Advances and Progresses in Hospital Information Systems

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Brazil

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Healthcare is changing…

	Today		Tomorrow
Scope	Cure Patients	→	Care for Citizens
Focus	On the process and provider	→	On the patient
Time	Symptomatic, curative	→	Preventive, lifetime
Location	Hospital	→	Decentralized, at home
Methods	Invasive	→	Less invasive

The processes in health are changing …

	Today		Tomorrow
Clinical Decisions	Personal preferences	→	Guide lines / evidence based
The Process	Fragmented, isolated	→	Disease mgt.
Experience	Individual	→	Best Practices
Order Process	Manual	→	Automated
Information	Fragmented, isolated	→	Consolidated / complete

IT is changing …

	Today		Tomorrow
Technology	Isolated systems	→	Integrated systems
Data access	Limited, Difficult	→	Any time, any place
Data integrity	Manual/error prone	→	Systematic mgt. and control
Data completeness	Fragmented	→	Consolidated
Data availability	Slow	→	Real time

Health Institutions and Information Processing

- **Health information systems** strongly influence quality and efficiency of health care, and technical progress offers advanced opportunities to support healthcare;

  - Are Health information systems and healthcare are interrelated?
  - What is the significance of information systems for healthcare?
  - How does technical progress affect healthcare?
  - Why is systematic information management important?

What is the significance of information systems for healthcare?

- Information processing is an **important quality factor**, but an **enormous cost factor** as well. It is also becoming a **productivity factor**;
- Information processing should offer a **holistic view** of the patient and of the hospital;
- A hospital information system can be regarded as the **memory and nervous system of a hospital.**

Information processing as a quality factor

- Decisions of healthcare professionals are based on vast amounts of information about the patient's health state (annotations, signals, images, etc…);

- It is essential for the quality of patient care and for the quality of hospital management to fulfill these information needs;

When a patient is admitted to a hospital, a physician or nurse first needs information **about the reason for patient admission** and about the **patient history**. Later, she/he needs **results from services** such as laboratory and radiology which are some of the most frequent diagnostic procedures.

Information processing as a quality factor

- **Incorrect reports** (lab reports, annotations, etc) may lead to erroneous and even harmful treatment decisions;
- Repeated examinations or lost findings have to be searched for ->>> **the costs of health care may increase**;
- Information should be **documented adequately**, enabling healthcare professionals to access the information needed and **to make decisions**;
- In general clinical patient-related information should be **available on time**, and it should be up-to-date and valid.

Information processing as a quality factor

- People working in hospital administration also must be well informed in order to carry out their tasks. They should be **informed timely and receive current information**;

- Hospital management also **has an enormous information need**. Up-to-date information **about costs and proceeds** are necessary as a basis for controlling the enterprise**;**

Thus, information processing **is an important quality factor in healthcare and, in particular, in hospitals**.

Information processing as a cost factor

- In 2007, states of the OECD[1] spent between 6% and 15 % of their total gross domestic product (GDP) for healthcare;

- The annual budget that healthcare institutions spend on information technology (IT) was in 2006 between 2.5% and 3.3% of the total hospital operating expense, depending on the number of beds

- In Brazil, most of the hospitals spend less than 1% of your budget with IT and less than 15% of the hospitals spend 3% to 5% with IT[2].

[1] Organization for Economic Co-operation and Development

[2] Getulio Vargas Foundation (http://portal.fgv.br)

Information as a productivity factor

- From an economic point of view, **productivity** of a hospital might be defined as the ratio of number of cases and full-time employees;

- If, however, output is considered as **quality of patient care**, it is much more difficult to calculate productivity;

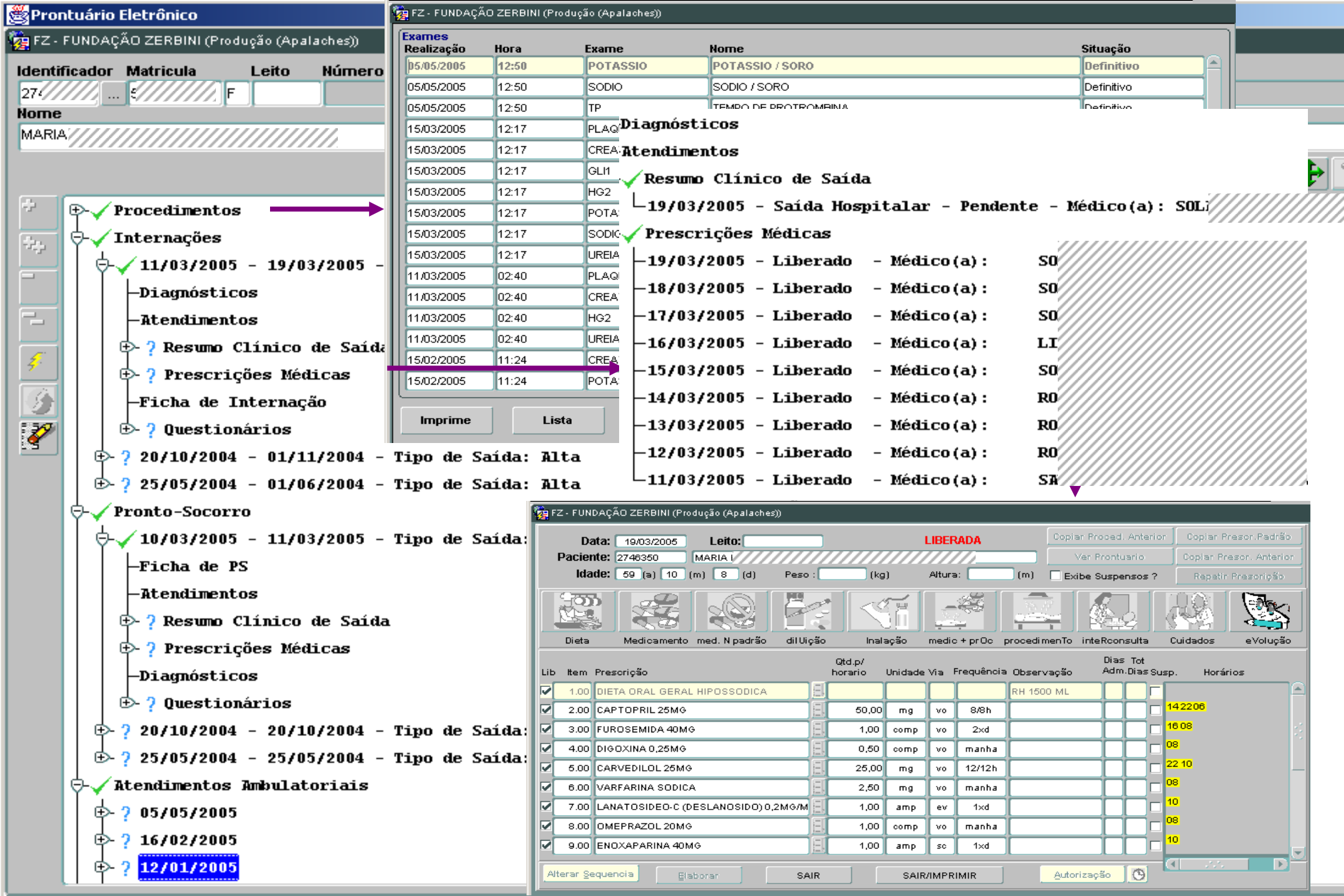
For **high-quality patient care** and **economic management** of a hospital, it is essential that the hospital information system can make correct information **fully available on time**. This is also increasingly important for the competitiveness of hospitals.

