AI Utilization at HIRA (Health Insurance Review & Assessment service) : Experiences and Challenges

Heesung Jung

International Cooperation Department
Health Insurance Review & Assessment service

HIRA's Role and Functions

1

- Benefit policy support
  - Listing
  - Pricing
  - Setting standards

※ Procedure, Drug, Medical supply

2

- Claims review
- Quality assessment
- On-site Investigation
- Drug Utilization Review (DUR)
- Medical fee verification service

3

- Korea Pharmaceutical Information Service (KPIS)
- Healthcare resources management
- Big data analysis
- Development of patient classification & coding system
- Healthcare Big Data analysis

ICT Support

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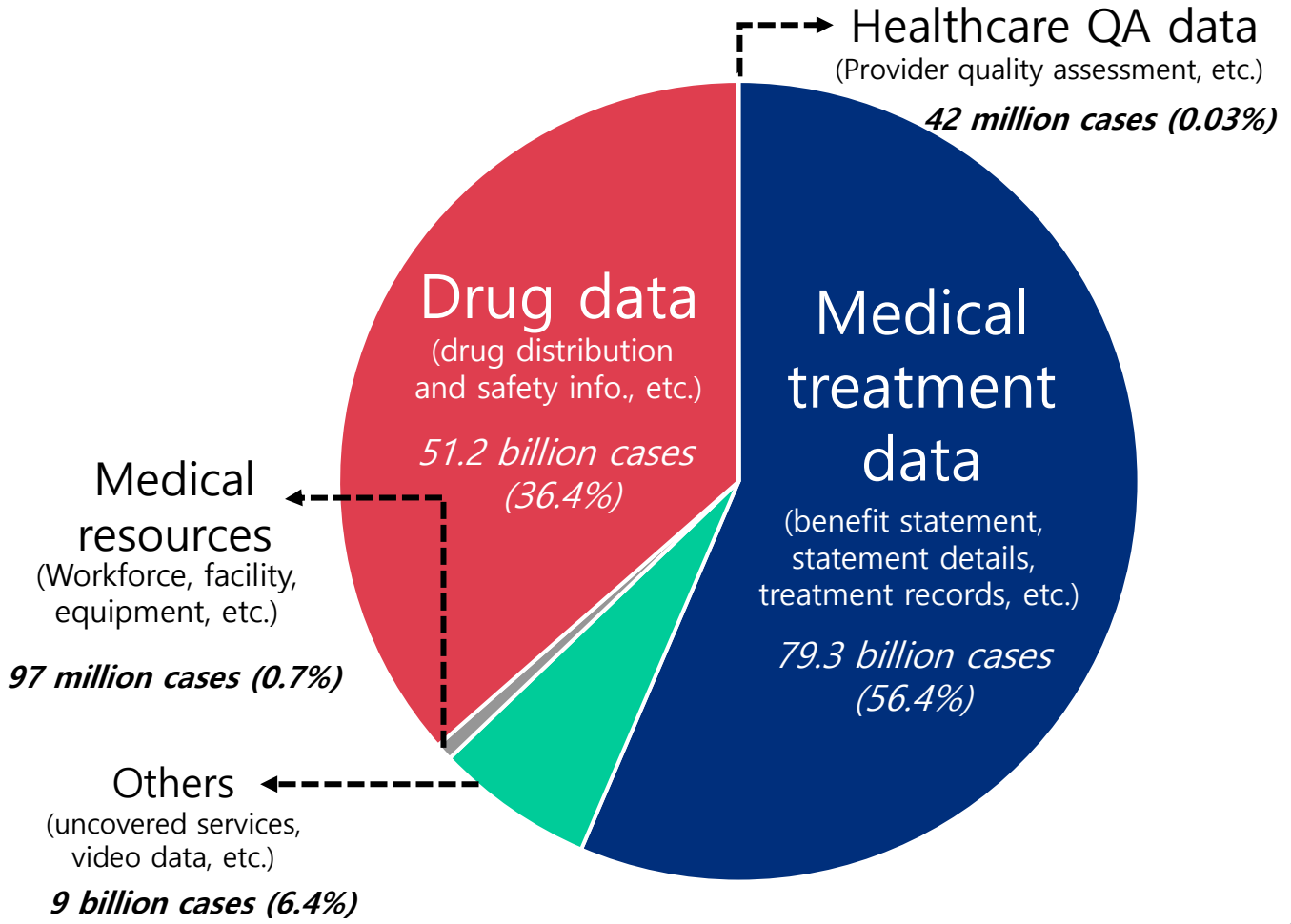
HIRA Big Data System for AI Utilization

