

CURRENT SITUATION OF VENTILATOR - ASSOCIATED PNEUMONIA IN DEPARTMENT OF INTENSIVE CARE AND ANTIPOISON AT PHU THO GENERAL HOSPITAL IN 2023

Nguyen Thi Phuong Thao^{1*}, Nguyen Quang An², Pham Kim Lien³

¹Phu Tho Provincial General Hospital - Nguyen Tat Thanh Street, Tan Dan Ward, Viet Tri City, Phu Tho, Vietnam

²Phu Tho Medical College - 179 Cao Bang Street, Thanh Minh, Phu Tho Town, Phu Tho, Vietnam

³University of Medicine and Pharmacy, Thai Nguyen University - 284 Luong Ngoc Quyen, Quang Trung, Thai Nguyen City, Thai Nguyen, Vietnam

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ABSTRACT

Objectives: Exploring current situation of ventilator - associated pneumonia (VAP) in department of intensive care and antipoison at Phu Tho general hospital in 2023.

Subjects and methods: A cross-sectional descriptive study on 137 mechanically ventilated patients were treated in department of intensive care and antipoison at Phu Tho general hospital from August 2022 to May 2023.

Results: Male 81,8%, mean age $64,2 \pm 19,8$ years old, the main underlying condition requiring patients admitting and ventilating mainly were coma (37,2%) and shock (32,8%). Incidence rate of VAP was 41,6%, mortality and serious patient come back home in VAP group was 65,9% which higher than non-VAP was 34,1%. Factors including immunodeficiency increase the risk of VAP 3,2 times, reintubation increases the risk 2,2 times, tracheostomy patients increase the risk 7,5 times, and mechanical ventilation for > 10 days increases the risk. muscle increased 7,4 times. VAP group had a longer duration of mechanical ventilation, ICU stays, as well as hospitalization days compared to non-VAP group.

Conclusion: VAP is a common severe infection in the intensive care unit, leading to increased mortality rates and prolonged treatment duration. Immunodeficiency, reintubation, tracheotomy and mechanical ventilation for more than 10 days increase the risk of VAP.

Keywords: Ventilator-associated pneumonia, hospital infection.

*Corresponding author

Email address: drphuongthao84@gmail.com

Phone number: (+84) 913 592 044

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1. INTRODUCTION

In recent years, Ventilator-associated pneumonia (VAP) has always been a topical issue for the health sector due to its constantly increasing incidence. According to reports in the US, for every 1000 people hospitalized, there are 5-10 patients with VAP, and for every 1000 days of mechanical ventilation, 10-15 patients have pneumonia. In developed countries, the incidence of VAP in intensive care units ranges from 9% to 25%. In Vietnam, according to author Nguyen Danh Duc, the rate of VAP is 74.2% [1], [2], [3].

At Phu Tho Provincial General Hospital, the intensive care and poison control department has a large proportion of patients who are intubated and mechanically ventilated. Over the years, we have also recorded pneumonia in patients after mechanical ventilation, resulting in unsatisfactory treatment results such as patient death, patient prolonged treatment, etc.

To have an objective, scientific view on ventilator-associated pneumonia and what factors are related to this phenomenon, we conducted the research: „The current situation of ventilator-associated pneumonia in the intensive care unit“. Phu Tho Provincial General Hospital“ with the goal to describe the rate of ventilator-associated pneumonia and some related factors in patients with ventilator-associated pneumonia treated at the Department of Intensive Care - Poison Control, Phu Tho Provincial General Hospital from August 2022 to May 2023 to find out the current situation and effective solutions to improve ventilator-related pneumonia at

the Hospital.

2. METHODS

Research subjects: 137 patients requiring invasive mechanical ventilation were treated as inpatients at the Department of Intensive Care - Poison Control, Phu Tho Provincial General Hospital, from August 2022 to May 2023.

Selection criteria: Patients aged ≥ 18 , receiving invasive mechanical ventilation for over 48 hours, diagnosed with VAP according to ATS/IDSA 2016 [1].

Exclusion criteria:

- The patient was diagnosed with lung disease before entering the department.
- Patients are intubated in the anterior route.

Research methods: Description of prospective study.

Research content: Research on age group characteristics, gender, and disease causes. Rate of pneumonia related to mechanical ventilation. Evaluation of treatment results: Mortality rate, endotracheal tube extubation rate, number of days on mechanical ventilation, number of days in ICU and hospital.

Statistical methods and data analysis: Data are processed and analyzed based on SPSS 22.0 software.

