# How nice it is, to have HL7 standardized storage

- Wide variety of applications out of Ministry's project based on HL7

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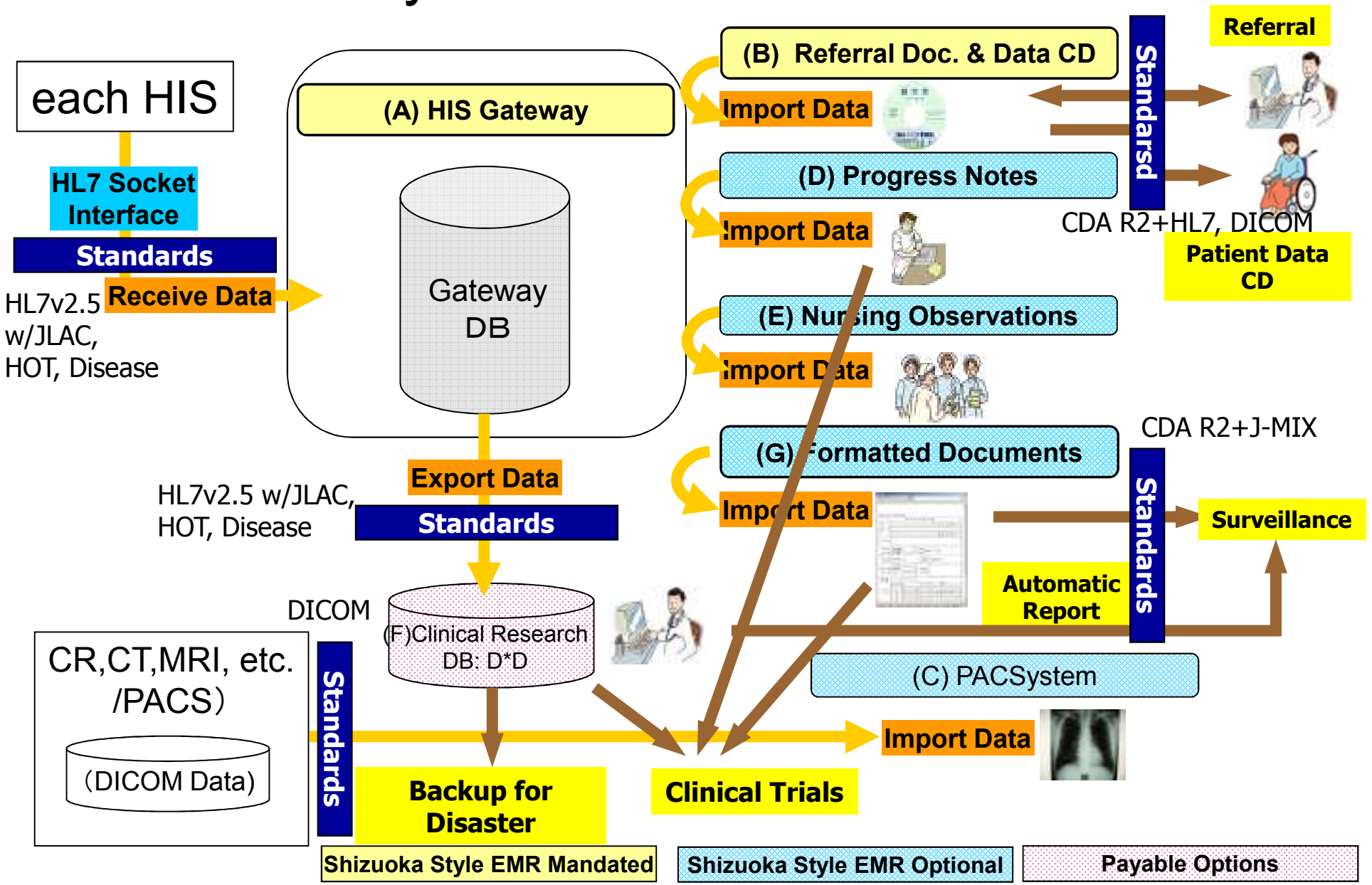
# CPOE and EMR in Japan, 2006

- Order entry system
  - 75% or more of the hospitals with more than 400 beds.
- Electronic medical record system
  - 22% of the hospitals with more than 400 beds and 5% of clinic.

# Enclosures

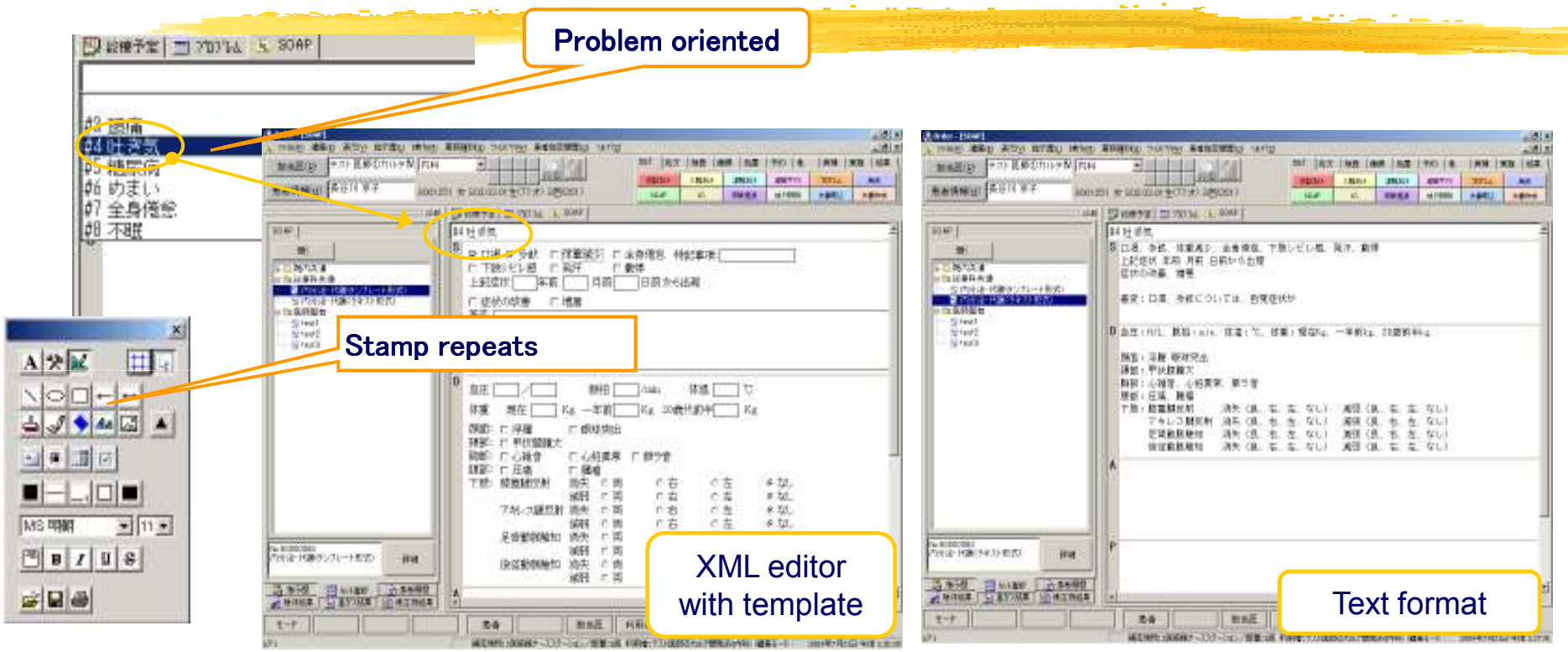
- Until recently, HL7 format export was not equipped, nor optional, but customization
- A vendor appeals that our EMR already has master files of drugs, examinations (of their own)(no standard code)
- "We have more confidence on our proprietary format than HL7."
- At replacing CPOE of vendor A, challenging vendor B required to pay 60,000,000 yen for "data conversion" to vendor A, in a real deal of 300,000,000 yen, as user required to carry over past data, naturally
  - Trump is the precious patients' data, by efforts of whole clinical staffs!
  - "Leave data in standardized format, at the completion of the contract" (A divorce clause at marriage contract).

# Shizuoka Style EHR Structure

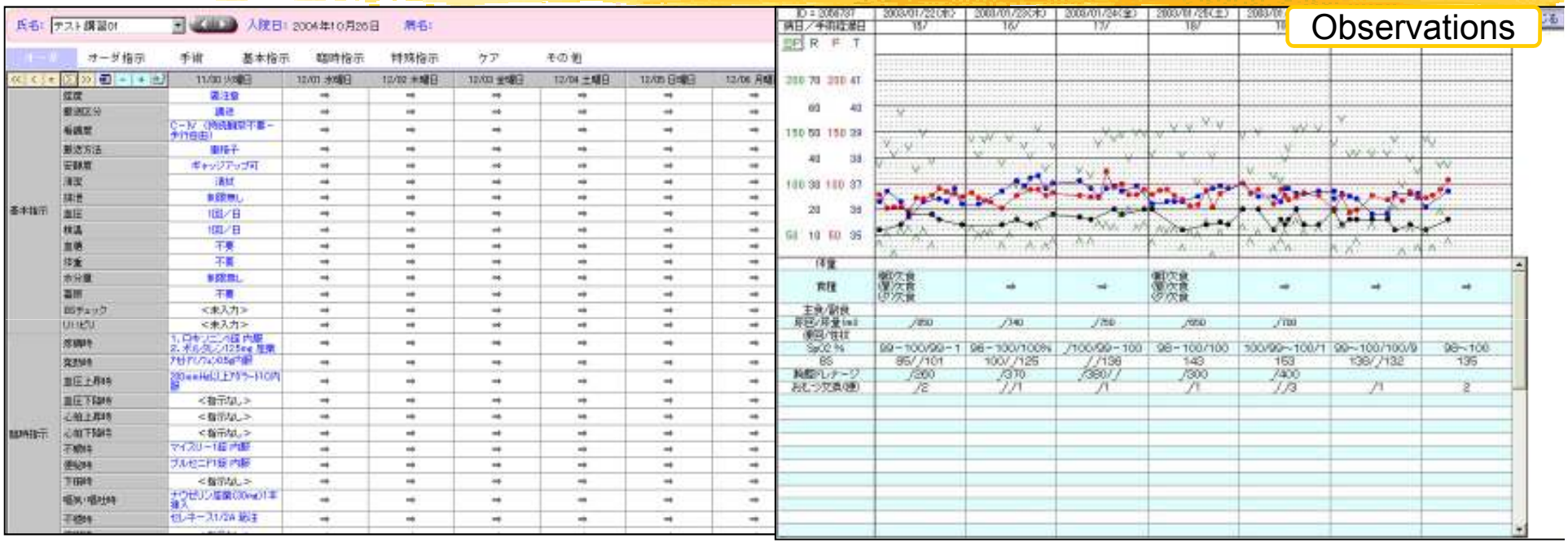


- Referral document
  - HL7 prescriptions and lab results
  - DICOM images
- Also can "sell" to patients who want this,