"Around 140.4 billion cases, and around 3PB"
(AS OF 2020)

Standardized national healthcare data by e-claim

- Patient & Healthcare facility data
- Disease Code(ICD11)
- Prescription(pharmaceutical) code(GS-1)
- Procedure code
- Image data(PACS)



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HIRA's AI Strategic Plan

Post-Monitoring

2023

- Fraudulent claim detection
- Medical Image Interpretation Advisor

Preemptive Prevention

2025

- Disease Prediction

Personalized Healthcare

2027

- Personal Health Advisor

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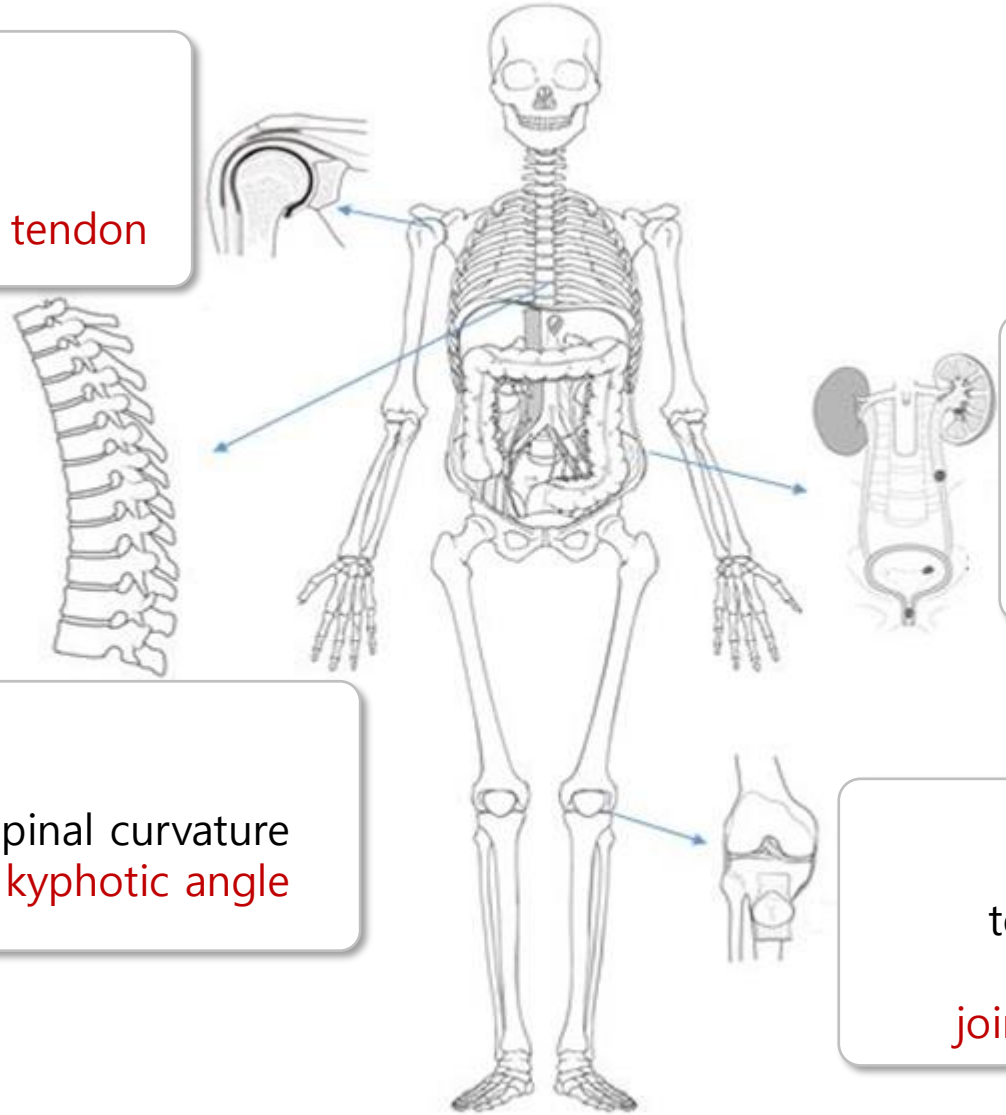
Medical Image Interpretation Models

