



Central venous catheter system with a mechanical valve needleless connector has a higher risk of catheter related blood stream infection than that with a split septum connector in a pediatric oncology ward.

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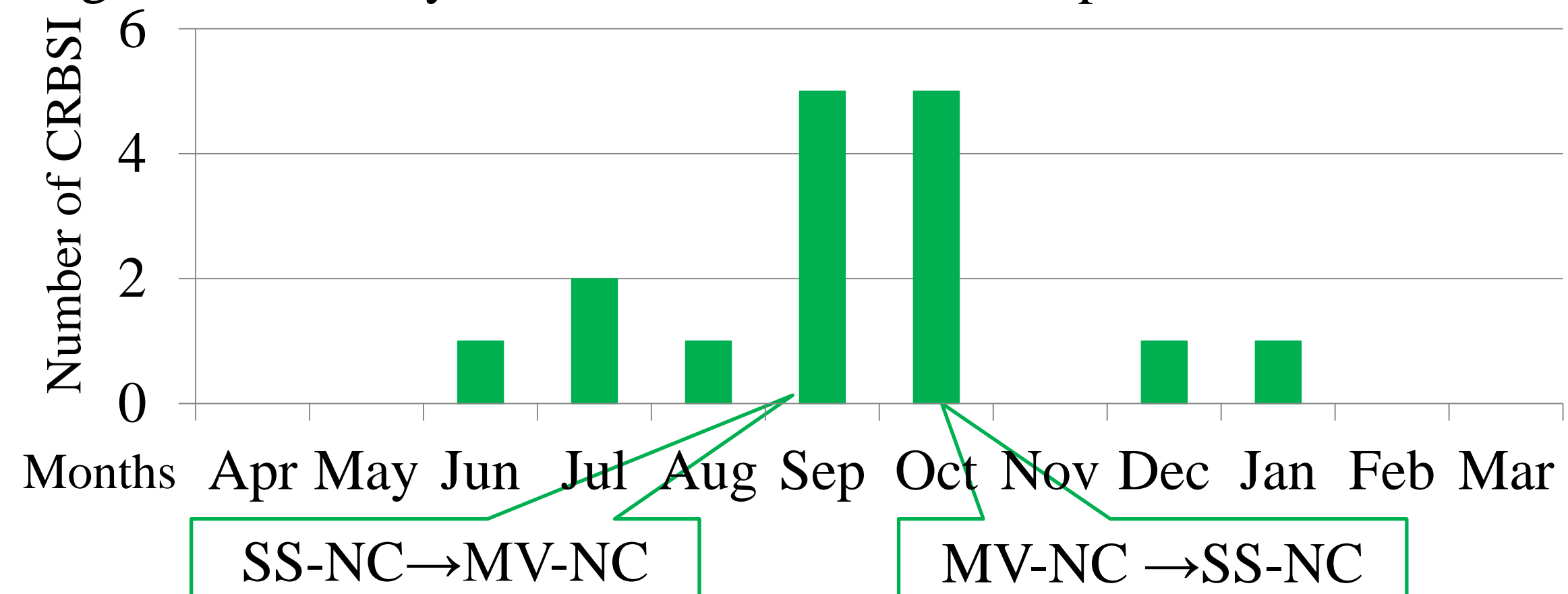
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Background

- CVC is essential for administration of anticancer drug and total parental nutrition and for blood sampling in pediatric oncology patients.
- Needleless connectors are important component of the intravenous systems.
- After SS-NC was converted to MV-NC to minimize the risk of sharps injury in our hospital, the number of patients of CRBSI drastically increased (Figure 1).

Figure 1. Monthly Number of CRBSI from Apr 2015 to Mar 2016



Method

- We investigated all hematologic oncology patients who had tunneled CVC (Hickman catheter, Bard Access Systems) in our pediatric ward from April 2015 to March 2016 to assess the association between the types of needleless connectors and the incidence rate of CRBSI in three periods:

Period 1 (SS-NC): Apr. 1, 2015 – Aug. 31, 2015

Period 2 (MV-NC): Sep. 1, 2015 – Oct. 15, 2015

Period 3 (SS-NC): Oct. 16, 2015 – Mar. 31, 2016

- There are no changes in the process of insertion and handling of CVC during all periods.
- Statistical analysis: Patients characteristics were compared among the 3 groups by using the Chi-squared analysis for categorical variables, and Kurskal Wallis analysis for continuous variables. Comparisons and calculations of relative risks with 95% confidence intervals were performed using Chi-squared analysis. Comparison of cumulative incidence of CRBSI was carried out with the log-rank test (SPSS 17). A P value of 0.05 or less was considered statistically significant.