# Progress Note



# Nursing observations

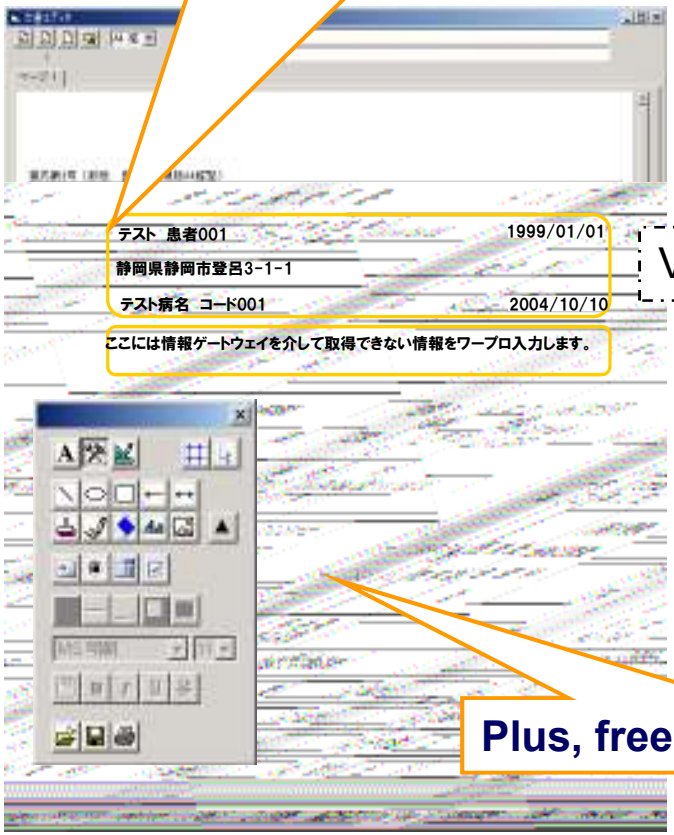



✓Orders and observations from HIS
✓Plus, nursing observations, orders,

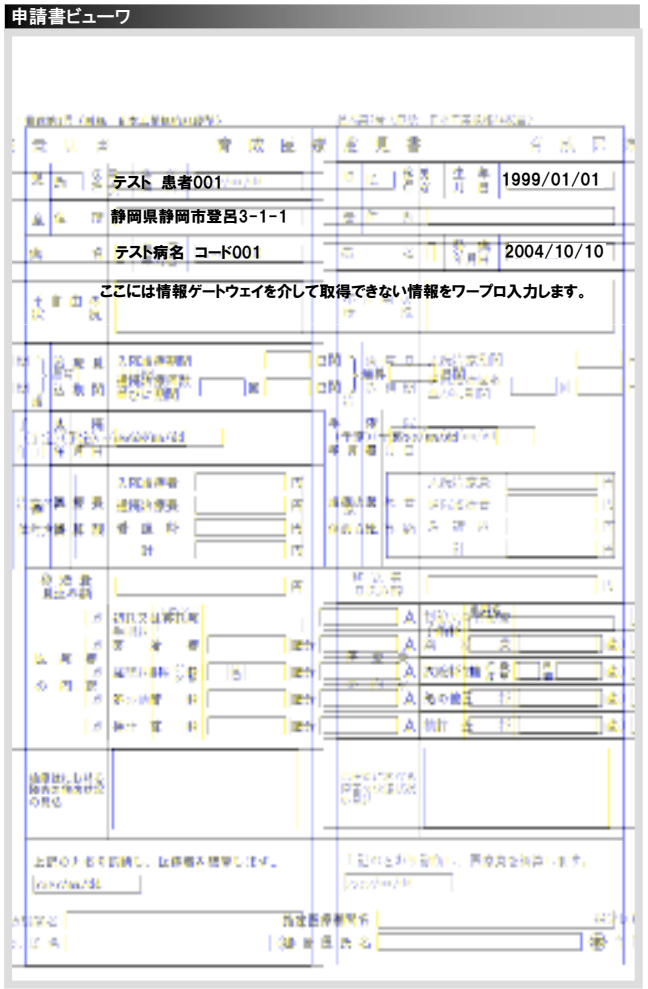
✓Vital signs and observations
✓Viewable by hours, days, weeks

# Formatted documents

**Some contents (Demographics, disease classifications, etc. imported from HIS**




Viewable by XML viewer




**Plus, free texts or pull downs**

診療情報提供書

ファイル(F)　ﾍﾙﾌﾟ(H)

# 診療情報提供書（患者紹介）

2007 年 3 月 23 日

医療機関
初夢クリニック
内科

担当医
初夢　太郎 殿

〒003-0007　北海道札幌市白石区東札幌６条１丁目１番１号
TEL 011-XXX-XXXX

医療機関名　コンベンション医療センター　内科

所在地　〒420-0011　静岡県静岡市葵区追手町1-1

電話番号　054-221-2406

医師氏名　富士鷹　茄子

| 患者氏名 | 駿河　葵 | 生年月日 | 1952 年 7 月 17 日 | 女 |
|---|---|---|---|---|

| | |
|---|---|
| 紹介目的 | 胃潰瘍投薬治療後の経過観察 |
| 現疾患（診断内容） | 胃潰瘍 |
| 現在の処方（現投与） | ＭＳコンチン錠　１０ｍｇ 2錠<br>１日２回　１２時間毎　内服 7日分 |
| 身体所 | 身長：170ｃｍ、体重：48ｋｇ |

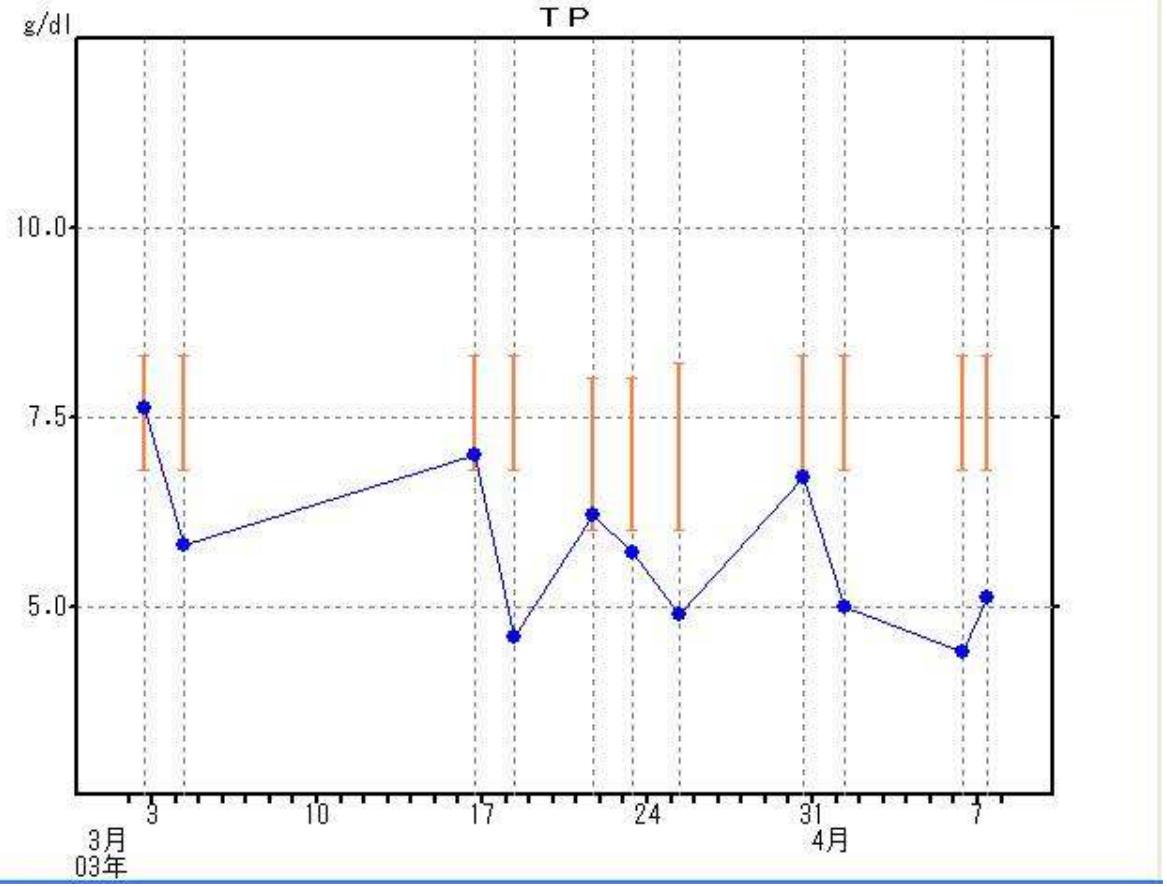
処方一覧　処方経過　検査結果　画像参照

○ すべて　◉ 年割　○ 月割

| | | 2003 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3/3 | 3/4 | 3/5 | 3/7 | 3/12 | 3/17 | 3/19 | 3/20 | 3/20 | 3/21 | 3/22 | 3/2 |
| ＴＰ | g/dl | 7.6 | | 5.8 | | | 7.0 | 4.6 | | | | | 6. |
| ＡＬＢ | g/dl | 3.7 | | 3.0 | | | 3.3 | 2.2 | | | | | |
| Ａ／Ｇ比 | | 0.95 | | 1.07 | | | 0.89 | 0.92 | | | | | |
| ＺＴＴ | K−U | | | 7 | | | | | | | | | |
| GOT(AST) | IU/L | 39 | | 18 | 26 | | 27 | 10 | 22 | | | | 3 |

2003 / 2005

グラフの設定



# The Japan Times
# May 17, 2006



NATI

## Shizuoka hospitals test electronic patient charts

By KOICHI MIYAGAWA
SHIZUOKA (Kyodo) In a radical departure from the practice of writing out patient medical records, the Shizuoka Prefectural Government has developed and is trying out a system to keep the documents in electronic form.

Two municipal hospitals, in the cities of Numazu and Fukuroi, started using the electronic chart system in January after getting it for free from the prefecture.

Eleven other hospitals are scheduled to follow suit sometime over the next 12 months.

Prefectural officials hope to introduce the system to all Shizuoka hospitals by fiscal 2009. The system is unique in that it has standardized data formats.

This, its creators say, enables the information to be more easily shared when patients are transferred, and outpatients will be able to use their home computers to view information compiled by their doctors, including diagnoses.

The Health Ministry is keeping a close eye on the experiment in hopes it can be expanded to hospitals nationwide.