Shoulder

rotator cuff tear
tear length and pattern by tendon



Urinary system

urolithiasis,
stone location, number, size

Spine

scoliosis, compression fracture, spinal curvature
Cobb angle, compression ratio, kyphotic angle

Knee

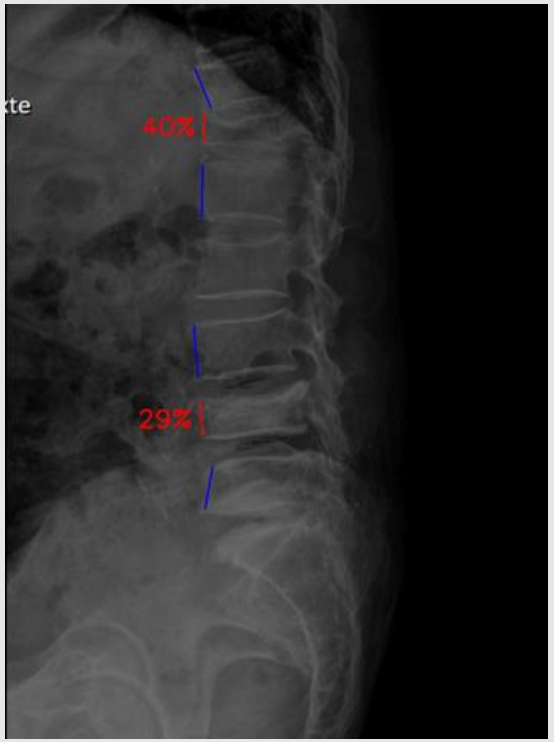
total knee replacement,
KL grade, osteophyte,
joint space narrowing ratio

Result of Medical Image Interpretation

- Scoliosis

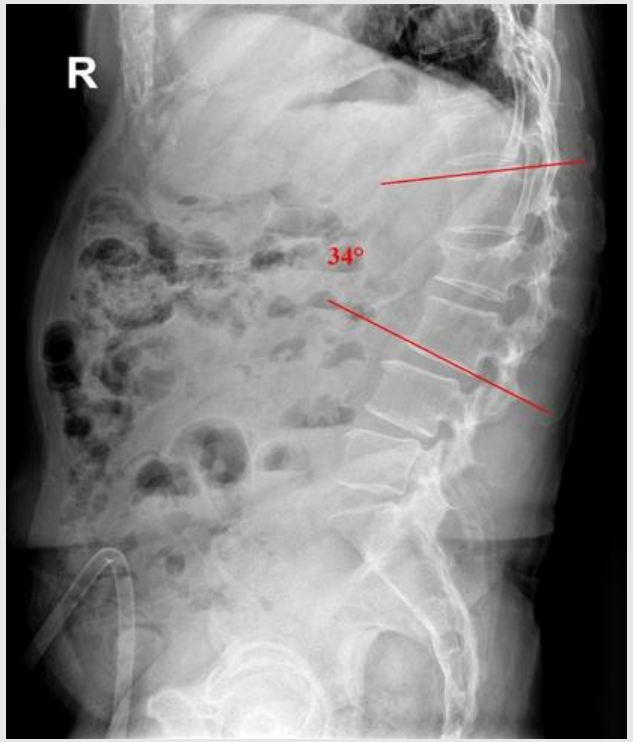
Measurement and notation of scoliosis angle.