Results

Table 1. Patients Characteristics

	period 1 N= 23	period 2 N= 22	period 3 N= 35	P value
Age (years, median, range)	7.7 (0.4-19.0)	8.8 (1.4-19.3)	8.2 (0 - 19.4)	0.77
Gender (male / female)	12 / 11	11 / 11	24 / 11	0.31
Diagnosis (leukemia / solid tumor / others, N)	15 / 5 / 3	15 / 5 / 2	20 / 10 / 5	0.94
HSCT (N)	3	4	8	0.63
The median rate of neutropenia (%) * 52 (0 - 97)		29 (0 - 100)	27 (0 - 75)	0.035

HSCT: hematopoietic stem cell transplantation, * (neutropenia (<500 / μ L) days / observation days) x 100

Table 2. Comparison of rate of CRBSI between period 1 and period 2 and between period 2 and period 3.

	period 1	period 2	RR	95%CI	P
Rate of CRBSI (/1,000 days)	1.8	12.3	2.7	1.9 - 3.8	< 0.01
	period 2	period 3	RR	95%CI	P
Rate of CRBSI (/1,000 days)	12.3	0.9	0.29	0.1 - 0.8	< 0.01

RR, relative risk; CI, confidence interval; CRBSI, catheter related blood stream infection

Conclusion

- Our results suggest the risk of CRBSI in catheter system with MV-NC is higher than that with SS-NC.
- CRBSI increased after two weeks of application of MV-NC drastically.
- SS-NC might be employed instead of MV-NC in pediatric oncology patients because they require long term indwelling CVC.

Figure 2. Cumulative incidence of CRBSI in MV-NC (period 2) and SS-NC (period 3)

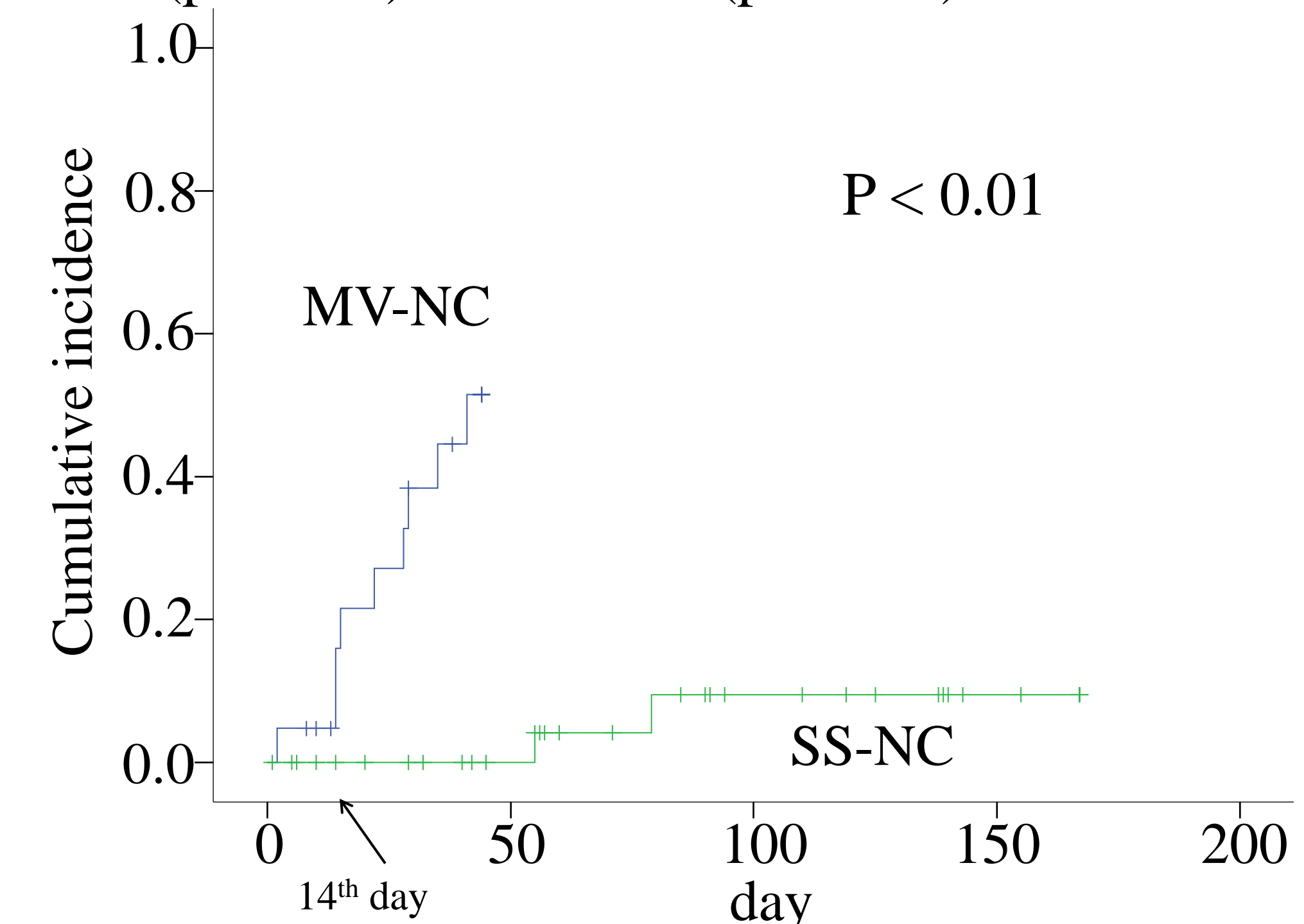


Table 3. Bacterial species causing CRBSI

	period 1	period 2	period 3	total
<i>S. epidermidis</i>	3	5	1	8
<i>Enterococcus spp</i>		2		2
<i>Micrococcus spp</i>		2		2
<i>Nocardia</i>	1			1
<i>Paenibacillus</i>		1		1
<i>P. aeruginosa</i>			1	1

ABBREVIATIONS: CVC, Central Venous Catheter; SS-NC, split septum needleless connectors; MV-NC, mechanical valve needleless connectors; CRBSI, catheter related blood stream infection