3. RESULTS

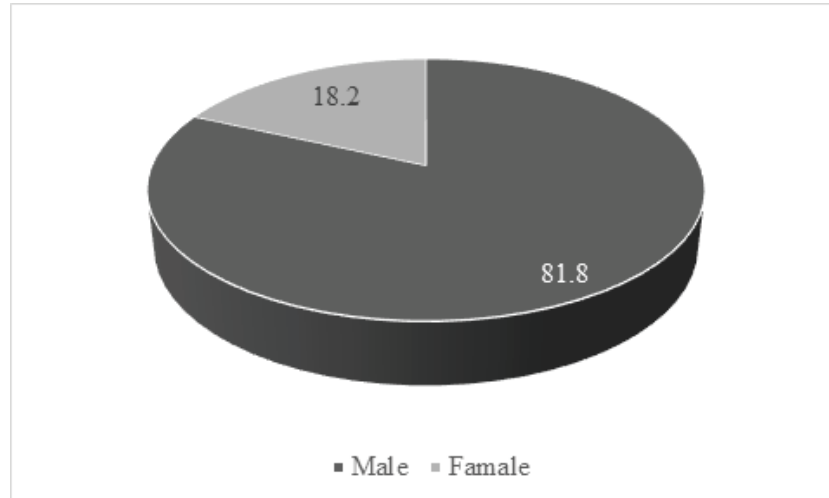
Table 1. General characteristics of research subjects

Characteristics		Total (n=137)	VAP (n=57)	Non-VAP (n=80)
		n (%)	n (%)	n (%)
Age groups	≤ 40	20 (14.6)	8 (14)	12 (15)
	41 - 50	12 (8.7)	3 (5.3)	9 (11.3)
	51 - 60	23 (16.8)	12 (21.1)	11 (13.8)
	> 60	82 (59.9)	34 (59.6)	48 (60)
Age	Mean	64.2 ± 19.8	65 ± 20	63.6 ± 19.8
	Max	98	96	98
	Min	18	18	20



The average age of the study patient group was 64.2 ± 19.8 years old, of which the highest age was 98 years old and the lowest age was 18 years old. The main age group is > 60 years old (accounting for 59.9%). In both VAP and non-VAP groups, age > 60% accounts for the highest rate.

Graph 1. Sex distribution of study subjects



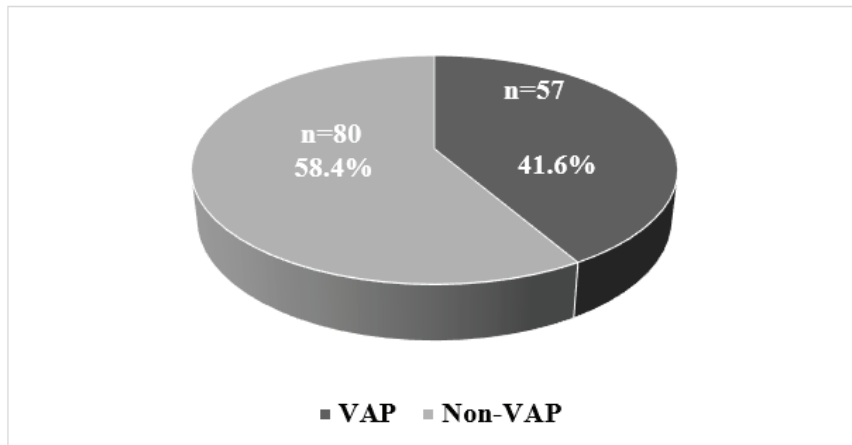
Men account for the majority of 81.8%, women account for 18.2%.

Table 2. Pathology causes VAP

Pathological cause		Amount (n)	Rate (%)
Respiratory disease	COPD exacerbation	15	10,9
	ARDS	3	2,2
Shock	Cardiogenic shock	3	2,2
	Septic shock	40	29,2
Sepsis		14	10,2
Cardiovascular disease		12	9,5
Comatose		48	37,2
Other		2	1,5

In the study patient group, the causes of patients receiving mechanical ventilation were coma (37.2%), septic shock (29.2%), and COPD exacerbations (10.9%).

Graph 2. Rate of pneumonia related to mechanical ventilation



in the study patient group, the rate of VAP diagnosis in the intensive care unit was 41.6%.

Table 3. Characteristics of treatment results

Treatment results	VAP (n=57)	Non-VAP (n=80)	P
Severe hospitalization and death rates	65,9%	34,1%	<0,05
Number of days on mechanical ventilation	15,5 ± 7,2	7,7 ± 3,9	<0,05
Number of days in ICU	16,6 ± 7,0	11,2 ± 5,4	<0,05
Number of days in hospital	17,8 ± 7,3	13,3 ± 6,3	<0,05

Regarding treatment results, the rate of severe patients returning home and dying in the VAP group was 65.9%, higher than the non-VAP group which was 34.1% with $p < 0.05$, the number of days of mechanical ventilation in the VAP group was $15, 5 \pm 7.2$ days is higher than the non-VAP group which is 7.7 ± 3.9 , the difference is

statistically significant $p < 0.05$. The number of days in the ICU in the VAP group was 16.6 ± 7.0 days, higher than the number of days in the non-VAP group, 11.2 ± 5.4 days with $p < 0.05$. The number of hospital days in the non-VAP group was 13.3 ± 6.3 days, lower than the VAP group, which was 17.8 ± 7.3 with $p < 0.05$.