Holistic view of the patient

- Information processing in a hospital should offer a comprehensive, holistic view of the patient and of the hospital;

- **Holistic in this context means to have a complete picture of the care of a patient available**, independent of the healthcare institutions and hospital departments in which the patient has been or will be treated;

This **holistic view on the patient** can reduce undesired consequences of highly specialized medicine with various departments and health care professionals involved in patient care.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Número
Nome
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Diagnósticos
Atendimentos
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Prescrições Médicas
Ficha de Internação
Questionários
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Pronto-Socorro
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05/05/2005 12:50 SODIO SODIO / SORO Definitivo
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15/03/2005 12:17 CREA
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15/03/2005 12:17 POTA
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Data: 19/03/2005
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LIBERADA
Paciente: 2746350 MARIA
Idade: 59 (a) 10 (m) 8 (d)
Peso : (kg)
Altura: (m)
Exibe Suspensos ?
Copiar Proced. Anterior
Copiar Presor.Padrão
Ver Prontuario
Copiar Presor. Anterior
Repetir Prescrição
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Medicamento
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Inalação
medic + prOc
procedimenTo
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Cuidados
eVolução
Lib Item Prescrição Qtd.p/ horario Unidade Via Frequência Observação Dias Adm. Tot Dias Susp. Horários
1.00 DIETA ORAL GERAL HIPOSSODICA RH 1500 ML
2.00 CAPTOPRIL 25MG 50,00 mg vo 8/8h 14 22 06
3.00 FUROSEMIDA 40MG 1,00 comp vo 2xd 16 08
4.00 DIGOXINA 0,25MG 0,50 comp vo manha 08
5.00 CARVEDILOL 25MG 25,00 mg vo 12/12h 22 10
6.00 VARFARINA SODICA 2,50 mg vo manha 08
7.00 LANATOSIDEO-C (DESLANOSIDO) 0,2MG/M 1,00 amp ev 1xd 10
8.00 OMEPRAZOL 20MG 1,00 comp vo manha 08
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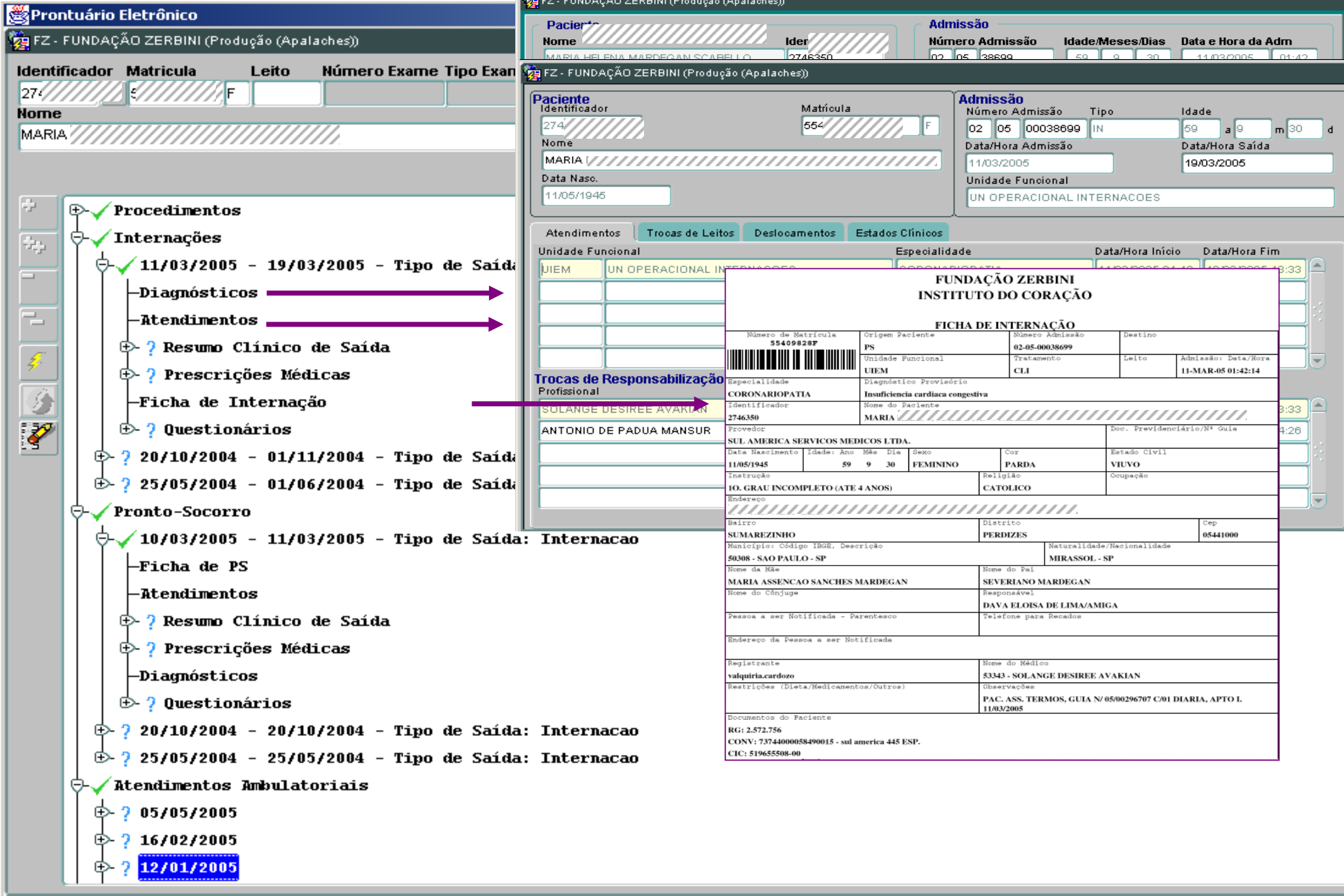
Alterar Sequencia