Under the trial, patients undergoing treatment at the two hospitals can obtain a CD-ROM with such information as the names of their maladies and drugs used to treat them. Each disc has a special password for the patient.

Included in the data are reports on medicines taken, results of blood pressure checks and CAT scans. Each CD contains software that lets a patient convert blood pressure data into graphics or enlarge CAT scan images.

A prefectural official said patients can view their medical charts on any PC and use the information if they seek second opinions.

"The system can also contribute to enhancing medical services for patients and improve the transparency of medical care," the official said.

In many cases, treatment results are handwritten by doctors on patient charts.

The patients, however, often have trouble with these handwritten medical records when seeking other opinions or when transferring to another medical institution.

Although many medical facilities compile electronic records of treatment, the records cannot be accessed by other hospitals if their formats differ, requiring a patient seeking transfer to another institution to repeat certain tests.

The central government had hoped to have standardized electronic charts at more than 60 percent of hospitals with more than 400 beds and clinics in the current fiscal year, but little progress has been made due to the vast funds needed to develop and introduce such a system.

A Health, Labor and Welfare Ministry official gave high marks to the Shizuoka system.

"In addition to standardizing the data format, Shizuoka Prefecture's electronic record system is one that can be easily introduced at small clinics," the official said.

Dr. Nobuo Akiyama, an honorary director of Numazu Municipal Hospital, said many patient charts and letters of introduction are simply difficult to read due to doctors' poor handwriting, causing problems for patients and medical practitioners alike.

He said medical care administered by teams of experts has now become common, and thus patient charts must break out of the realm of just being records kept by individual physicians.

"Electronic patient charts are appropriate for information disclosure," Akiyama said, adding they can be used by any hospital where patients are transferred as long as the formats are standardized.

He predicted that electronic charts will come into widespread use, "although it may take time."

FUKUOKA — Taro Okamo
ture, in December.

Display

NAGASAKI (Kyodo) Hiroshi
ganaki residents have bee
put on permanent exhibitio
Japanese artist Taro
(1911-1966) that depicts th
bombing of Hiroshima.
But neither one of the
pressed eagerness to offer
home for the long-lost "My
row," which was brought
nearly a year ago from N
A foundation running th
mato Memorial Museum i
to display the mural, whi
ters high and spans 38
summer after it undergo
in Toon, Ehime Prefectur
The foundation hopes to
current exhibition site

# CDs at Hamamatsu Univ. by month

| | CDs accepted | CDs taken in | Referral CDs | "Souvenir" CDs |
|---|---|---|---|---|
| | 持込CD数 | 取り込み可能 | 紹介状CD | 患者CD |
| 08/05 | 34 | 25 | | |
| 08/06 | 74 | 50 | | |
| 08/07 | 76 | 64 | | |
| 08/08 | 68 | 56 | | |
| 08/09 | 76 | 54 | | |
| 08/10 | 89 | 65 | 3 | |
| 08/11 | 101 | 76 | 32 | 1 |
| 08/12 | 97 | 75 | 24 | 1 |
| 09/01 | 74 | 62 | 38 | |
| 09/02 | 94 | 80 | 46 | 1 |

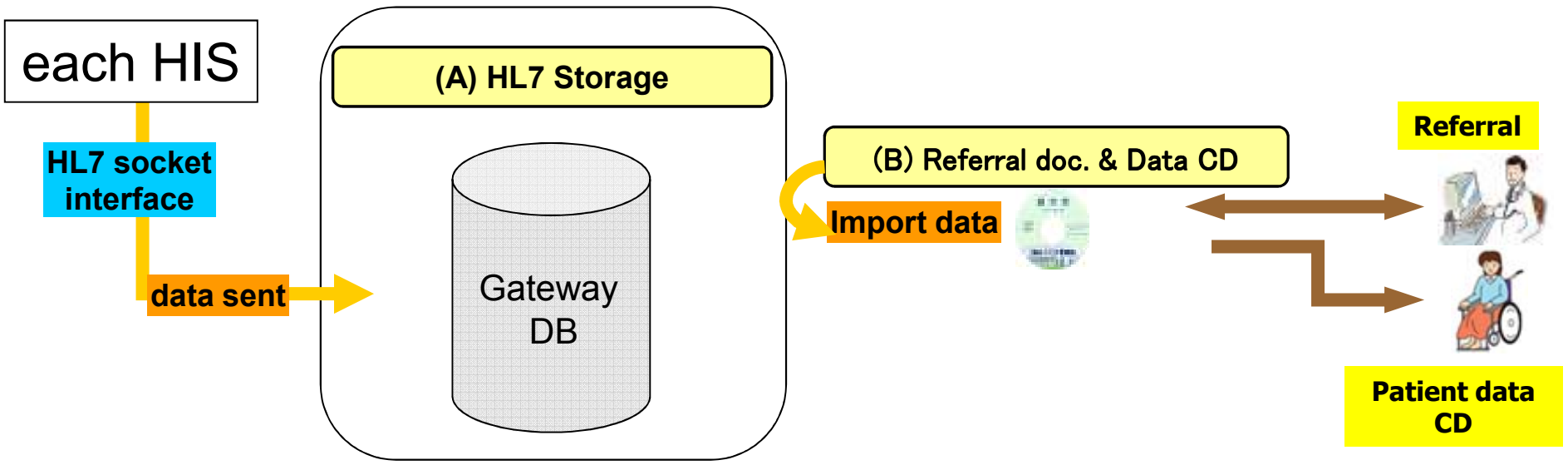
Michio Kimura, M.D., Ph.D., Hamamatsu University, School of Medicine

# MHLW promotes Shizuoka Prefecture EHR for Nationwide Use ...04/'06

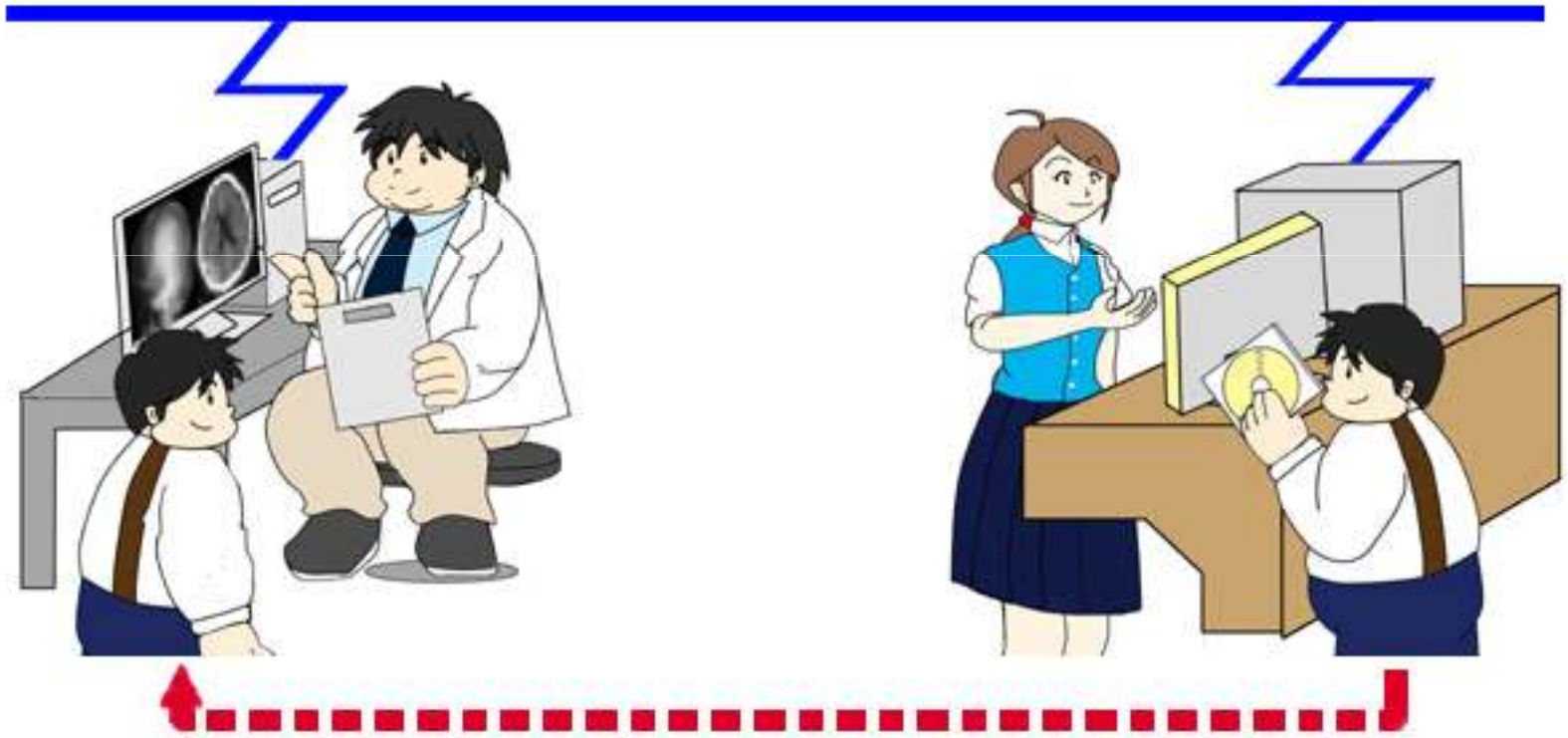
- 88M yen
- CD (referral and data for patients) free components software nationwide, like Shizuoka
- CD for patient can be payable like diagnosis certificate (3000 yen)
  - prescriptions, lab results, images + documents
- Part of Shizuoka EHR is now SS-MIX (Standardized Structured Medical Information eXchange).

