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Use and Management of Big Data in Health Economics and Outcomes Research in Korea

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Overview

- General characteristics of NHI-related data
  - HIRA data
  - NHIS
- Application of the big data in HEOR

General description of Korean NHI data

- Health Insurance claims data
  - 97% of total population
- Medical assistance data
  - 3% of total population
- Produced by providers for reimbursement purpose
- Electronic Claims over 90% since 2005

- General Information
  - Name of the recipients, date of birth, provider's specialty, date of the visit, length of stay, list of services covered by the insurance
  - Patients' cost sharing, insurer's payment etc.
- Medical service details
  - FFS payment system
  - Medical services/devices/medicines itemized

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Pros and cons

Pros

- Represent total population
  - Burden of disease estimation
  - Health care utilization pattern

- Represent current practice pattern

Cons

- Only Captures utilizations covered by the insurance
  - Non-reimbursed services not measured
  - Patients who has the disease but do not seek care could not be captured
  - Could underestimate the burden of diseases (ex, migraine)
- Internal Validity issues
  - Validity of primary diagnosis code
    - About 70% of primary diagnosis concurred with Medical Record
    (Park et al, 2003)
  - Consistency of the clinical definition
    - GERD vs. esophagitis/dyspepsia

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NHIS-NSC cohort

- National Health insurance service-national sample cohort
- A population-based cohort
- Constructed to provide researchers & policymakers with representative data
  - Healthcare utilization, health examination
- 2.2% of total population as of 2002 (1,025,340)
  - Stratified sampling (of 1,476)
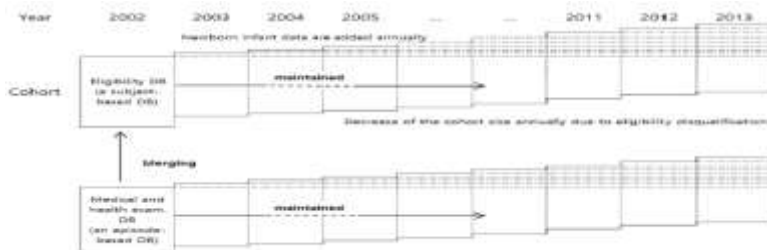- Followed for 11 years (until 2013)

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Int. J. Epidemiol. Advance Access published January 28, 2016

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Application in HEOR

- Identify target population
  - Diagnosis code (ICD codes)
  - Disease-specific procedures/drugs

- Incidence rate, health care utilization, health outcome estimation (Bae et al, 2012)

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Application of HEOR (1)

Original Article

Incidence and Short-term Mortality From Perforated Peptic Ulcer in Korea: A Population-Based Study

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Received March 19, 2012; accepted May 28, 2012; released online September 1, 2012

Incidence and 30-day mortality of peptic ulcer bleeding in Korea

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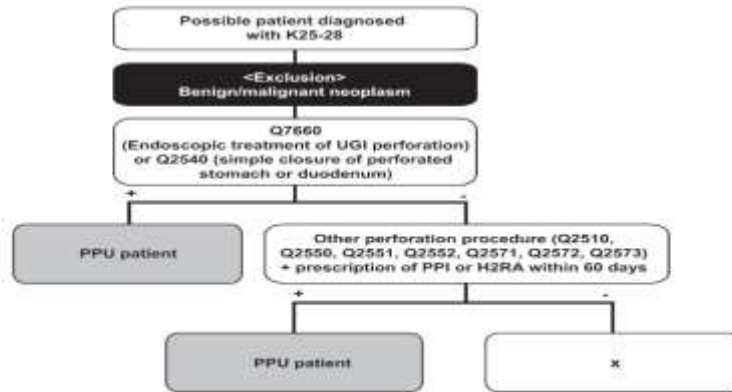
Figure 1. Diagnostic algorithm for patients with perforated peptic ulcer. The algorithm was developed to identify PPU patients, using data from the Korean NHI claims database. Q2510, gastrotomy; Q2550, vagotomy; Q2551, truncal vagotomy with gastrojejunostomy or pyloroplasty; Q2552, truncal vagotomy with gastrectomy; Q2571, gastroduodenostomy; Q2572, gastrojejunostomy; Q2573, gastrojejunostomy (Roux-en-Y jejunostomy). UGI, upper gastrointestinal; PPU, perforated peptic ulcer; PPI, proton pump inhibitor; H2RA, H2-receptor antagonist.

Table 1. Positive predictive value and sensitivity of diagnostic algorithm for perforated peptic ulcer

		PPU cases confirmed by chart review (gold standard)			
		Positive	Negative	Total	PPV
Possible PPU cases based on diagnostic algorithm and Korean NHI claims database	Positive	25	1	26	0.96
	Negative	4			
	Total	29			
	Sensitivity	0.86			

Abbreviations: NHI, National Health Insurance; PPU, perforated peptic ulcer; PPV, positive predictive value.