Elaborar
SAIR
SAIR/IMPRIMIR
Autorização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19/03/2005
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UN OPERACIONAL INTERNACOES
Atendimentos
Trocas de Leitos
Deslocamentos
Estados Clínicos
Unidade Funcional
Especialidade
Data/Hora Início
Data/Hora Fim
Trocas de Responsabilização
Profissional
SOLANGE DESIREE AVAKIAN
ANTONIO DE PADUA MANSUR
FUNDAÇÃO ZERBINI
INSTITUTO DO CORAÇÃO
FICHA DE INTERNAÇÃO
Número de Matrícula
55409828F
Origem Paciente
PS
Número Admissão
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Destino
Unidade Funcional
UIEM
Tratamento
CLI
Leito
Admissão: Data/Hora
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Especialidade
CORONARIOPATIA
Diagnóstico Provisório
Insuficiencia cardiaca congestiva
Identificador
2746350
Nome do Paciente
MARIA
Provedor
SUL AMERICA SERVICOS MEDICOS LTDA.
Doc. Previdenciário/Nº Guia
Data Nascimento
11/05/1945
Idade: Ano Mês Dia
59 9 30
Sexo
FEMININO
Cor
PARDA
Estado Civil
VIUVO
Instrução
1O. GRAU INCOMPLETO (ATE 4 ANOS)
Religião
CATOLICO
Ocupação
Endereço
Bairro
SUMAREZINHO
Distrito
PERDIZES
Cep
05441000
Município: Código IBGE, Descrição
50308 - SAO PAULO - SP
Naturalidade/Nacionalidade
MIRASSOL - SP
Nome da Mãe
MARIA ASSENCAO SANCHES MARDEGAN
Nome do Pai
SEVERIANO MARDEGAN
Nome do Cônjuge
Responsável
DAVA ELOISA DE LIMA/AMIGA
Pessoa a ser Notificada - Parentesco
Telefone para Recados
Endereço da Pessoa a ser Notificada
Registrante
valquiria.cardozo
Nome do Médico
53343 - SOLANGE DESIREE AVAKIAN
Restrições (Dieta/Medicamentos/Outros)
Observações
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Documentos do Paciente
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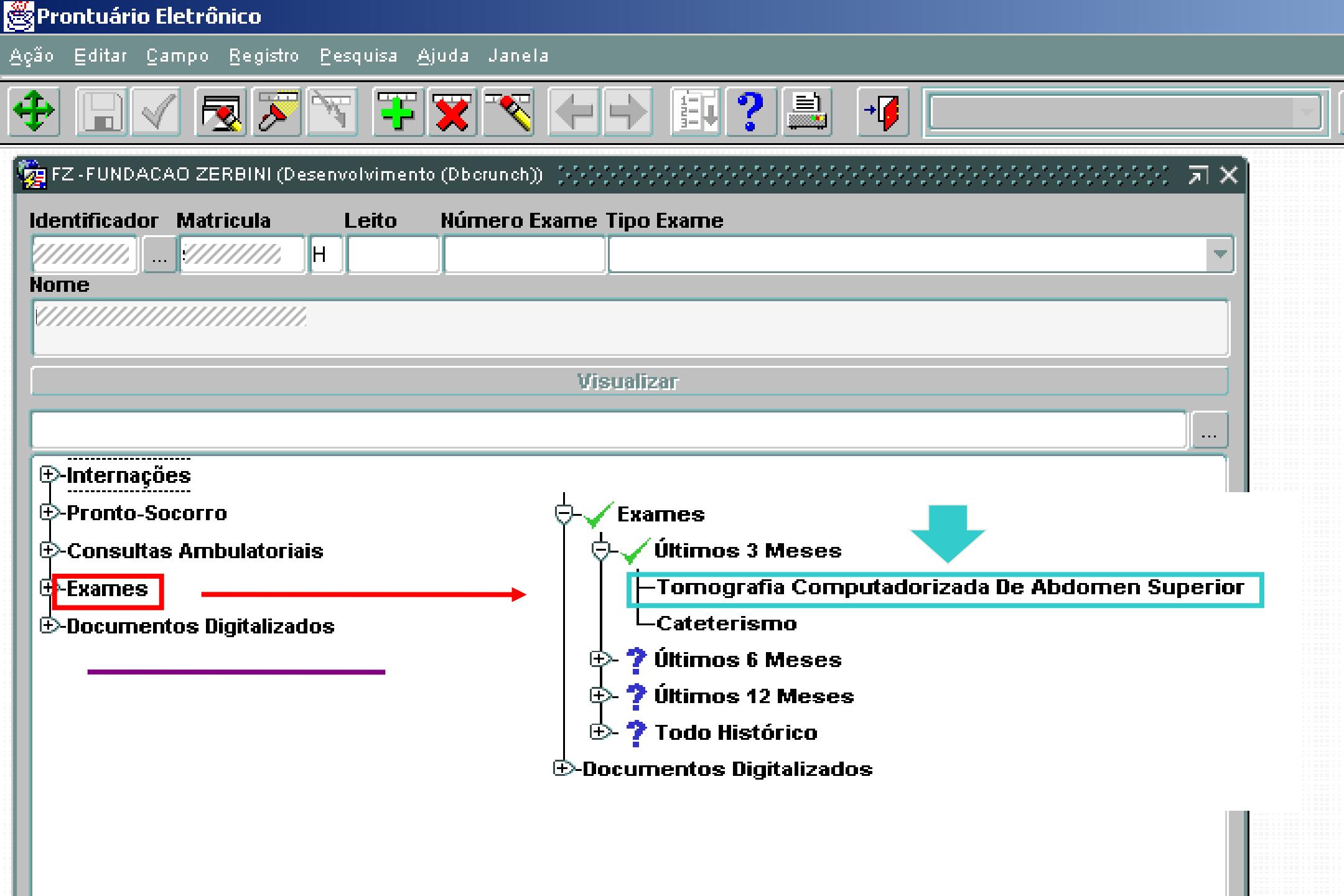
CONV: 73744000058490015 - sul america 445 ESP.
CIC: 519655508-00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Ação Editar Campo Registro Pesquisa Ajuda Janela
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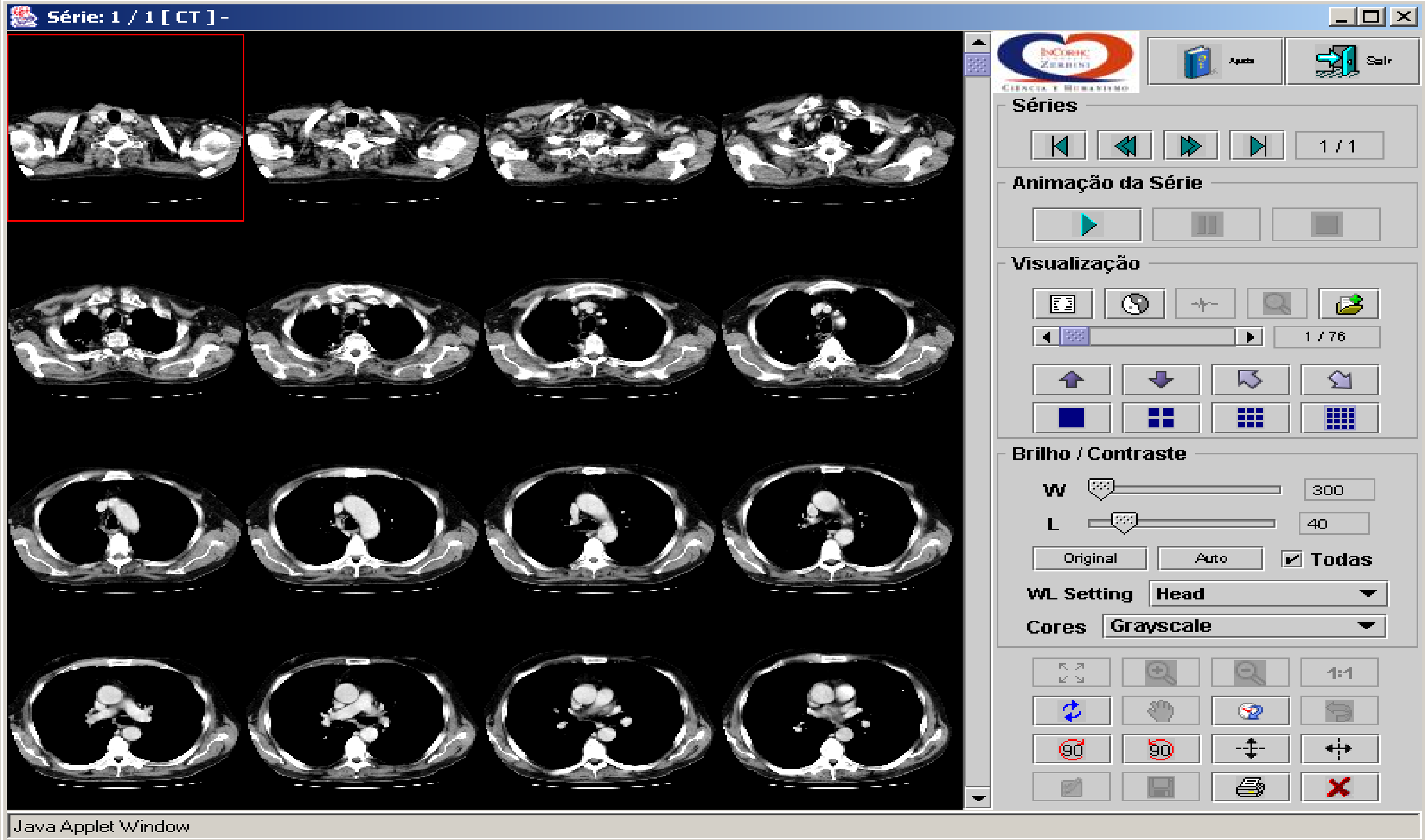
Nome
Visualizar
Internações
Pronto-Socorro
Consultas Ambulatoriais
Exames
Documentos Digitalizados
Exames
Últimos 3 Meses
Tomografia Computadorizada De Abdomen Superior
Cateterismo
Últimos 6 Meses
Últimos 12 Meses
Todo Histórico
Documentos Digitalizados



