Section: Paediatric

Original Research Article

STUDY ON INDICATION FOR MECHANICAL VENTILATION AMONG CHILDREN IN A TERTIARY CARE TEACHING HOSPITAL

Jaiom Dagar[1], Neeraj Verma[1], Naveeta Boora[2]

[1]*Assistant Professor, Department of Paediatric, World College of Medical Sciences Research and Hospital, Jhajjar, Haryana, India*
[2]*Consultant Microbiologist, Krishna Diagnostic Lab, Najafgarh, Delhi, India*

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Corresponding Author:
Dr.Neeraj Verma,
Assistant Professor, Department of Pediaric, World College of Medical Sciences Research and Hospital, Jhajjar, Haryana, India.
Email:doctorneerajverma@gmail.com

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ABSTRACT

Background: In the present day, mechanical ventilation—a life-saving procedure in a critical care unit—is constantly evolving. Despite this, it might be difficult to care children with invasive ventilation in underdeveloped nations with little funding. The clinical profile, indications, problems, and length of ventilator treatment are all examined in this study.

Materials and Methods: The study was prospective in nature and all patients on mechanical ventilators who were admitted to the pediatric critical care unit throughout the designated study period were included for consideration for case identification.

Results: The most common diagnosis at presentation in patients studied was Severe dengue 38 (33.04%), followed by Pneumonia 20 (17.4%), Sepsis 13 (11.3%).

Conclusion: In conclusion, the most common diagnosis at presentation in patients studied was Severe dengue 15(30.0%), followed by Sepsis shock 12(24.0%), poor GCS 10(20.0%) and dengue shock 7(13.0%).

Keywords: Severe respiratory distress, ventilator-associated pneumonia, pneumonia, and mechanical ventilation.

INTRODUCTION

A critical disease is a change in the body's fundamental physiology that, if proper and prompt intervention is not received, can result in organ dysfunction, long-term morbidity, and even death. The most advanced respiratory support available in a critical care unit is mechanical ventilation. Supporting the cardio-respiratory condition until the underlying disease is cured is a life-saving measure. With the advent of numerous new ventilator modes, invasive mechanical ventilation is constantly evolving.[1] Healthcare-associated pneumonia was the most common (Hospital-Acquired Infection) HAI in five studies, and second only to bacteremia in another two reports.[2] There is a wide variety of VAP incidence density rates in both neonates and children. There have been reports of rates ranging from 1/1000 ventilator-days to 63/1000 ventilator-days.The incidence varies geographically and is influenced by the country's income level and hospital type.[3] Higher VAP rates were found at academic hospitals as opposed to nonacademic hospitals by a surveillance research conducted by the International Nosocomial Infection Control Consortium (INICC).[4] According to the same survey, lower-middle-income countries had greater rates than upper-middle-income ones. Both Egypt (31.8/1000 ventilator days) and India (36.2%) have reported extremely high PICU rates.[5] Consistently lower rates were recorded in surveys conducted in Germany and the USA. However, high-income nations also reported high rates. According to a multicenter research conducted in Europe, VAP developed in 23.6% of children hospitalized to a PICU. 6.6% of the 451 children on mechanical ventilation in an Italian research and 6.7% of the 269 children on mechanical ventilation in a mixed PICU in Australia were found to have VAP.[6] With an incidence of 4 to 44 per 1000 intubated children, VAP accounts for 20% of nosocomial infections in the PICU. For hospitalized infants and children, VAP poses a serious health danger. With 18% to 26% of all HAIs in the PICU and a 10% to 20% fatality rate, it is one of the leading causes of HAIs in the unit.High health care costs, longer hospital

stays, and higher rates of death and morbidity are all linked to VAP.[7]

Pneumonia is currently the leading cause of death for children worldwide and the sixth most common cause of death in the United States. VAP patients of all ages have a death rate of between 33% and 50%. About 10–28% of patients in critical care get ventilator-associated pneumonia (VAP). According to estimates, each case of ventilator-associated pneumonia (VAP) results in an additional expense of £6000–£22000, and it can lengthen hospital stays by up to 28%. Death rates range from 24% to 71%.[8] Intubated patients have a 6- to 21-fold higher risk of pneumonia, and the longer they are on mechanical breathing, the higher the rate. Depending on the population under study, the incidence of VAP can vary from 6 to 52 instances per 100 patients. Typically, crude VAP rates range from 1 to 3% per day of mechanical breathing and intubation.[9] The best comparative rates are those per 1,000 ventilator days. VAP rates ranged from 5 cases per 1,000 days in pediatric patients to 35 cases per 1,000 days in patients with thermal injury, according to the National Nosocomial Infections Study. Depending on the population under study, overall rates for ICU patients are typically 10 to 15 instances per 1,000 ventilator days. Additionally, compared to medical ICU patients, rates are often greater for surgical ICU patients.[10] The clinical profile, indications, difficulties, and duration of ventilator care are all assessed in this study.

MATERIALS AND METHODS

This prospective study was conducted in the department of pediatric, WCMSRH, Jhajjar. All patients on mechanical ventilator admitted to the pediatric intensive care unit during the prescribed study period were considered for case identification and study was prospective study. 115 children ranging in age from one month to sixteen years. A study was conducted on consecutive pediatric critical care unit patients who met the inclusion criteria and acquired pneumonia while on a mechanical ventilator. Children who have been on a mechanical ventilator for more than 48 hours, ranging in age from 1 month to 16 years, are included in this study. Excluded are patients who died within 48 hours, were released from the PICU within 48 hours, or had respiratory infections during the first 48 hours of mechanical ventilation. According to the inclusion criteria, all children admitted to the PICU and on mechanical ventilation for longer than 48 hours undergo clinical, radiographic, and bacteriological investigations to identify the presence of pneumonia and identify the causal microbe. Comorbid illnesses such as CP, CHD, hematological diseases, and seizure disorders were also taken into account in the study.