- Compression Fracture (Compression Rate)



Measurement and notation of vertebral compression rate (when compression is over 20%)

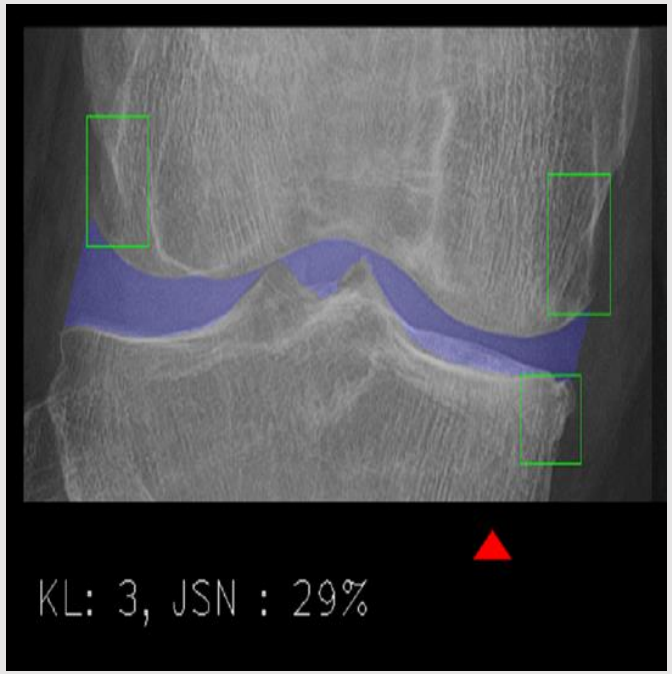
- Compression Fracture (Kyphotic Angle)