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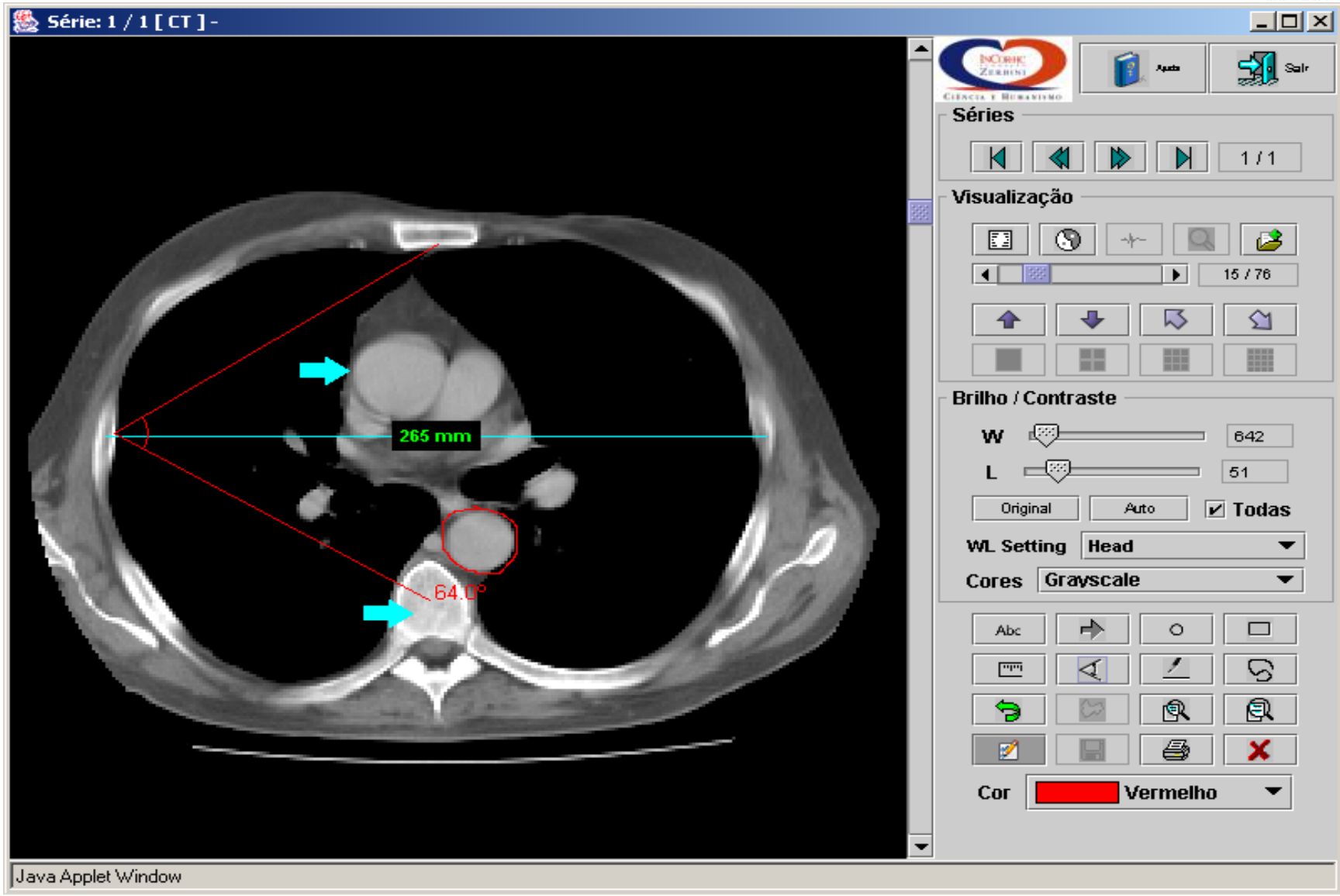
Basic IP methods



