Early preventive measures for post stroke infections from analysis using Clinical Data Warehouse (CDW)

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Objective

Post-stroke infections are associated with increased mortality and poor clinical outcomes in acute stroke patients. Understanding the risk factors for infection can help prevention and early management of poststroke infection. However, studies about all-cause post-stroke infection as outcome are insufficient. Besides, there is a lack of consideration on whether drugs can affect infectious complications. This retrospective cross-sectional study aimed to identify risk factors for post-stroke infections by analyzing a digitized database of electronic medical records (EMR).

Participants and Methods

We collected the data from patients who were hospitalized with a first stroke diagnosis (ICD-10 code I60, I61, I63, I64) at 5 hospitals in Korea between January 2011 and December 2020, and whose ages were 18 years or older using Clinical Data Warehouse(CDW). Infection was identified as a case of leukocytosis while taking antibiotics. We collected the following clinical characteristics : age at diagnosis, sex, Charlson Comorbidity Index (CCI) score, medication histories, Modified Barthel Index (MBI), whether the patient underwent brain surgery, mechanical ventilation, and use of enteral tube feeding. Logistic regression analysis was performed to examine the effect of clinical variables on poststroke infection.

Table1. Univariable and multivariable logistic regression associated with infection.

	Univariable		Multivariable	
	OR (95% CI)	p value	OR (95% CI)	p value
Age (yr), mean ± SD	1.00 (1.00-1.01)	0.345		
Male sex	1.29 (1.10-1.50)	0.001	1.79 (1.49-2.15)	<0.001*
Ventilation	61.29(31.07-139.13)	<0.001	18.26 (8.49-44.32)	<0.001*
Tube feeding	8.43 (7.19-9.90)	<0.001	3.65 (2.98-4.47)	<0.001*
MBI , mean ± SD	0.97 (0.97-0.97)	<0.001	0.98 (0.98-0.98)	<0.001*
CCI, mean ± SD	1.12 (1.07-1.17)	<0.001	1.03 (0.97-1.09)	0.411
Durg exposures				
Antipsychotic	1.75 (1.47-2.07)	<0.001	0.82 (0.66-1.01)	0.061
Opioid	1.80 (1.09-2.83)	0.015	1.42 (0.78-2.46)	0.23
Benzodiazepine	1.10 (0.81-1.47)	0.533		
Anticholinergic	1.14 (0.85-1.49)	0.365		
Steroid	2.97 (2.28-3.84)	<0.001	2.22 (1.60-3.06)	<0.001*
Acid suppressants	2.03 (1.68-2.48)	<0.001	1.44 (1.15-1.81)	0.002*
Aspirin	0.53 (0.45-0.61)	<0.001	0.81 (0.64-1.03)	0.086
Clopidogrel	0.61 (0.52-0.71)	<0.001	0.86 (0.68-1.09)	0.216

*Multivariable model included all variables with p < 0.1 on univariable analysis. * p < 0.05, statistically significant by multivariable logistic regression analysis.*
SD, standard deviation; MBI, modified Barthel index; OR, odds ratio; CI, confidence interval.
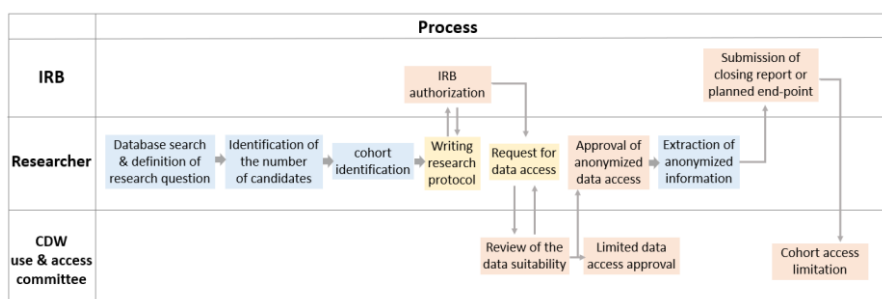

Figure1. The process of accessing information in Clinical Data Warehouse(CDW)

Results

The prevalence of infection was 12.2% (797/6518). In the multivariable analysis, post-stroke infection was associated with sex(male: odds ratio [OR], 1.79; 95% confidence interval [CI], 1.49-2.15), mechanical ventilation(OR, 18.26; 95% CI,8.49-44.32), enteral tube feeding(OR, 3.65; 95% CI, 2.98-4.47), functional level(Modified Barthel Index: OR, 0.98; 95% CI, 0.98-0.98), and exposure to steroids(OR, 2.22; 95% CI, 1.60-3.06) and acid suppressive drugs(OR, 1.44; 95% CI, 1.15-1.81).

Conclusion

Our study findings suggest that implementing early preventive measures in the intensive care unit, where postoperative management, mechanical ventilation, and enteral nutri-tion are administered, may be crucial in reducing the risk of infection. Additionally, early measures aimed at improving patients' functional levels, such as early mobilization, should also be considered. Finally, when caring for these high-risk stroke patients prone to infection, it is essential to evaluate the balance between the potential benefits of pre-venting gastrointestinal bleeding with acid suppressant drugs or administering cortico-steroids and the increased risk of infection.