# SS-MIX for Hospitals

With patient demographics, lab, prescription from CPOE in HL7 v2.5 format, CD (referral or data for patients) is created



# Reception desk receives CD, checks virus, imports information, which can be viewed at clinics (Free software, provided by Ministry project)

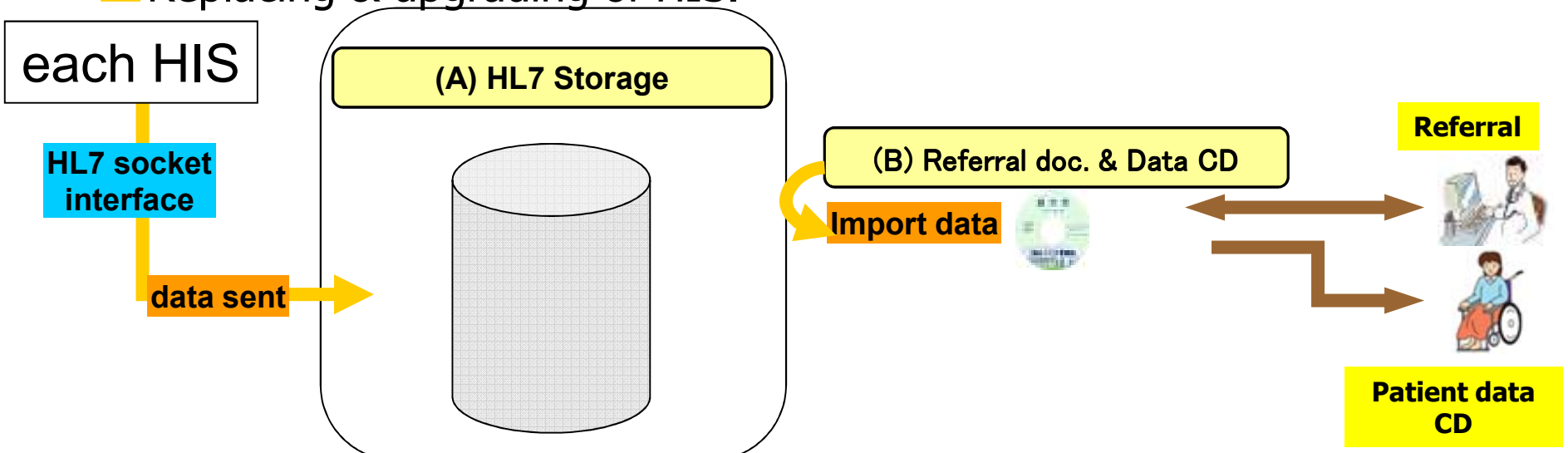


# PDI Agreement

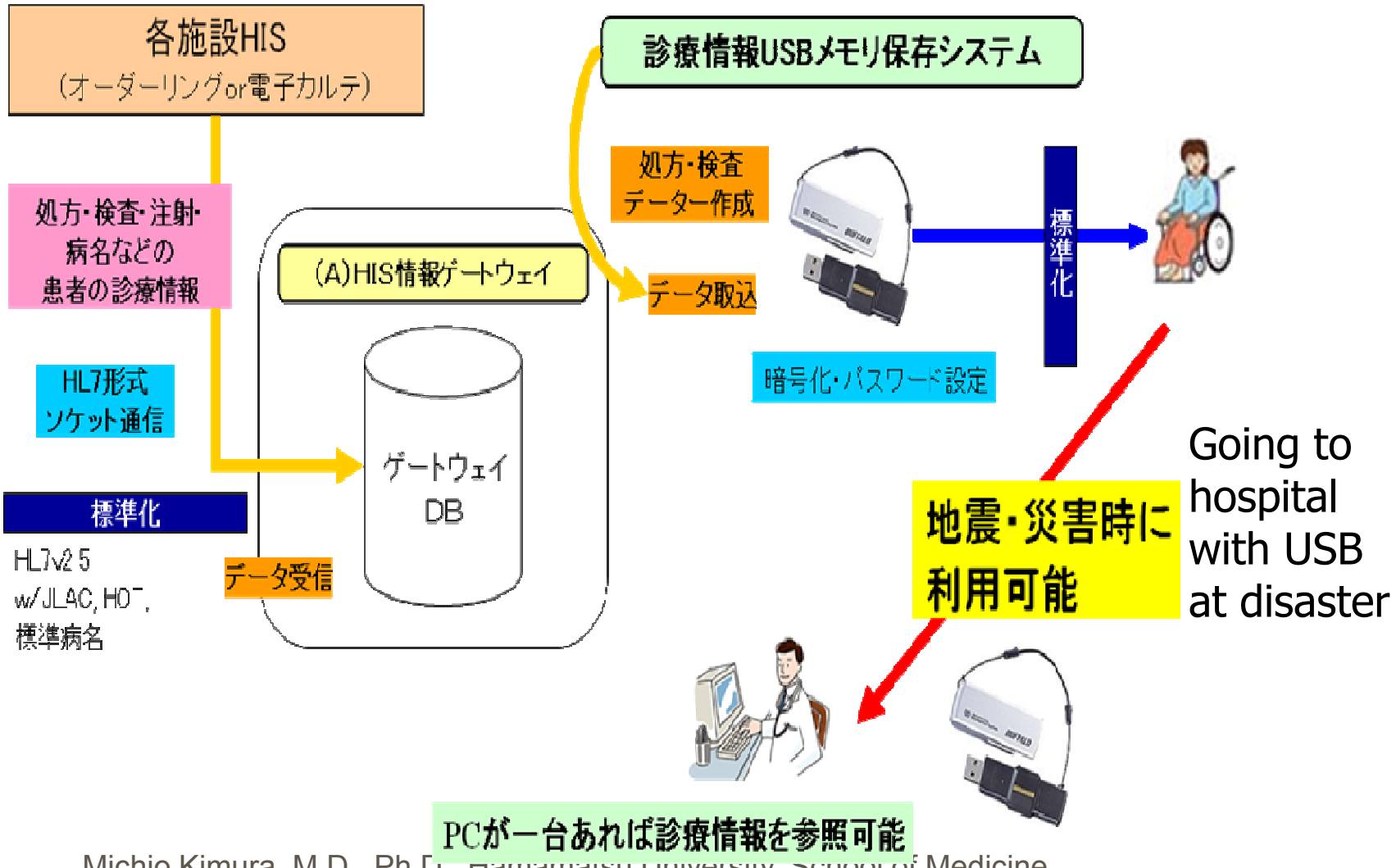
- Images exchanged by CD started, but making some annoyance
  - Not conforming PDI, DICOM
  - Too many slices, too many studies
  - Multiple patients in one CD
  - etc.
- By academic assoc.(JAMI, JRS, JSRT), vendor assoc. (JIRA, JAHIS), and IHE-J
  - 1 patient, 1 CD
  - Conform PDI
  - Conform DICOM
  - Reasonable amount of slices (no 1000+ MDCT), and studies
  - If include report, must be in "other files" position and note it

# Wide variety of applications on HL7 standardized storage

- We have patient demographics, prescriptions & injections, lab results, diagnosis classifications in HL7 v2.5
  - PHR
  - Making documents
  - Data retrieval
  - Interoperability with peripheral systems
  - Replacing & upgrading of HIS.



# -PHR by fingerprint-secured USB memory



# Trial at Fukuroi Municipal Hospital 2008-12-05 Disaster Drill

- 5 patients(actually, hospital staffs) have accumulated their data from HL7 storage
  - 49.7 seconds (average) from USB memory being handed, fingerprint authenticated, then data displayed.

# Questionnaires for 12 staffs involved

5 level Likart scale: very good, good, average, poor, very poor

- Times spent until display of data
  - （Fast） 3-8-4-0-0 （Slow）
- Prescriptions, lab results (no images) are enough?
  - （Enough） 3-5-5-3-0 （Not enough）
- Which you prefer, caring patient without paper record picked-up and delivered, or this method?
  - （This method） 2-6-4-3-0 （Without paper record）
- This USB PHR is useful for disaster
  - （Agree） 2-5-6-2-0 （Disagree）

# -Making documents with HL7 storage

- Patient demographics, prescriptions & injections, lab results, diagnosis classifications can be pre-populated
  - Adverse event report
  - Diagnosis certificate for submission to insurance organizations, etc.
  - Infection control report
  - Certificate for subsidy by local governments
  - Clinical research case card.