Visualização da Impressão

Zoom 75 %

Instituto do Coração - HCFMUSP

Laudo de Tomografia

Dados de Identificação

Identificador: 145 Paciente: JOAO CARLOS DA SILVA

Data de Nascimento: 01/02/1975

Exame Realizado: TOMOGRAFIA COMPUTADORIZADA DE TÓRAX

Data do Laudo: 19/05/2003

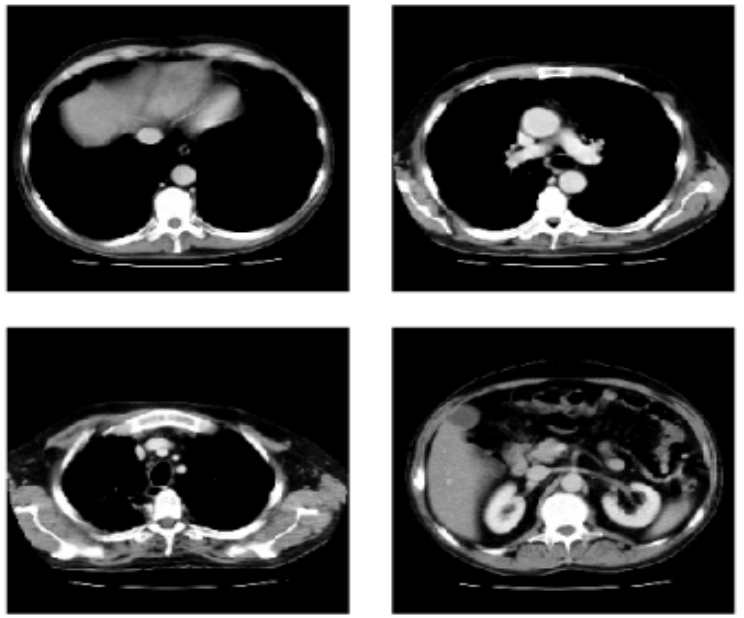
Laudo do Exame:

Número da Sala: 4 Número do Exame: 000145

Pesquisa

Laudo

Conclusão



Progress in IT

IT has become economically important and decisive for the quality of healthcare and it will continue to change healthcare.