Measurement and notation of compression rate and kyphotic angle of the spine

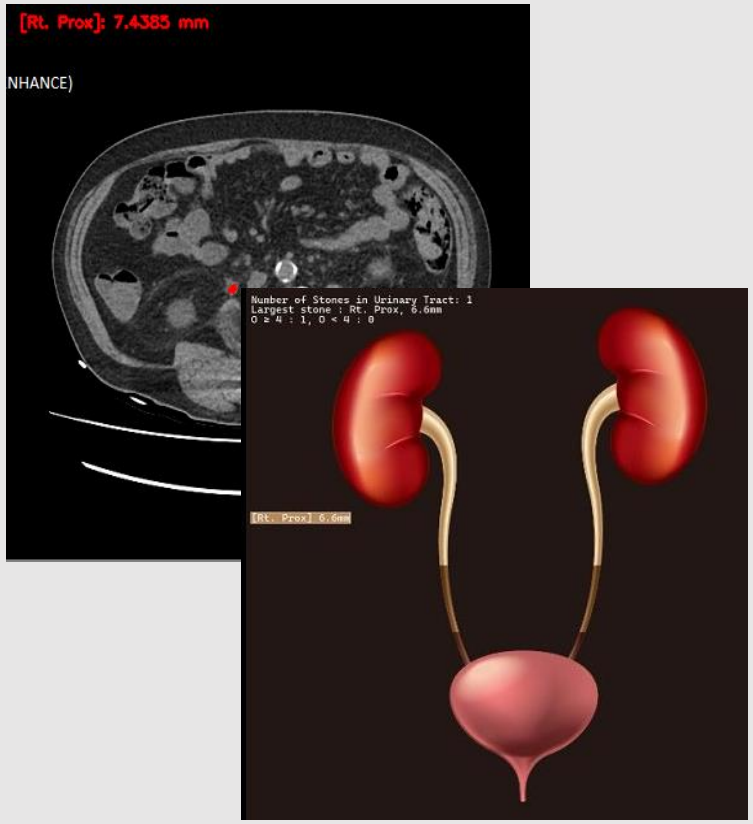
Result of Medical Image Interpretation

- Knee osteoarthritis



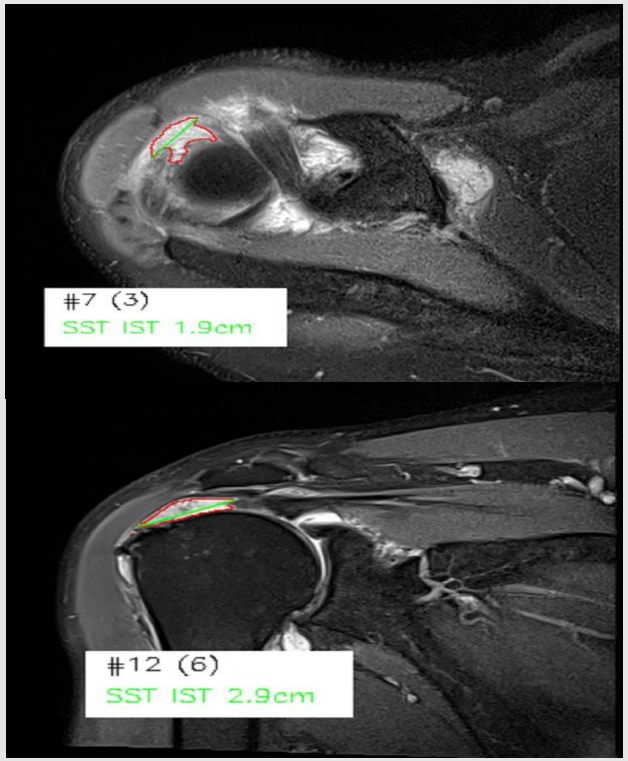
joint space narrowing (JSN), osteophyte, KL grade measurement, notation

- Urolithiasis



stone detection, size measurement, localization, and notation

- Rotator cuff tear



measurement and notation of the maximum tear length for each torn tendon

Fraudulent Claim Detecting Models Based on Claim Data

Detect upcoding case with similar codes

Infuser

$ 10

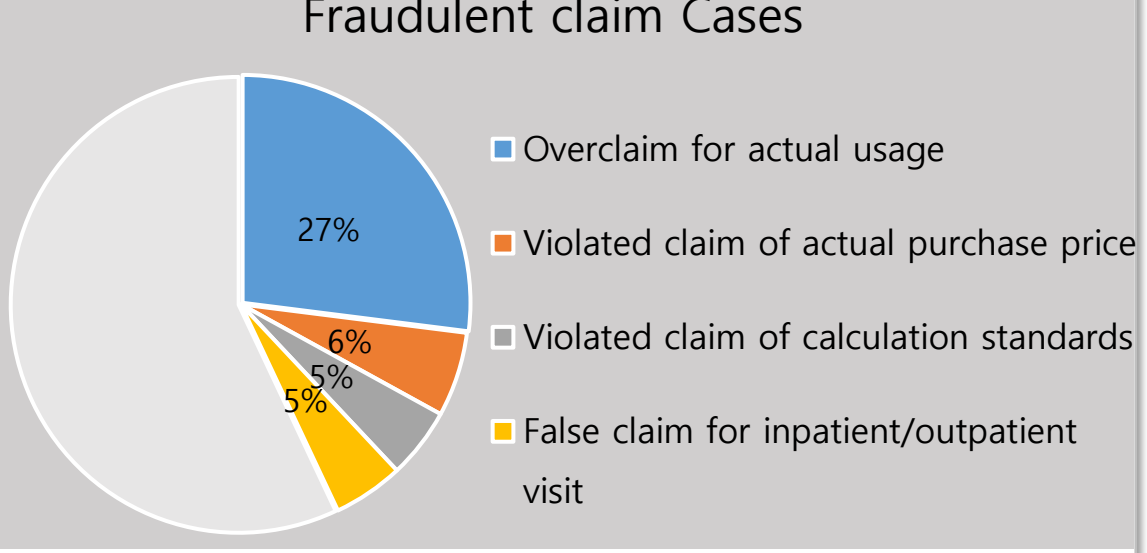
Claim

Intravenous line & infuser

$20

- Implement hospital's profile(30,173) based on claim data
- Group facilities into 3 levels of upcoding likelihood (H/M/L)
- Verify performance of the model(0.89 accuracy)
- Integrate the model with the business system

