural areas where access to pulmonologists might be relaxed. Also, the absence of protocol regarding when consultations should be launched and the scarcity of trained intensivist with the capability to handle perplexing pulmonary problems without support may hinder continuum (Patil et al., 2021).

One more issue is the application of pulmonologists' consultations into the context of the extended MDT. The working cooperation with all other specialists, such as pulmonologists, intensivists and, especially the nurses, along with all other members of the healthcare team is critical for the best outcome for the patients. Nonetheless, variations in treatment management and client-practitioner relations at some moments may become an obstacle for effective work (Cochrane et al., 2016).

CONCLUSION

Overall, pulmonary input to the management of patients with RIF and ARDS in ICU is absolutely essential and consistently produces improved patient care. Of these, the difficulties linked to these ailments, which include čtOCÖy ™®ΩÇÇXn and mechanical ventilation, or the use of ECMO and HFOV, can only be addressed by pulmonologists. The former encompasses guidance in managing assignable settings such as the ventilator, the provision of pharmacological therapies, and the offering of advanced pulmonary support that makes a difference in the mortality rates as well as other complications such as ventilator-associated pneumonia and recovery.

Pulmonologists are always involved in creating care maps on admissions, addressing unique aspects of ventilator-associated lung injury, fluid balance, sedation, and ventilator liberation. Furthermore, their knowledge in ECMO and HFOV as important ways of supporting the patients with the severe, continuing hypoxemia is crucial to participate in the decision-making process to offer any of these therapies.

Nevertheless, several issues remain unresolved: short supply of pulmonologists in particular healthcare institutions, especially in such smaller hospitals or in healthcare systems with fewer means. Furthermore, interdisciplinary collaboration still remains critical for the realization of the benefits offered by pulmonology consultations and although the facilities studied had reasonably

good inter-professional relations, the lack of Standard Operating Procedure, and the occasional procedural misunderstandings seem to deserve attention.

Lastly, incorporating pulmonologists in ICU team of care providers is still important as a way of enhancing the suboptimal management of patients with respiratory failure and ARDS. Going forward as healthcare systems advance, expanding availability of pulmonologist care as well as integrating the right care team members to support the critically ill patient with complicated pulmonary disease will be critical to overcoming the existing challenges and improving outcomes.

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