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Fig. 1

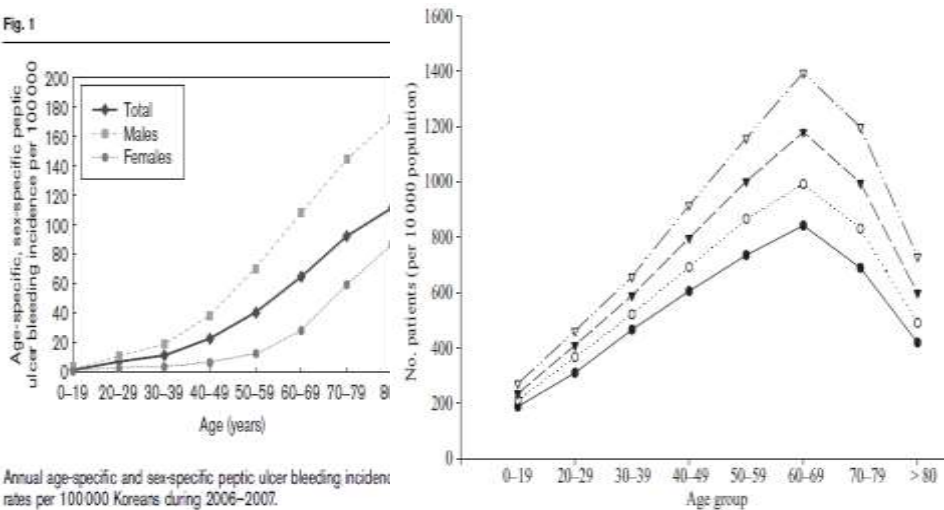Annual age-specific and sex-specific peptic ulcer bleeding incidence rates per 100 000 Koreans during 2006–2007.

Figure 1 Age-specific prevalence rates (per 10 000 population) patients with gastroesophageal reflux disease in Korea. ●, 200 ○, 2006; ▼, 2007; ∇, 2008.

Table 3 Demographic characteristics and crude mortality rate ratio after peptic ulcer bleeding in Korea of 21 107 patients during 2006-2007

Variables	PUB, n (%)	30-day mortality (%)	Crude MRR (95% CI)	P-value
Total	21 107 (100)	2.15		
Age (years)				
<60	11 099 (74)	0.83	1.00	–
60–79	8453 (40.0)	2.87	3.50 (2.75–4.45)	<0.001
≥ 80	1555 (52.6)	7.65	9.55 (7.28–12.5)	<0.001
Sex				
Male	16 177 (76.6)	1.83	1.00	–
Female	4930 (23.4)	3.20	1.78 (1.46–2.16)	<0.001
History of PU-related hospitalization				
No	20 230 (95.8)	2.11	1.00	–
Yes	877 (4.2)	3.08	1.47 (0.99–2.19)	0.055
Charlson comorbidity index				
Low (0)	19 779 (93.7)	1.85	1.00	–
Medium (1–2)	1158 (5.5)	5.49	3.53 (2.75–4.53)	<0.001
High (≥ 3)	170 (0.8)	8.24	4.62 (2.71–7.88)	<0.001
Ulcer-related drug users[a]				
No	15 605 (73.9)	1.93	1.00	–
Yes	5502 (26.1)	2.79	1.45 (1.19–1.77)	<0.001
Antiulcer drug users[b]				
No	8294 (39.3)	1.93	1.00	–
Yes	12 813 (60.7)	2.78	1.45 (1.19–1.77)	<0.001

CI, confidence interval; MRR, mortality rate ratio; PU, peptic ulcer; PUB, peptic ulcer bleeding.
[a]Filled prescription for NSAIDs, aspirin, oral glucocorticoids, vitamin K antagonists within 30 days before the PUB event.
[b]Antiulcer drugs include proton pump inhibitors and H2 receptor antagonists.

Table 4 Adjusted 30-day mortality rate ratios for patients with peptic ulcer bleeding

Variables	Adjusted 30-day MRR (95% CI)	P-value
Age (years)		
<60	1.00	–
60–79	3.24 (2.56–4.14)	0.001
≥ 80	8.13 (6.10–10.82)	<0.001
Charlson comorbidity index		
Low (0)	1.00	–
Medium (1–2)	2.36 (1.81–3.09)	<0.001
High (≥ 3)	3.48 (2.01–6.01)	<0.001

Adjusted by a Cox regression model for age, sex, comorbidity, previous peptic ulcer-related hospitalization, ulcer-related drug, and antiulcer drug usage.
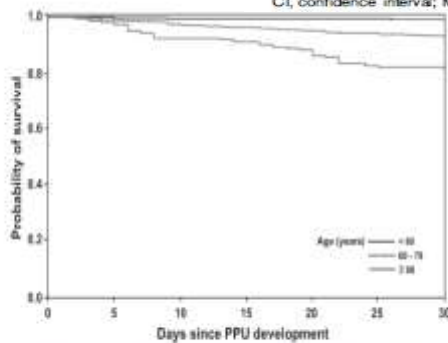CI, confidence interval; MRR, mortality rate ratio.

Figure 3. Kaplan–Meier plot of early mortality after perforated peptic ulcer development according to age. Early mortality was significantly higher in the oldest group than in the youngest group (log-rank test, P < 0.0001). The unadjusted odds ratios were 6.70 (95% CI 4.31–10.30, P < 0.001) and 22.5 (95% CI 13.92–36.31, P < 0.001) for patients aged 60 to 79 years and 80 years or older, respectively, as compared with patients younger than 60 years. PPU, perforated peptic ulcer.

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Thank you

- References

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