RESULTS

During our study period of one year, we had 115 children who required mechanical ventilation in our critical care unit. [Figure 1] Shows the most common indication for mechanical ventilation in patients studied was Severe respiratory distress (33.91%), followed by septic shock(20.0%), poor GCS (18.26%),Dengue shock(15.65%).

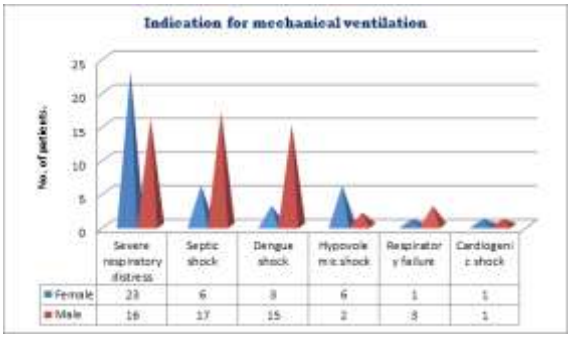

Figure 1: Shows the mechanical ventilation indications for the patients according to study.

Most common diagnosis at presentation in patients studied was Severe dengue 38(33.04%), followed by Pneumonia 20(17.4%), Sepsis 13(11.3%) in [Table1 and Figure 2].

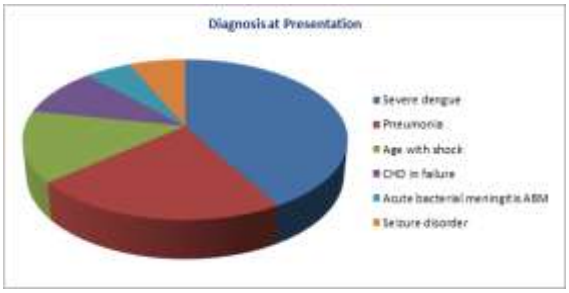

Figure 2: Shows the Patients during study received diagnoses on presentation.

Table 1: Shows the Patients during study received diagnoses on presentation.

Presentation of the Diagnosis	Male	Female	Total
Severe dengue	15 (34.09%)	23 (32.4%)	38 (33.04%)
Pneumonia	8 (18.2%)	12 (16.9%)	20 (17.4%)
Sepsis	5 (11.4%)	8 (11.3%)	13 (11.3%)
Age with shock	4 (9.09%)	5 (7.04%)	9 (7.8%)
CHD in failure	3 (6.8%)	2 (2.8%)	5 (4.34%)
Acute bacterial meningitis ABM	2 (4.5%)	4 (5.6%)	6 (5.2%)
Seizure disorder	3 (6.8%)	6 (8.45%)	9 (7.8%)
Poisoning	2 (4.5%)	3 (4.22%)	5 (4.34%)
Asthma	1 (2.3%)	5 (7.04%)	6 (5.2%)

Tubercular meningitis	1 (2.3%)	3 (4.22%)	4 (3.47%)
Total	44 (%)	71 (%)	115 (%)

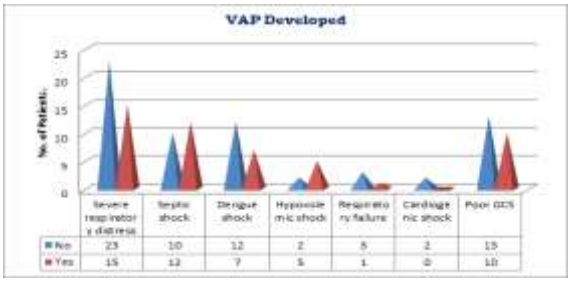

Figure 3: Shows the indication for VAP patients to receive mechanical ventilation.

[Figure 3] Shows the most common indication for mechanical ventilation in VAP patients was severe respiratory distress 15(30.0%), Septic shock 12(24.0%), Poor GCS 10(20.0%).

DISCUSSION

The cornerstone of managing severely ill children in an intensive care unit is mechanical ventilation. There are risks and consequences specific to this approach. The risk of pneumonia, often known as ventilator-associated pneumonia, is one such consequence.[11] Pneumonia that develops more than 48 hours after a patient has been on a mechanical ventilator is known as ventilator-associated pneumonia. VAP differs from community-acquired pneumonia in terms of its pathophysiology, risk factors, therapy approaches, and outcome in addition to its etiology.[12] The diagnosis of VAP has been a topic of continuous discussion. The diagnosis of VAP requires a high level of clinical suspicion in addition to radiographic testing and respiratory secretion culture. One of the most significant problems in any intensive care unit is reducing nosocomial infections such as VAP. In various configurations, VAP prevalence varies. In order to enhance and execute prevention efforts, it is critical to determine the burden of VAP in any given setup. In addition to being linked to higher mortality, VAP is also linked to longer ICU stays, higher treatment costs, and a higher likelihood of ventilator dependence. Numerous risk factors have been found that may make VAP more likely to occur.[13] The microbiology of VAP may differ from one center to another, and the antibiotic susceptibility pattern does differ not only from one unit to another but can occasionally exhibit a shifting trend within a unit, as is the case with other nosocomial infections.[14]

CONCLUSION

In conclusion, the most frequent reasons for mechanical ventilation in patients with ventilator-associated pneumonia were poor GCS 10 (20.0%), septic shock 12 (24.0%), and severe respiratory distress 15 (30.0%). The study shows that severely ill children can be effectively maintained in situations with limited resources.

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