- Impact on quality of care
- Impact on economics
- Changing health care

The impact of IT on quality of healthcare

Progress in IT **changes societies** and **affects the costs and quality of information processing in health care**;

Important progress due to improvements in IT can also be observed in information systems of health care organizations;

The role of **computer-supported information systems**, together with **clinical documentation** and **knowledge-based decision support systems**, can hardly be overestimated in respect to the **quality of healthcare**, as the volume of data available today is much greater than it was a few years ago (BigData).

Impact on economics

The worldwide IT market volume is estimated at nearly **2.5 trillion € in 2009** with a **growth rate of about 5 %** per year;

IT has become a major factor for quality and efficiency of healthcare worldwide. IT in healthcare also emerged to a leading industry branch;

There is a significant and increasing economic relevance for IT in general but also in healthcare.

Changing healthcare

What changes in healthcare do we expect through IT?

The development of IT will continue to have a considerable effect on our societies in general and on our healthcare systems in particular

Changing healthcare

- The use of computer-based tools in healthcare is dramatically increasing, and new technologies such as mobile devices and multifunctional bedside terminals will proliferate;
- Computer-based training systems strongly support efficient learning for healthcare professionals;
- Documentation efforts are continuously rising and lead to more sophisticated computer-based documentation tools;
- Decision support tools, for example in the context of drug prescription, support high-quality care (drug-drug, drug-dose, …);
- Communication is increasingly supported by electronic means instead of paper.

Importance of systematic information management

Systematic processing of information contributes to high quality patient care and reduces costs

The integrated processing of information is important because:

- All groups of people and all areas of a hospital depend on its quality;
- The amount of information processing in hospitals is considerable;
- Healthcare professionals frequently work with the same data.

Affected people and areas

- Nearly all people and all areas of a hospital are affected by the quality of the information system, as most of them need various types of information in their daily work

- The patient certainly profit most from high-quality information processing since it contributes to the quality of patient care and to reducing costs

- The professional groups working in a hospital, especially physicians, nurses, and administrative personnel, but also others, are also directly affected by the quality of the information system

Amount of information processing

The amount of information processing in hospitals, especially in larger ones, should not be underestimated. The Heart Institute, a **500 hundred beds hospital generates more than 20 TB/yr** (90% images and signals);

The computer-based tools of a university medical center encompass more than hundred of computer-based application components, thousands of workstations and other terminals, and more than hundred servers and the respective network.

Sharing the same data

There are different reasons for pursuing holistic and integrated information processing;

The most important reason is that various groups of healthcare professionals within and outside healthcare institutions need the same data.

The Hospital

High Quality
Cost Effective

Medical Knowledge

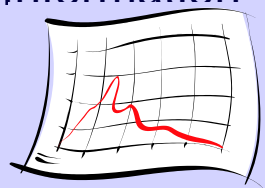
Activities

needs

Assessment

needs

Information



produces

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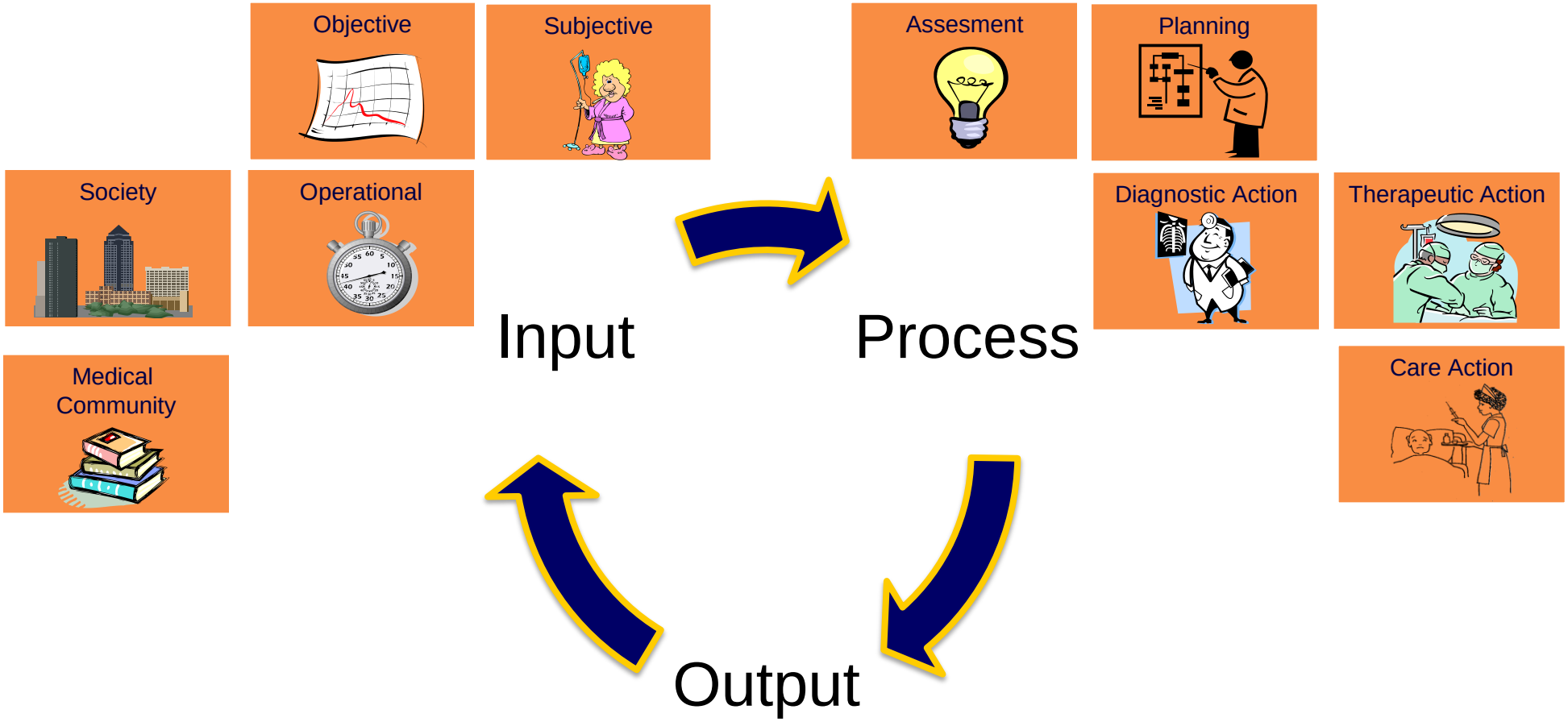
Healthcare as a Process