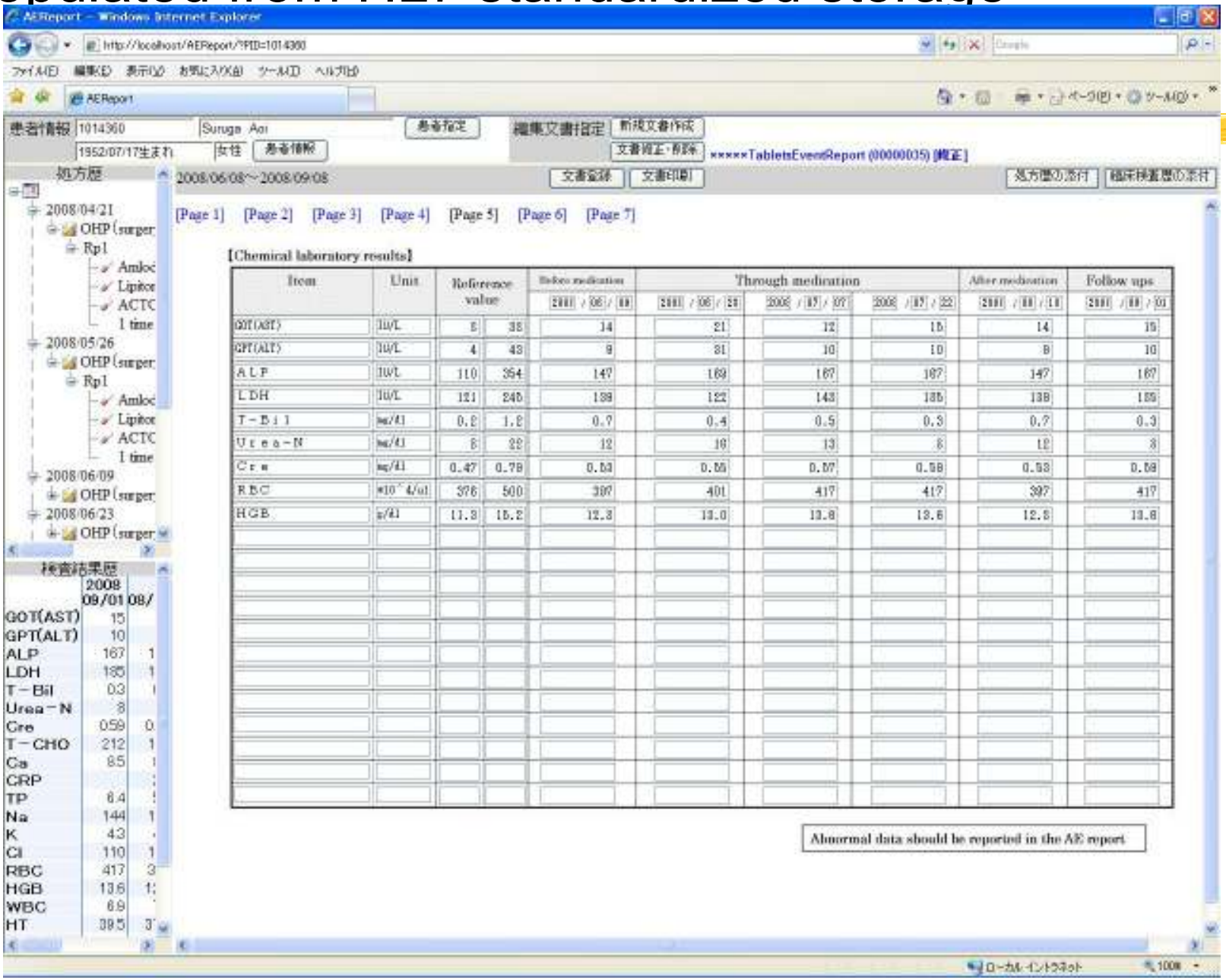
# Post Market Report

- Paper-based
- Manually collected in busy clinics

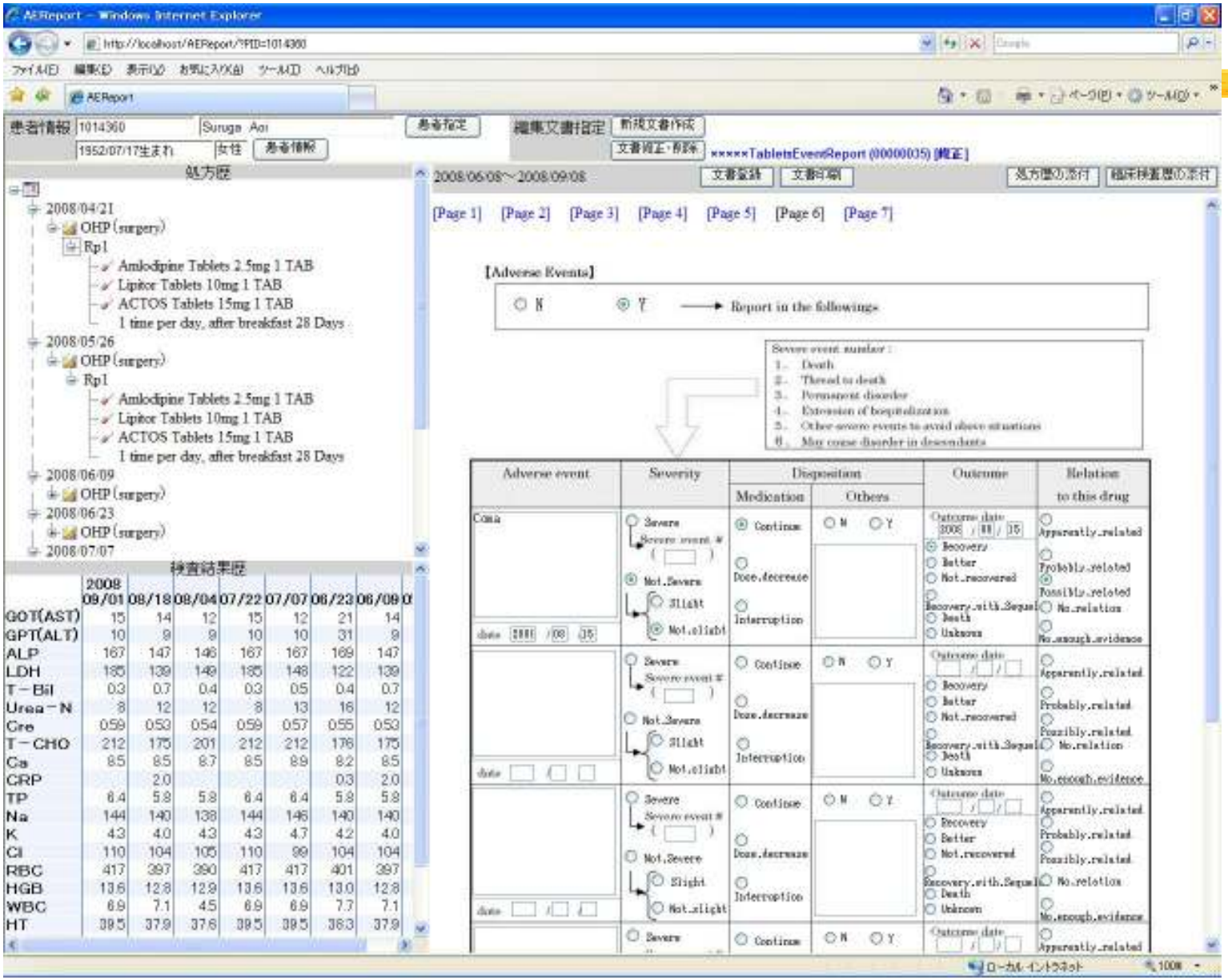
# Form Filling

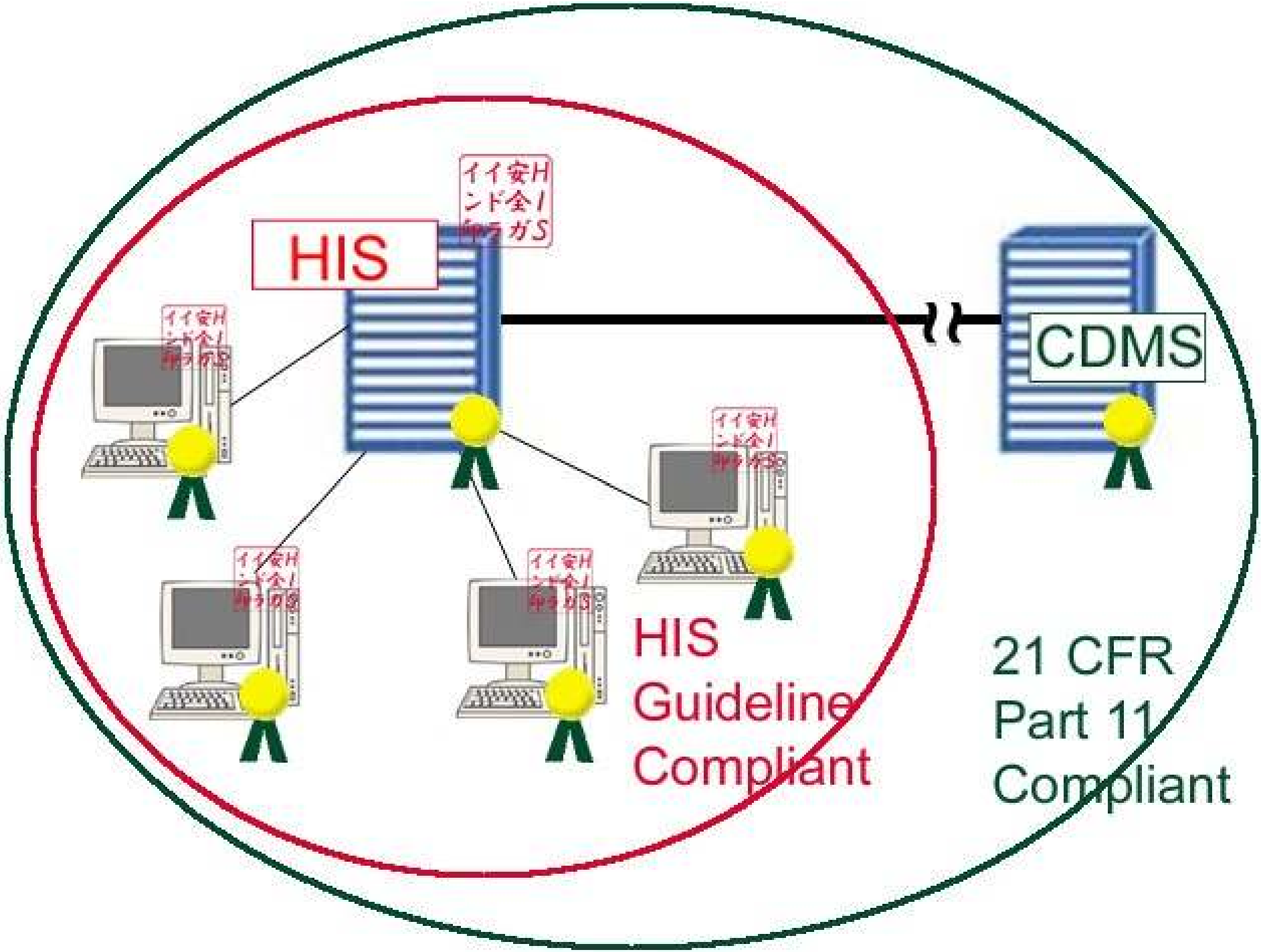
- Manually
- But, most items are in CPOE and EMR