Table 4. Factors related to VAP

Factors	VAP n (%)	Non-VAP n (%)	p
Immunodeficiency	6 (10,5)	1 (1,25)	<0,05
BMI ≥ 23	8 (14)	9 (11,3)	>0,05
Age ≥ 60	48 (60)	34 (59,6)	>0,05
Reinsert the endotracheal tube	39 (68,4)	18 (22,5)	<0,05
Tracheostomy	35 (61,4)	14 (17,5)	<0,05
Mechanical ventilation > 10 days	38 (66,7)	17 (21,3)	<0,05



In the study, factors including immunodeficiency, reintubation, tracheostomy and mechanical ventilation > 10 days were associated with ventilator-associated pneumonia with p value <0.05.

4. DISCUSSION

In our study, the age groups with the highest percentage were > 60 and 51 - 60 years old, accounting for 59.9% and 16.8%, respectively. The average age of the study subjects was 64.2 ± 19.8 years old, of which the highest age was 98 years old and the lowest age was 18 years old. The age group accounts for the highest proportion in the VAP and non-VAP groups, also mainly > 60%. Our study is also similar to Nguyen Danh Duc's study [2], with the age groups accounting for the highest percentage being > 60 years old and from 51 - 60 years old, accounting for 67.9% and 11.7%, respectively. The average age is 65.8 ± 17.2 years old. Nguyen Minh Luc's [3] research age group ≥ 60 accounts for 79.2%; the average age is 70.1 ± 19.4 . It can be said that the studies have a high proportion of elderly patients, especially the group of patients aged > 60 years old. Elderly patients have many complex underlying diseases, so the risk of being admitted to the intensive care unit is higher, and the mechanical ventilation rate is higher.

In our study, men accounted for the majority at 81.8%, with the female/male ratio being 1/4.5. Similar to the study of Nguyen Minh Luc [3], men accounted for 81%, and in Nguyen Danh Duc's study [2], men accounted for 66.7%. Men are subject to many risk factors, such as smoking, alcohol abuse, and other chronic diseases, so men account for a higher proportion than reported in studies.

Pathological characteristics at the time of hospitalization of the study subjects accounted for a high rate, including coma (accounting for 37.2%), septic shock (accounting for 29.2%), and COPD exacerbations (accounting for 10,000% of patients). 9%). Our study is different from the studies of other patients. Pham Thi Ngoc Oanh [4] respiratory diseases account for 44.6%, neurological diseases account for 34.8%. Tran Dinh Phung [5] traumatic brain injury accounts for 52.83%, and sepsis/septic shock accounts for 16.35%. The causative

pathologies vary by resuscitation unit and type of resuscitation unit.

According to our research results, the rate of VAP diagnosis in the intensive care and anti-poison department is 41.6%, and the rate of non-VAP is 58.4%. There are differences between studies in different resuscitation units in Vietnam. Research by Pham Thi Ngoc Oanh [4] in 2014, VAP accounted for 28.3%; Tran Dinh Phung [5] in 2016, the rate was 35.85%. Differences in VAP rates are related to many factors, including the increased proportion of patients on mechanical ventilation in the intensive care unit, application of VAP prevention measures, characteristics of the type of intensive care unit or proper sputum culture as well as equipping a sputum culture system to detect and identify bacteria.

Regarding treatment results, our study shows that the rate of severe patients returning home and dying at the hospital in the VAP group is 65.9%, significantly higher than in the non-VAP group, which is 34.1% ($p < 0.05$). At the same time, the average number of mechanical ventilation days, ICU days, and hospital days in the VAP group were all higher than the non-VAP group, 15.5 ± 7.2 , respectively, 7.7 ± 3.9 higher; 16.6 ± 7.0 is higher than 11.2 ± 5.4 and 17.8 ± 7.3 is higher than 13.3 ± 6.3 , the difference is statistically significant with $p < 0.05$. Research by Vu Dinh An [6] showed that the mortality rate in the group with VAP was 49.4% higher than the group without VAP, 31.9%, the duration of mechanical ventilation in the group with VAP was 16 days higher than the group without pneumonia was 6 days, the hospital stay in the group with VAP was 21 days, the group without VAP was 6 days, the difference was significant with $p < 0.01$. Severe patients who returned home and died in the study accounted for 65.9%, of which patients who died seriously ill returned home due to many different causes, such as coma due to traumatic brain injury, septic shock, and cardiovascular disease... Thus, it can be seen that VAP not only increases the mortality rate but also prolongs the mechanical ventilation and recovery time in patients [7] and increases the financial burden [8]. The univariate analysis of risk factors also showed that immunodeficiency, reintubation, tracheostomy, and mechanical ventilation > 10 days increased the risk of VAP.

5. CONCLUSION

VAP is a common severe infection in the intensive care unit, leading to increased mortality rates and prolonged treatment duration. Immunodeficiency, reintubation, tracheotomy and mechanical ventilation for more than 10 days increase the risk of VAP.

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