Difference of Emergency Department Frequent Users' Clinical Characteristics between Two Tertiary Teaching Hospitals in South Korea

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Background

- The Korean National Health Insurance System is designed to ensure that all people have mandatory government health insurance. Therefore, many Korean patients frequently visit the Emergency Department (ED) as the low cost of the ED care. Furthermore, there are many ED visits for the purpose of inpatient admission, because usually it takes long time for admission via outpatient department.
- Frequent ED user and ED crowding has been observed as both a concern for patient safety and a worldwide public health problem[1]. Unnecessary frequent ED visits can cause misuse of medical resources. Understanding the characteristics of frequent ED users is critical to designing effective interventions to reduce their visits and the associated healthcare costs[2]. However, very few studies have examined the difference of clinical characteristics of the frequent ED users between different institutions.
- The purpose of this study is to identify the difference of clinical characteristics between frequent ED users in two tertiary teaching hospitals by using OMOP-CDM research ecosystem.

Methods

Mapping system

- We developed a mapping system to transform the National Emergency Department Information System (NEDIS) into OMOP-CDM.

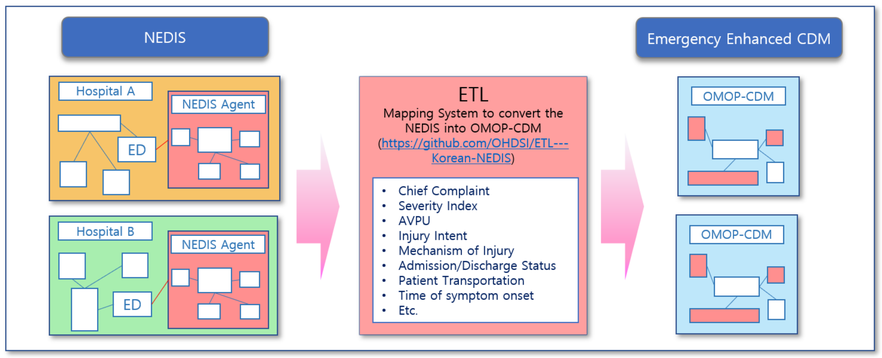

Figure 1. Two tertiary teaching hospital's NEDIS data were converted into OMOP-CDM which contains emergency information such as chief complaint, severity index, injury intent, mechanism of injury, etc.

Data source

- Two tertiary teaching hospital's ED visitors from 2012 to 2017
- Hospital A has 336,364 ED patients who had 515,387 visits.
- Hospital B has 233,883 ED patients who had 405,295 visits.

Definition of frequent user

- 4 or more ED visits per year[3]

Analysis

- We compared the difference of clinical properties such as age, gender, diagnosis, admission status, discharge status to identify the pattern of between frequent users in two tertiary hospitals after converting ED record into OMOP-CDM.

Results

- There is a significant difference among discharge status, and ED diagnosis. The proportion of admission in frequent user are 24.4% and 32.8% in hospital A and B respectively (Table 1).

Table 1. Characteristics of frequent user of emergency department between two hospitals.

	Hospital A		Hospital B		
Variable	Chance user (N=467,305)	Frequent user (N=48,082)	Chance user (N=338,281)	Frequent user (N=67,014)	p-value*
Gender					< 0.001
Male	246,754 (52.8%)	26,480 (55.1%)	165,962 (49.1%)	34,808 (51.9%)	
Female	220,551 (47.2%)	21,602 (44.9%)	172,319 (50.9%)	32,206 (48.1%)	
Age group					< 0.001
18 < Age	157,152 (33.6%)	18,790 (39.1%)	71,312 (21.1%)	16,354 (24.4%)	
18 ≤ Age < 65	243,762 (52.2%)	20,149 (41.9%)	186,778 (55.2%)	31,826 (47.5%)	
65 ≤ Age	66,391 (14.2%)	9,143 (19.0%))	80,191 (23.6%)	18,834 (28.1%)	
Admission Status					< 0.001
Direct	385,372 (82.5%)	44,265 (92.1%)	269,533 (80.4%)	56,657 (85.0%)	
Transferred from other hospital	81,445 (17.4%)	3,776 (7.9%)	44,739 (13.3%)	4,411 (6.6%)	
Referred by outpatient department	191 (0.0%)	7 (0.0%)	19,921 (5.9%)	5,239 (7.9%)	
Other	76 (0.0%)	17 (0.0%)	1,182 (0.4%)	311 (0.5%)	
Unknown	221 (0.0%)	17 (0.0%)	2 (0.0%)	0 (0.0%)	
Discharge status					< 0.001
Home	350,457 (75.0%)	35,323 (73.5%)	242,262 (73.95)	43,467 (66.0%)	
Inpatient admission	101,312 (21.7%)	11,755 (24.4%)	77,465 (23.6%)	21,645 (32.8%)	
Transfer to other hospital	2,298 (0.5%)	98 (0.2%)	5,432 (1.7%)	504 (0.8%)	
Death	2,063 (0.4%)	71 (0.1%)	2,397 (0.7%)	212 (0.3%)	
Other	832 (0.2%)	93 (0.2%)	312 (0.1%)	76 (0.1%)	
Unknown	10,343 (2.2%)	742 (1.5%)	2 (0.0%)	0 (0.0%)	

*Chi-square test

- In hospital A, frequent user comprise 1.7% of all ED patients and account for 9.3% of all ED visits. In hospital B, frequent user comprise 3.5% of all ED patients and account for 16.5% of all ED visits (Figure 1).