Detect fraudulent healthcare facility



Detected claims and facilities can be subjected to onsite investigation

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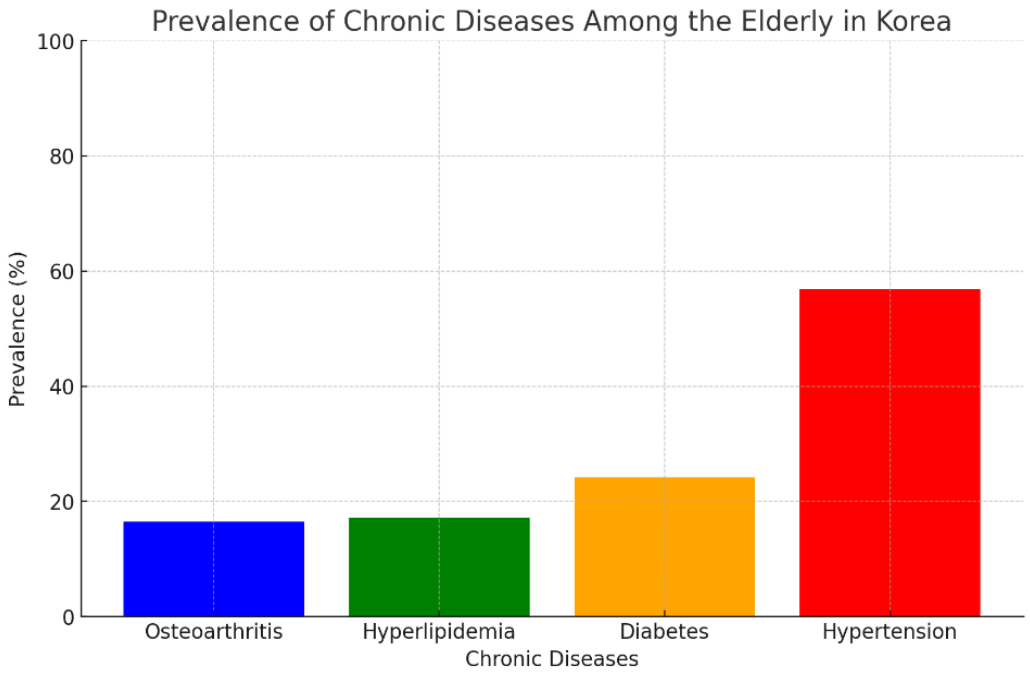
Disease Prediction Models to Prevent Chronic Diseases