# Lab results (as well as prescriptions) are pre-populated from HL7 standardized storage

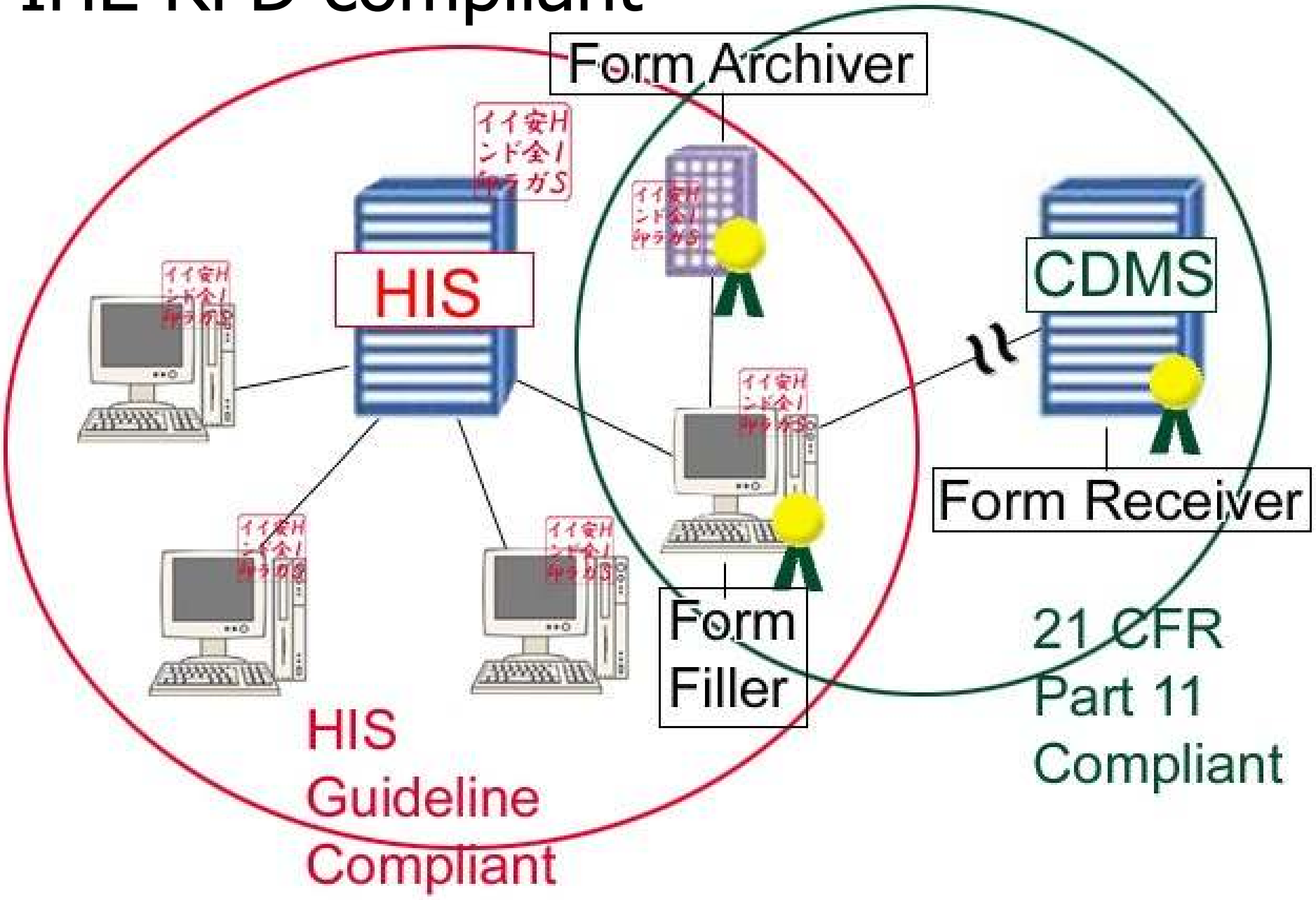


# Adverse events must be input by reporting doctors




HIS
CDMS
HIS
Guideline
Compliant
21 CFR
Part 11
Compliant

# IHE RFD compliant

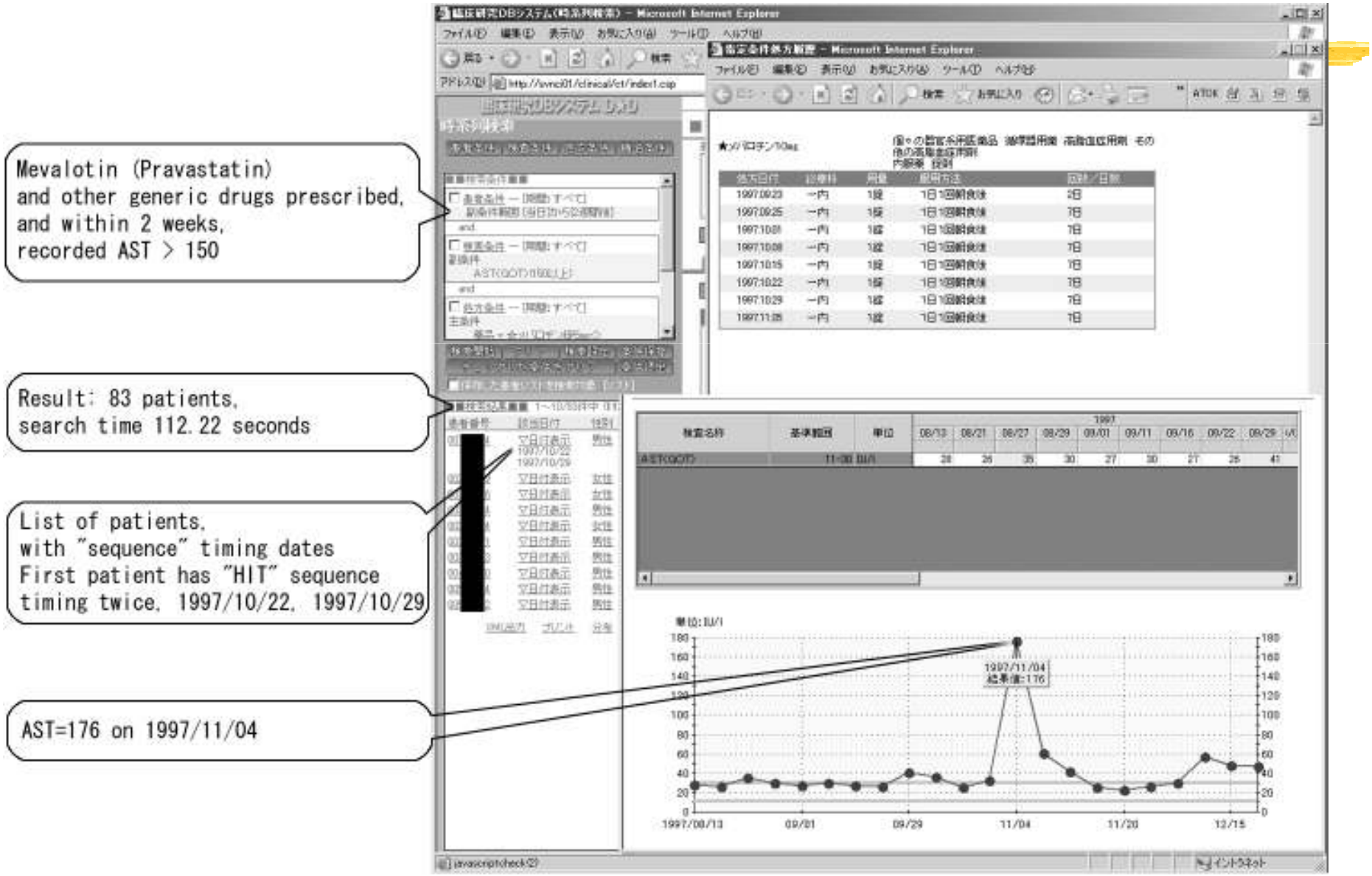


# -Clinical Database: D*D at Hamamatsu Univ.

- 73,709,298 records of 10 years of Lab. results, Prescriptions, Diagnoses,, all from HL7 storage

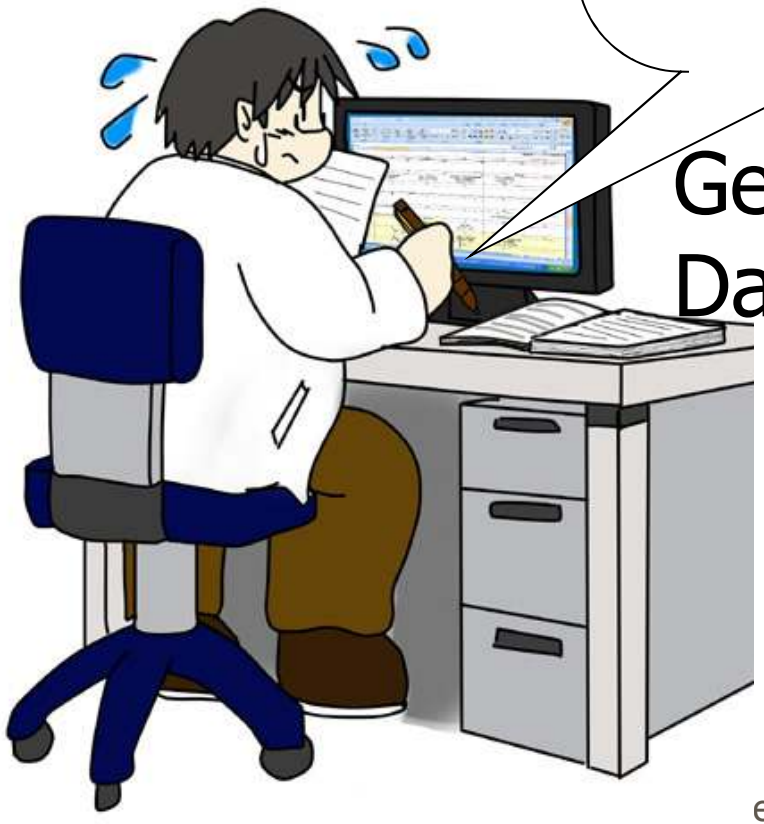
- “Pravastatin (any titer, with generics) prescribed and recorded AST > 150 within two weeks” resulted in "83 Patients", took 112.22 seconds

"pravastatin (or others, any titer) and AST > 150 subsequently within 2 weeks"
Search result: 83 patients, search time 112.22 seconds
Patient list shows a selected patient has "HIT" prescription twice, 1997/10/22, and 10/29,
and graph of AST show peak high value recorded on 1997/11/04, within two weeks of the medication.



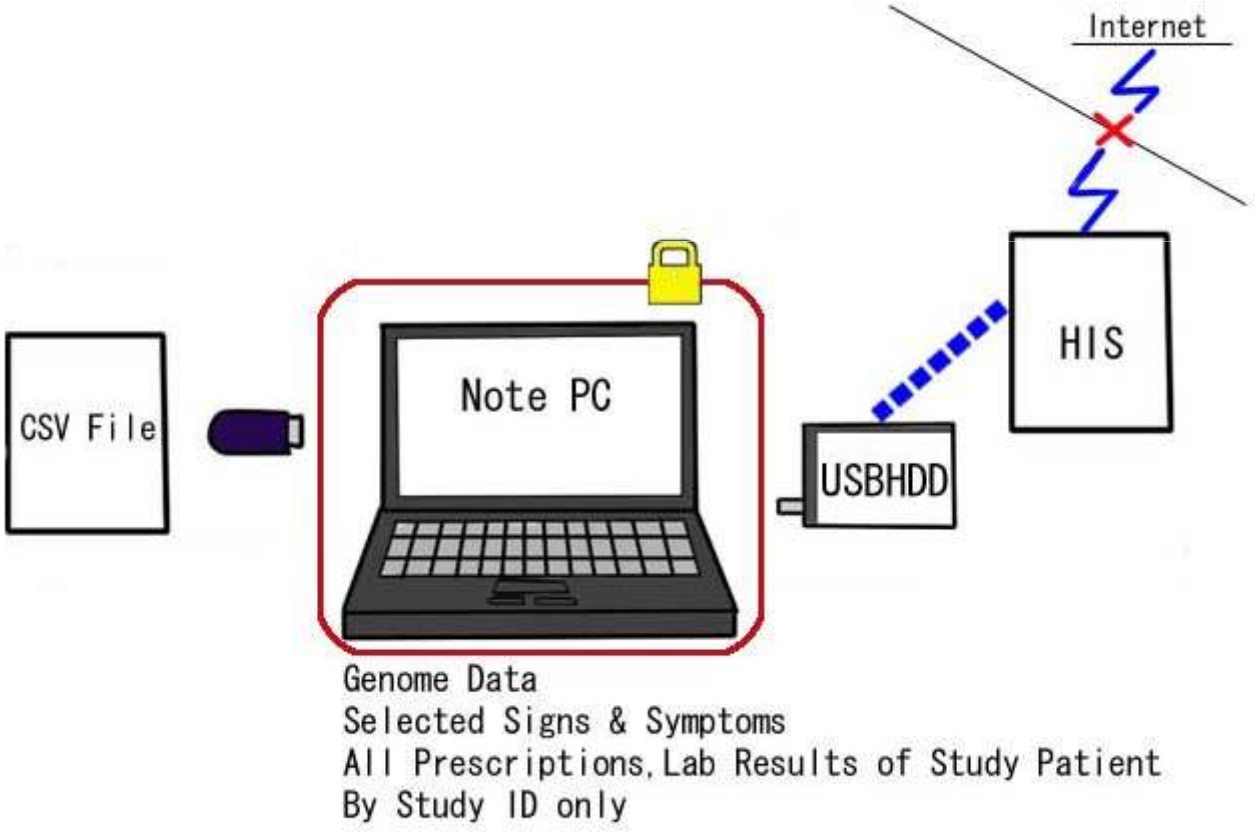
# Translational Study

- Selected clinical data into Genome Database
- You may not be able to check what you thought of.