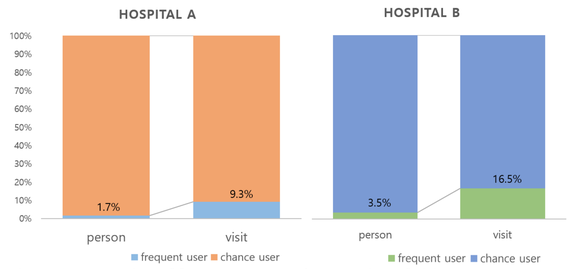

Figure 1. Proportion of frequent user and proportion of visit.

- Especially in the diagnoses, the proportion of patient with injury for chance user and frequent user is 31.1%, 9.1% respectively in hospital A. In contrast, the proportion of patient with neoplasms for chance user and frequent user are 12.6%, 40.2% respectively in hospital B (Table 2).

Table 2. Top ten occurrence in classification of reason for ED visit.

	Hospital A			Hospital B		
No	Variable	Chance user (n=563,660)	Frequent user (n=60,666)	Variable	Chance user (n=405,877)	Frequent user (n=81,847)
1	Injury, poisoning and certain other consequences of external causes	175,429 (31.1%)	5512 (9.1%)	Symptoms, signs and abnormal clinical and laboratory findings, NEC	85096 (21.5%)	10663 (13.2%)
2	Diseases of the respiratory system	67,252 (11.9%)	12,163 (20.0%)	Neoplasms	49716 (12.6%)	32425 (40.2%)
3	Certain infectious and parasitic diseases	57,986 (10.3%)	6,765 (11.2%)	Injury, poisoning and certain other consequences of external causes	71121 (18.0%)	3466 (4.3%)
4	Symptoms, signs and abnormal clinical and laboratory findings, NEC	52,414 (9.3%)	5,485 (9.0%)	Diseases of the respiratory system	28301 (7.2%)	4946 (6.1%)
5	Diseases of the digestive system	50,624 (9.0%)	5,809 (9.6%)	Diseases of the digestive system	27220 (6.9%)	4512 (5.6%)
6	Diseases of the circulatory system	30,266 (5.4%)	3,039 (5.0%)	Certain infectious and parasitic diseases	21010 (5.3%)	2292 (2.8%)
7	Diseases of the genitourinary system	25,883 (4.6%)	3,247 (5.4%)	Diseases of the musculoskeletal system and connective tissue	18449 (4.7%)	4697 (5.8%)
8	Diseases of the ear and mastoid process	18,633 (3.3%)	1,225 (2.0%)	Diseases of the circulatory system	17653 (4.5%)	2522 (3.1%)
9	Neoplasms	14,013 (2.5%)	5,357 (8.8%)	Diseases of the genitourinary system	16224 (4.1%)	3235 (4.0%)
10	Diseases of the skin and subcutaneous tissue	15,428 (2.7%)	1,361 (2.2%)	Factors influencing health status and contact with health services	10632 (2.7%)	3723 (4.6%)

- The most different part of frequent user was neoplasms (40.2%, 8.8% respectively), diseases of respiratory system (6.1%, 20% respectively) between two tertiary hospitals (Figure 2).

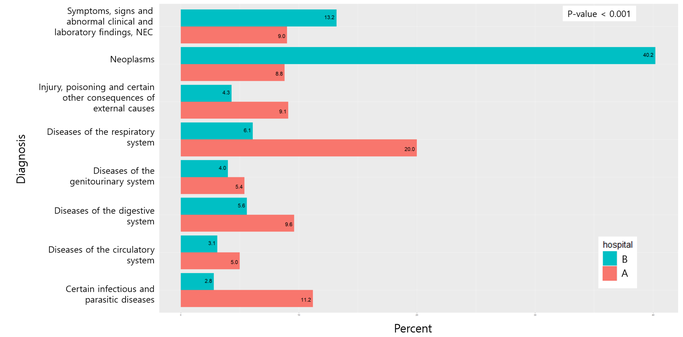

Figure 2. Condition difference of frequent user between two tertiary hospitals (chi-square test).

Conclusion

- We found the number of patients with injury is highest in ED patients hospital A, and cancer is high in ED patients in hospital B, as hospital A and B is specialized and famous for trauma center and cancer center, respectively.
- We can compare and understand the basic characteristics of frequent ED users by hospital. In the future study, we will try to make prediction models for frequent ED user. It will be used to identify frequent ED users, interventions to reduce the number of ED visits, and for improving ED crowding problem and quality of care.

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