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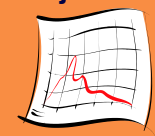
Healthcare as a Process

- Isolated information
- Fragmented information
- Not accessable information
- Too much information
- Bad information presentation
- Only clinical data is kept (no knowledge)
- Some information is not computer usable (free text, image features, genome in the future)
- No feed back to medical community and society

- Complex desicions
- Lack of training
- Changing knowledge
- Medical errors
- Inefficient workflow
- Understaffing
- No operational information
- No infrastructure information
- No common language

Input - Output

Information

Medical Community	Operational	Society	Objective	Subjective
				

Process

Clinical Desicions		Workflow
Assesment	Planning	Action
		

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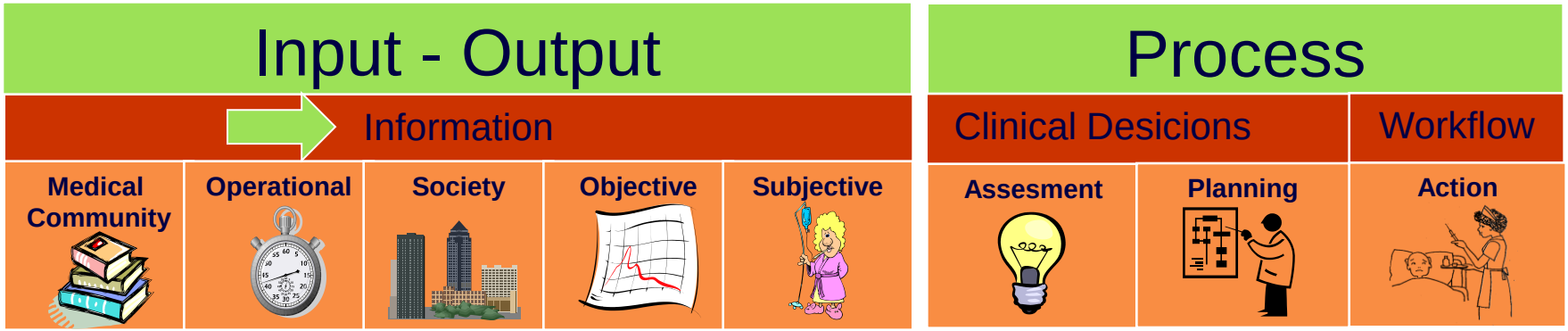
IT approach – wave 1

PAS: Patient Adminstration System

HIS: Hospital Information System

Result Distribution



IT approach – wave 2

PAS: Patient Adminstration System

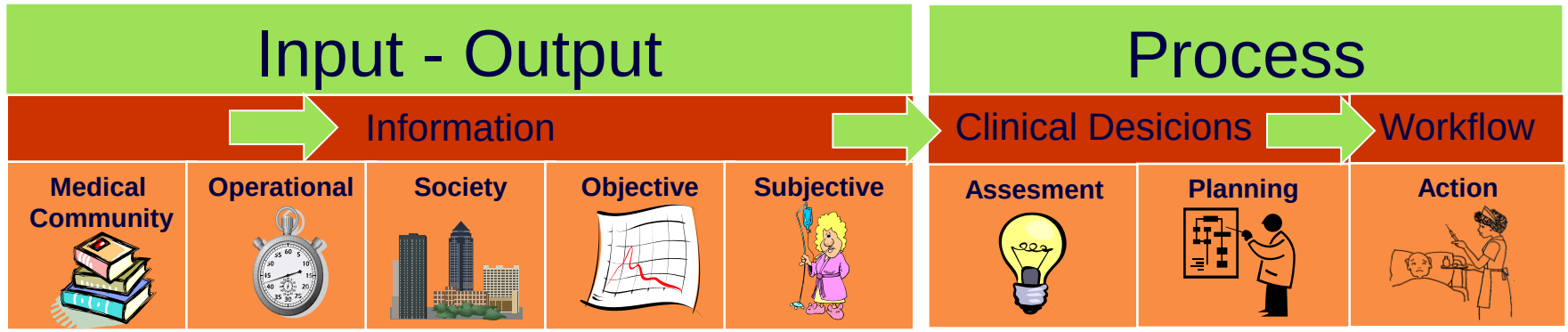
HIS: Hospital Information System

CIS: Clinical Information System

PACS: Picture Archiving And Communication Sytem

Computerized Prescription Order Entry

Result Distribution



IT approach – wave 3

Information Filtering

Decision Support

Semantic Driven UI

Clinical Pathways

Evidence Based Medicine

Clinical Trials (data mining)