# Then, put Genome data into Clinical DB, not Clinical data into Genome DB

- So, you can try whatever you think of medication, lab results, to try.
- Safely apart from network, other users.



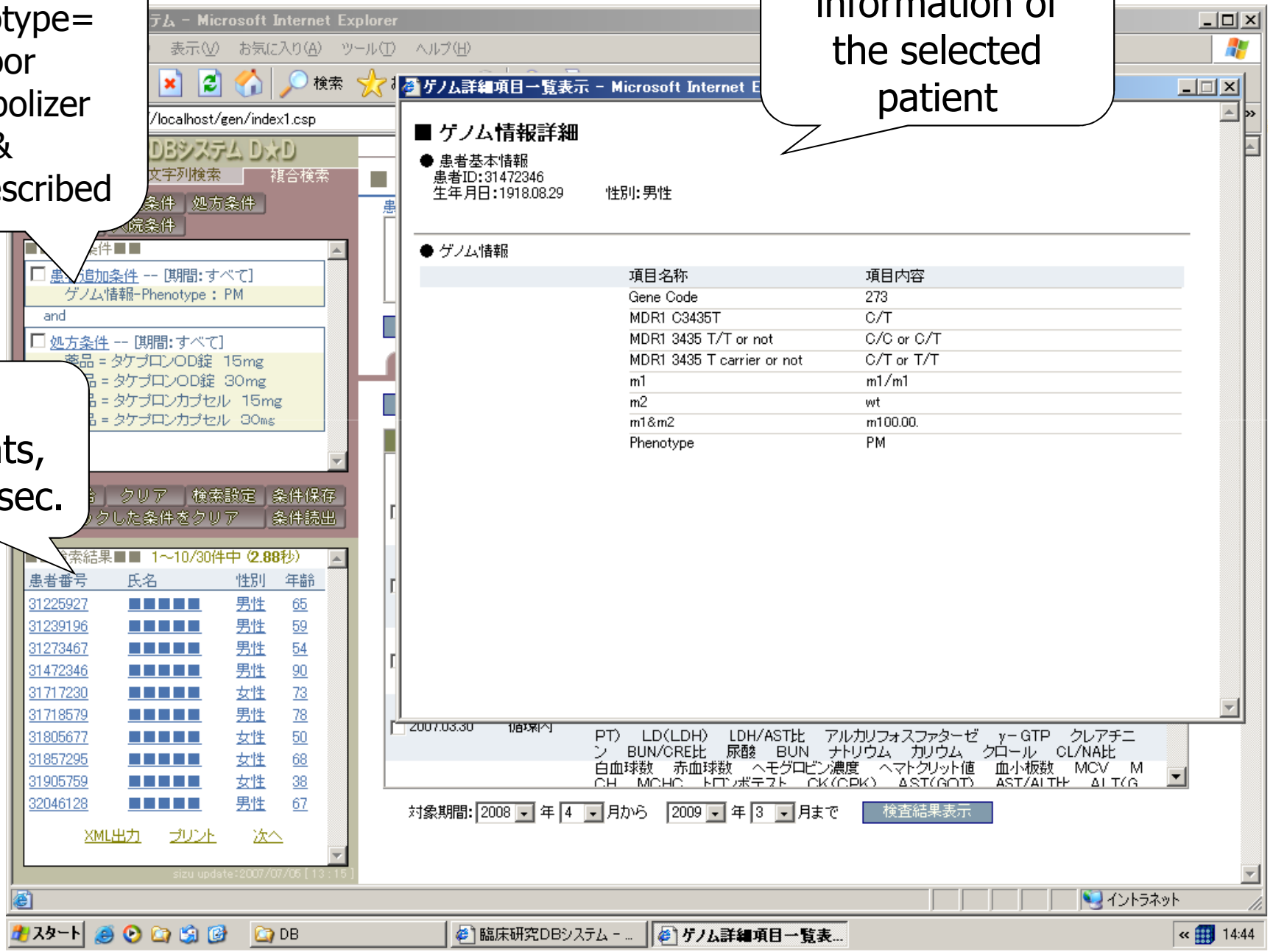
# "CYP2C19 genotype is associated with symptomatic recurrence of GERD during maintenance therapy with low-dose lansoprazole" EJCP-2008-0363.R1

- 125 patients of gastroesophageal regurgitation, their CYP2C19 genotype status, presence or absence of heartburn condition, are put into Clinical DB.
- We tested the relation of genotype (rapid, intermediate and poor metabolizers), examination results, such as calcium and total protein,,,,,
- Finally, we tested an example of improvement where the given dose of PPI could remain reduced 8 weeks after the start of medication. We found a significant difference between PM-RM and PM-IM (PM-RM P=0.014, PM-IM P=0.104).
- This study design (effectiveness judgment by PPI and relation with Genotype) required less than one hour.

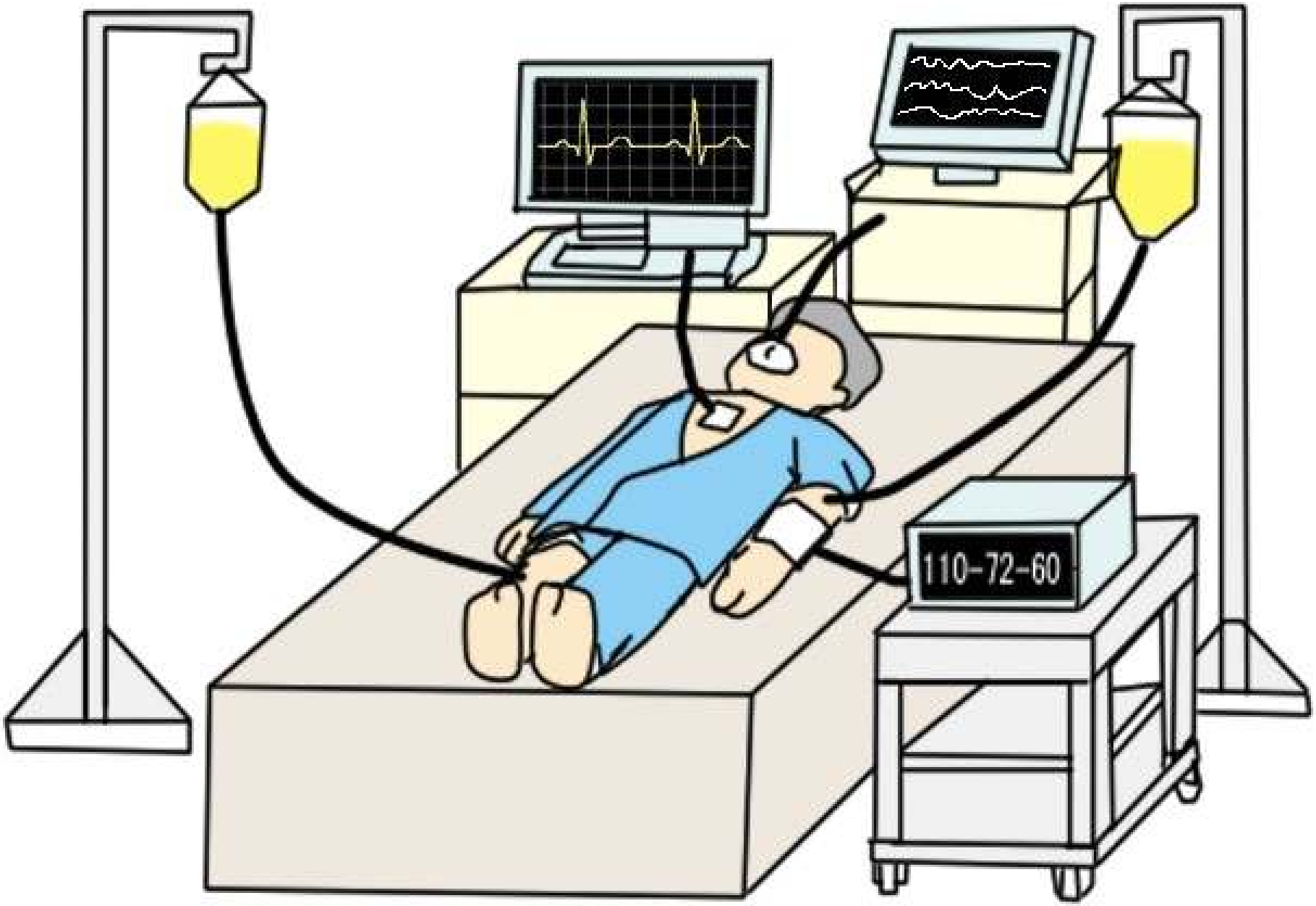
Search condition: Phenotype= poor metabolizer & PPI prescribed