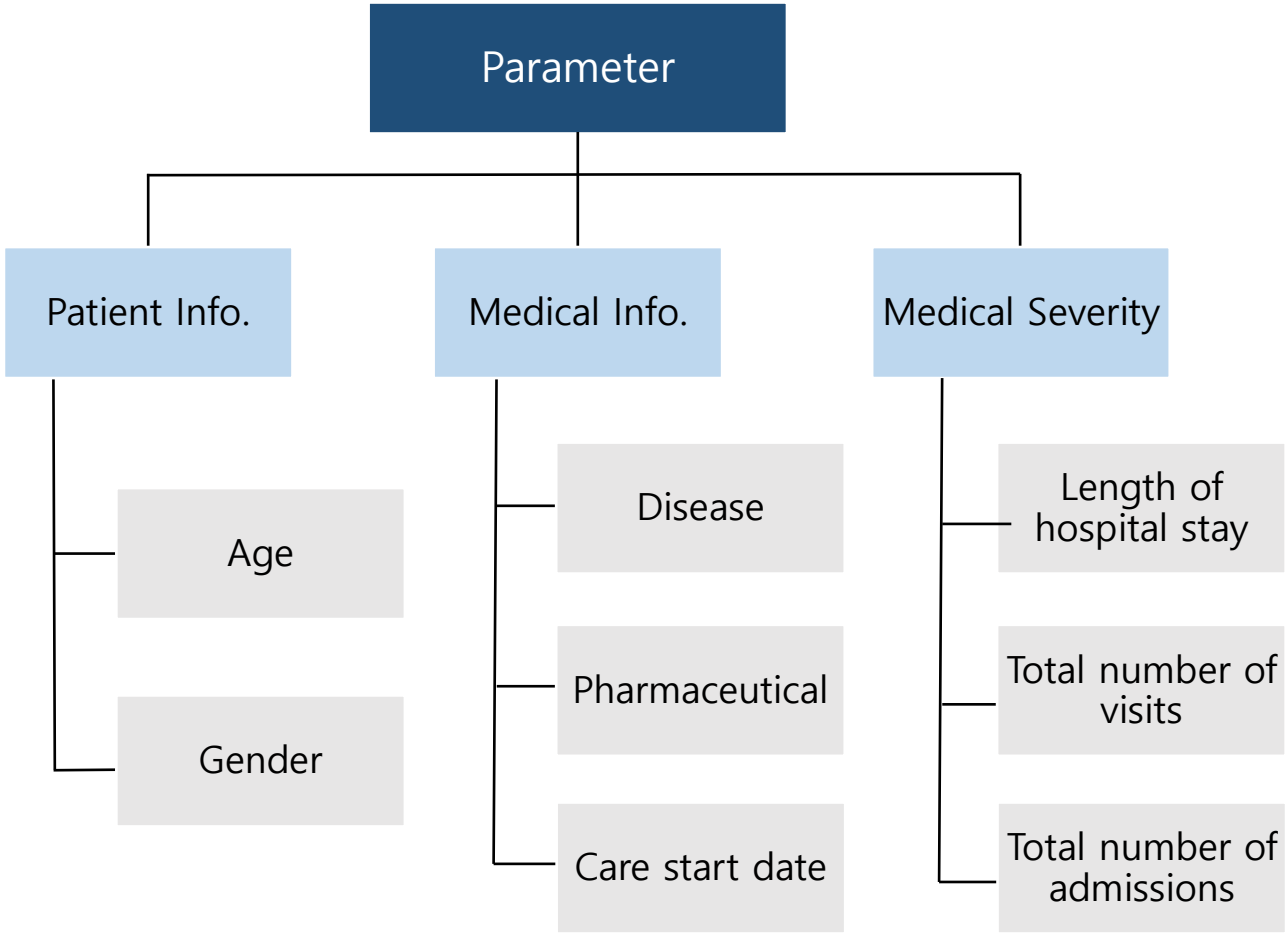


- To prevent chronic diseases among elderly
- Model trained using PHR in HIRA system
- AUROC 0.9, Accuracy 0.8, Sensitivity 0.8

Metabolic diseases	Degenerative diseases	Cancer diseases
2022	2023	2024
• Diabetes • Hypertension • Coronary artery disease • Cerebrovascular disease • Dyslipidemia	• Joint diseases • Dementia • Chronic kidney disease (CKD) • Chronic obstructive pulmonary disease (COPD) • Kidney dialysis	• Stomach cancer • Colorectal cancer • Liver cancer • Lung cancer • Prostate cancer • Breast cancer

Disease Prediction Models to Prevent Chronic Diseases

- Develop parameters and patients' 3Million dataset using claim data
  - Collaborate with Yonsei University
- Tokenize parameters and train the model
  - NLP model(BEHRT) used
- Verify performance
  - AUROC 0.9, Accuracy 0.8
  - Sensitivity 0.87, Specificity 0.77



Challenges in AI Utilization

Accuracy, Transparency

- Limited data and Resources
  - Absence of clinic information in claim data
  - High cost of initial development
- Integration Difficulty
  - Difficulty in integrating data from different sectors and countries.
  - Difficulty in integration with existing systems
- Limited Interpretability
  - Black box problem

- Operational
  - Feasibility
    - Data availability / cost
  - Governance
    - Data accessibility and sharing policy
    - Privacy and protection
    - Transparency
  - Sustainability
    - Ongoing data collection
- Technical
  - Data collection
  - Data linkage
  - Data management and analysis
- Methodological
  - Cognizant of data relevancy and limitation
  - bias

Source: Drug discovery Today 2023;28(1):1-12

What We Can and Cannot Do

- Limited Data and Resources
  - Expand claim data coverage to collect clinic information
  - Integrate outside data using pseudonymous data (financial, mobile communication, wearable devices..)
  - Train internal AI experts
- Integration Difficulty
  - Migrate systems to the public cloud
  - Enhance domestic/international cooperation
- Limited Interpretability
  - Issue being faced by all the health technology organizations

Fair Review and Assessment, Unwavering Healthcare System,
Trusted and Specialized Institution in National Healthcare Management

Thank you