

Exploration of optimizing management of Vascular Access Devices for patients based on real world data analysis

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The 6th WoCoVA Congress
April 29-30, 2021

Introduction

Peripherally inserted central catheters (PICCs) and central venous catheters (CVC) are both vascular access device (VAD) which are commonly used in critically ill patients who need long-term therapy.¹ Various VAD solutions have been practiced clinically, however the most appropriate VAD solution based on clinical scenarios has not been well evaluated. Based on the real-world data, this study is aiming to identify the most appropriate VAD solution for patients, as well as to explore the optimizing management pattern of VADs.

Methods

This study extracted VAD-specific data of deidentified patients from one large tertiary hospital in China from January 2016 to December 2018. General information (age, sex, diagnosis, hospital stay) and clinical information (CVC usage, PICC usage and all relevant nursing records, medical costs) were extracted. Patients were divided into three groups based on the device they received: CVC&PICC, PICC only and CVC only. Exploratory Data Analysis (EDA) and nonparametric tests were used for data analysis.

Results

959 adult patients have been included, CVC&PICC 37, PICC 212, CVC 710; average age was 56.6 years, average hospital stay was 19.7 days, average medical costs are RMB 90,026.5. PICC only group had the lowest hospital stay (15.1 days), followed by CVC only (17.9 days), and CVC&PICC (30.8 days). Medical costs were lowest for PICC only group (RMB 61,301.2), followed by CVC only (RMB 91,553.9), and CVC&PICC (RMB 225,306.0) (See Table 1). Each devices placed the most are mainly in neurosurgery department, include CVC&PICC 26, PICC 23, CVC 260. The

Table 1. Clinical usage of each VAD group

Groups	CVC&PICC	PICC	CVC	Total
Cases	37	212	710	959
Average age (years)	59.0	60.4	55.4	56.7
Average hospital stay (days)	30.8	15.1	18.0	17.8
Average medical costs (RMB)	225,306.0	61,301.2	91,553.9	90,026.5

Table 2. Rank sum test of VAD implantation in Neurosurgery

Index	Groups	N	Average rank sum
Hospital stay	CVC&PICC	26	235.17
	PICC	23	208.33
	CVC	260	142.27
Medical costs	CVC&PICC	26	265.85
	PICC	23	235.50
	CVC	260	136.79
Nosocomial infection events	CVC&PICC	26	190.04
	PICC	23	189.52
	CVC	260	148.44

rank sum test was carried out in neurosurgery department with more records of VAD operation. Nonparametric tests show that the results have statistical significance(See Table 2). Clinically, CVC implantation is usually the first choice, followed by PICC implantation according to the complexity of treatment. In this case, direct insertion of the PICC has significant advantages.

Discussion and Conclusion

Currently, PICC are always used for patients after CVC placement. The trend in China shows that using PICC&CVC may increase hospital stay, resource utilization, and medical costs as compared to PICC only for the full treatment. It is strongly suggested to conduct further research among target patients by establishing multi-disciplinary treatment (MDT) scheme including doctors, nurses and pharmacists to evaluate the most appropriate VAD solutions. The limitation in this study is that these groups from hospital were not matched for baseline characteristics. Thus, these results should be interpreted with caution and cannot be generalized.

Reference

¹ Climo M, Diekema D, Warren DK, et al. Prevalence of the use of central venous access devices within and outside of the intensive care unit: results of a survey among hospitals in the prevention epicenter program of the Centers for Disease Control and Prevention. Infect Control Hosp Epidemiol. 2003;24(12):942–5.