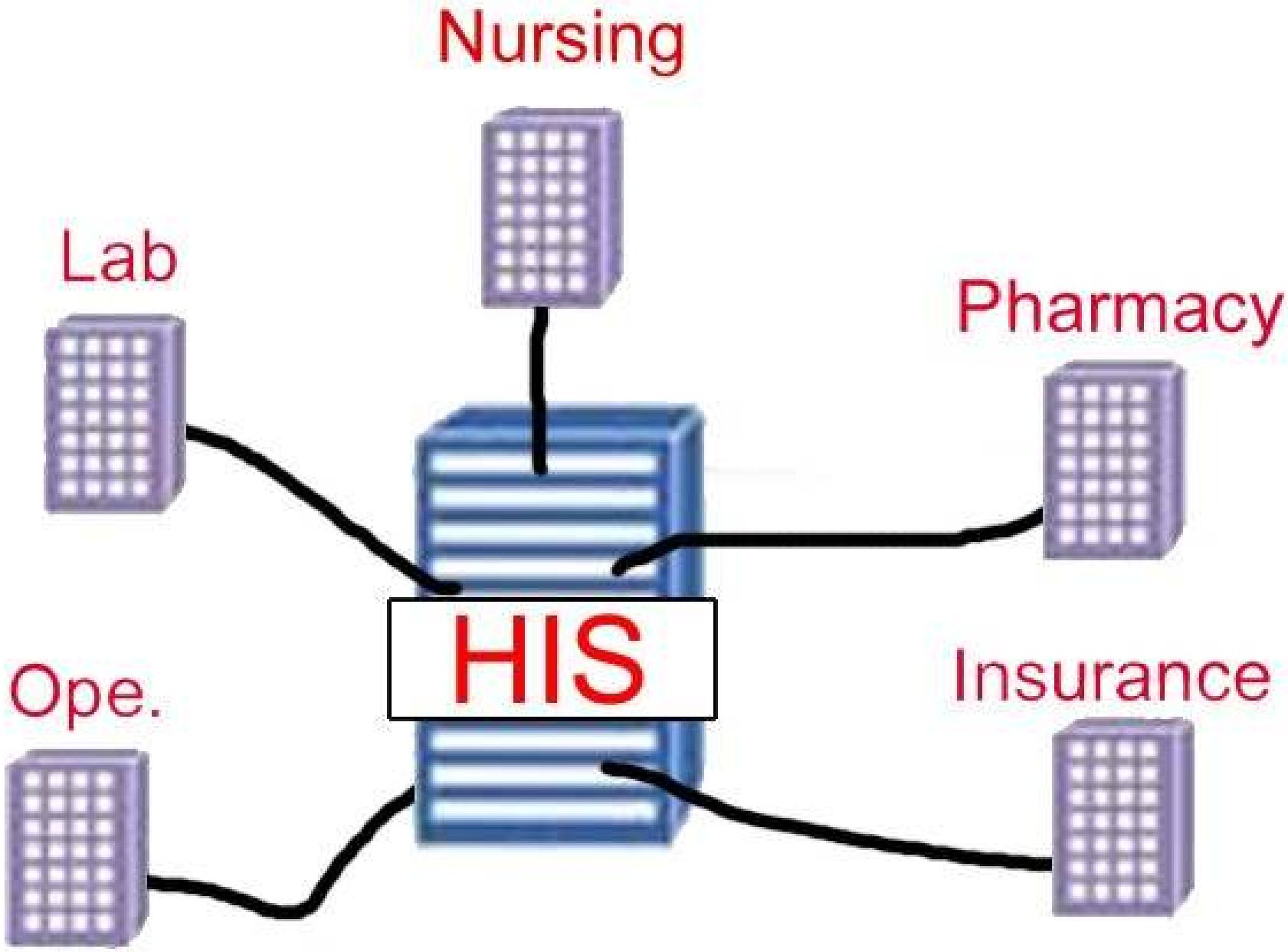
30 patients, in 2.88sec.

Other Genome information of the selected patient



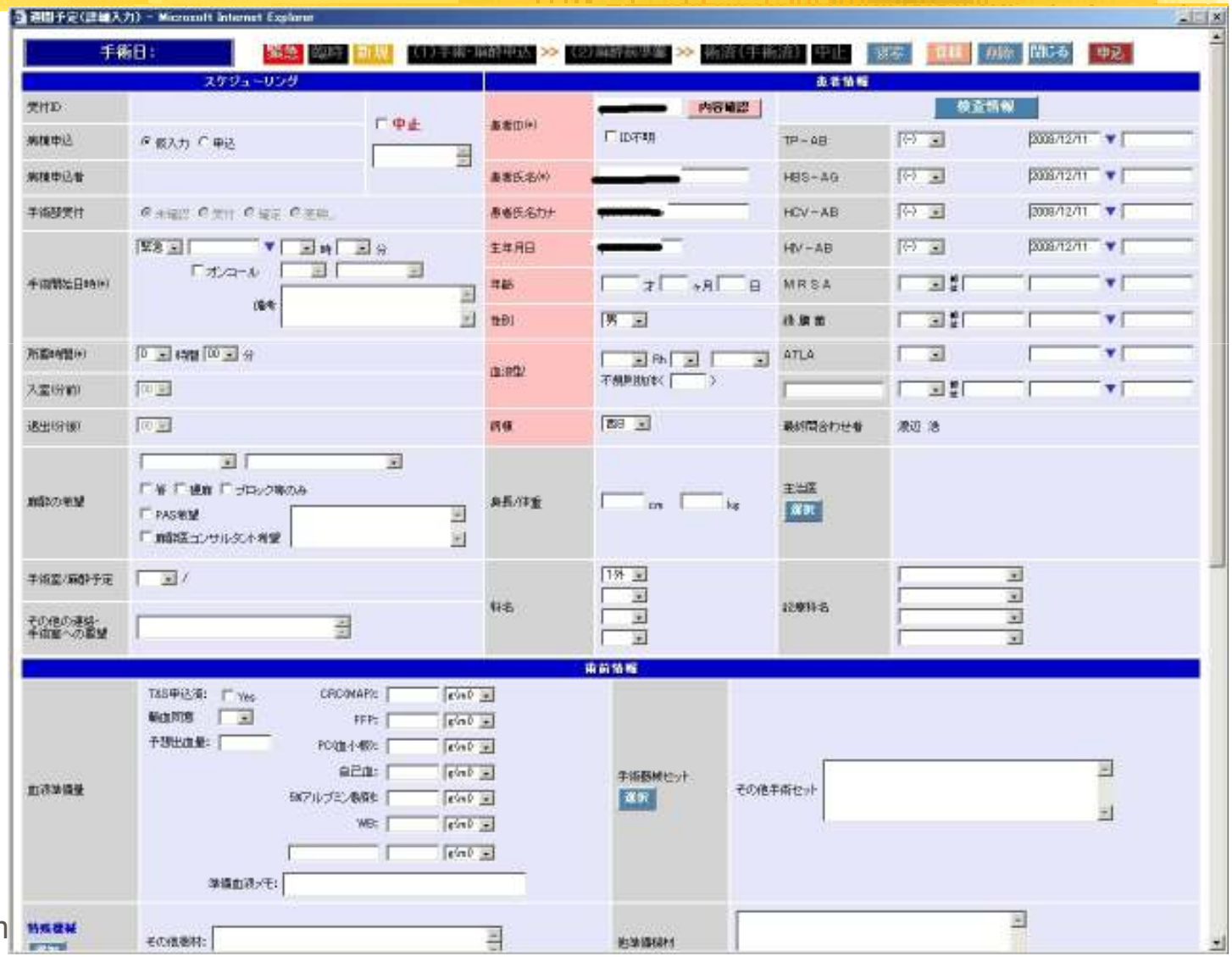
# -Interoperability with peripheral systems


110-72-60


Nursing
Lab
Pharmacy
HIS
Ope.
Insurance

# Japan Anesthesiologists Society's Registry System, has HL7 import of lab results

- At work in Hamamatsu Univ.
- Lab results (infection), and patient demographics are pre-populated



# Merits of standards come late: Hamamatsu Univ. Hospital HIS replaces

- HIS(NEC)-LIS(Lab by A&T) by HL7 since 2002
- Usually this connection costs around 10,000,000 yen, by in Hamamatsu 2007 replace, only 1,500,000 yen spent
- In 2007, TeraRecon(3D), DIOWAVE(web PACS), NTT Data(Clinical DB) developed new features, while other non-standardized departments were struggling hard to meet the cut-over date, saying "data is coming in the same format (HL7, DICOM), isn't it?".

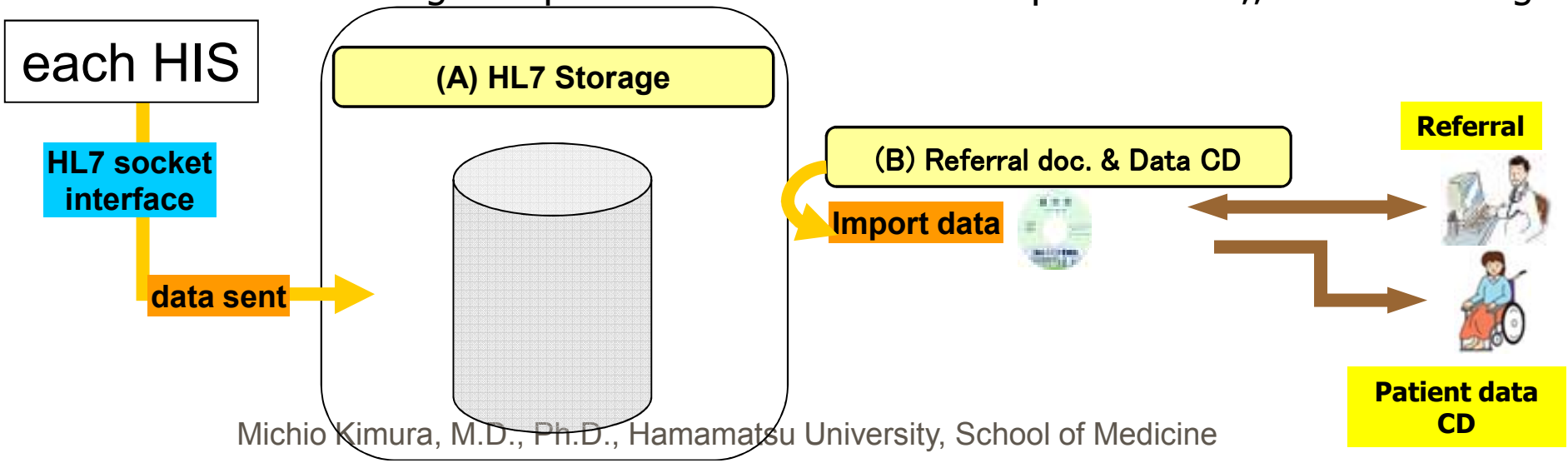
# Very Recent Government Activities

- Interoperability of Health Information Systems Project by METI ...'04-'07
  - HL7 v2.5 is basis of interoperability, 5 major vendors participated
  - IHE Japan activity support
- MHLW promotes Shizuoka Prefecture EHR for Nationwide Use ...04/'06
  - Standardized referral documents, and HL7 storage
  - Let CPOE become able to export data in HL7 v2.5
- Clinical Trial 5 year Promotion Aid by MHLW ...'07-'11
  - CDISC and HL7.. watching BRIDG model
- Mandated Health Check Up for all 40-75 citizens from '08
  - In hope of healthcare cost reduction
  - Standardized (HL7 CDA R2) export of data
  - Each insurer's performance measured by % of check up

# Now, HIS's able to export in HL7 v2.5 are;

- Fujitsu: GX series, FX series(at regular version up)
- NEC: EMR HR series, CPOE AD series v.4 and after
- SBS: Doctor-X, and PrimeKARTE series
- Software Service: e-Karte series

- They were in market since 2006.
  - 50% or more large hospitals have HIS with HL7 export feature,, and increasing!



# Final remarks with old sayings


- 朝三暮四（列子）
  - "Count the gross amount, not just in front" by Liezi
  - Merit of standardization comes later
- 君子和而不同、小人同而不和（論語、孔子）
  - "Lord harmonizes, doesn't follow blindly, knows why he is harmonizing, Petty men are clannish, not harmonious" from Analects by Confucius
  - Even for different purposes, we know what we should share as standards, and what are for future developments.