Terminology

Feature Extraction from Unstructured or Massive Information (images, text)

Advanced Connectivity Content

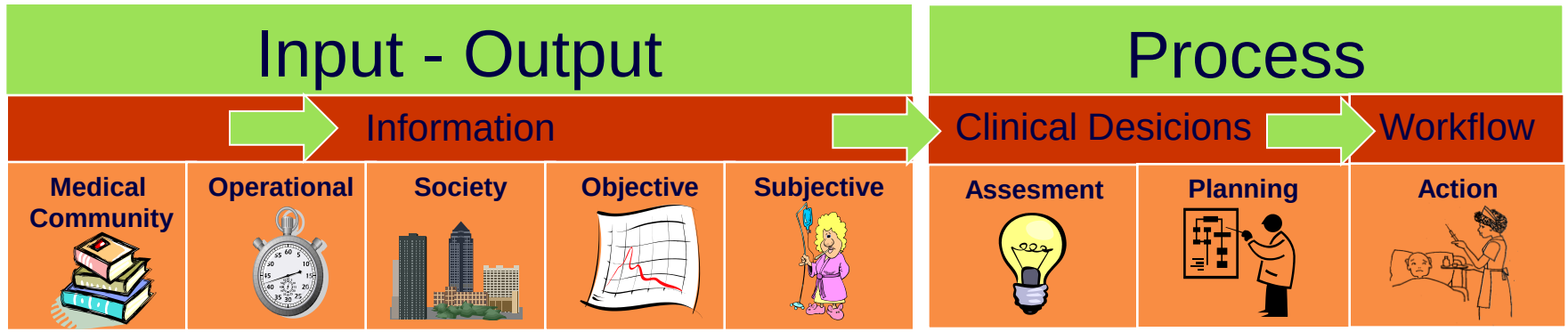
Workflow Optimization

Intelligent Patient Portals

Remote Data Capture (Telemetry)

Community Healthcare

Analytics



As a Hospital, what would we expect from an integrated hospital information system?

- Access to documents (texts, signals and images) for continuous patient assistance;
- Fast, distributed and confidential access;
- Integrated information;
  - demographic
  - administrative
  - clinical (reports, evolutions, exams, procedures, ...)

Healthcare Information

- Distributed
- Low level of structure
- Controlled by Heterogeneous systems

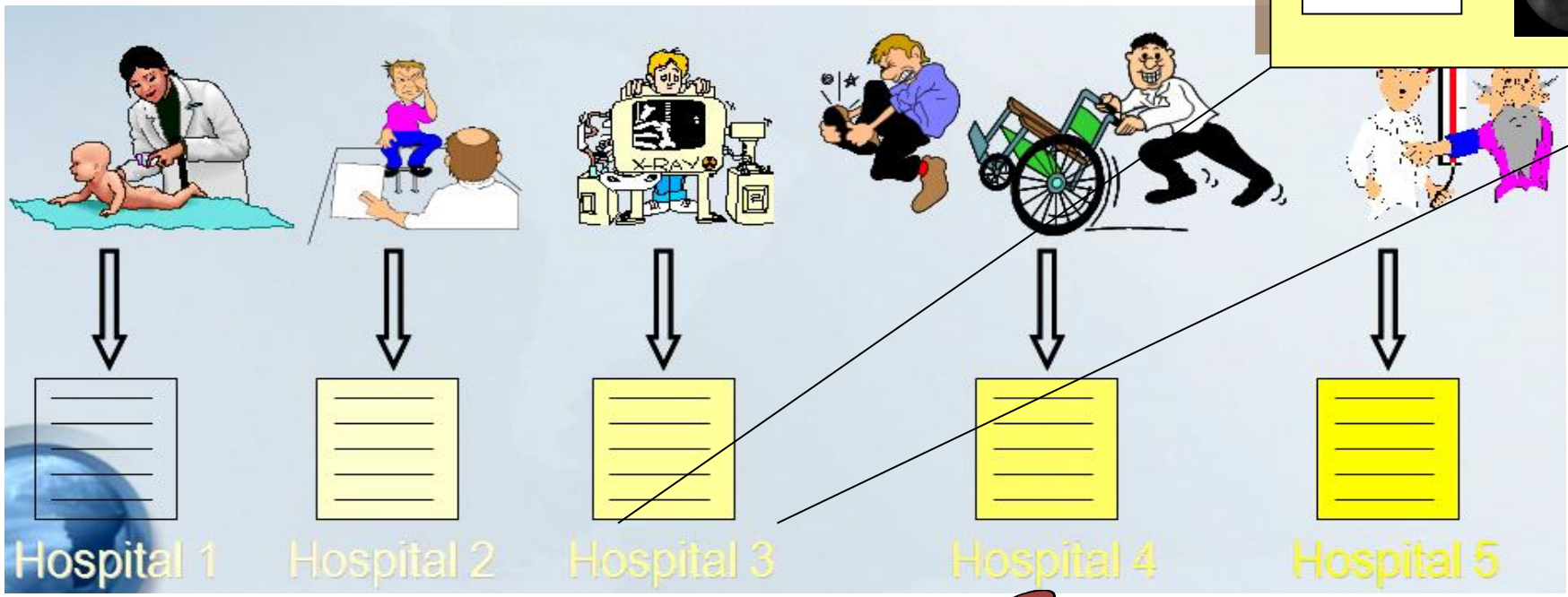
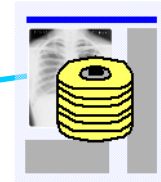


Image information workflow

ADMISSION

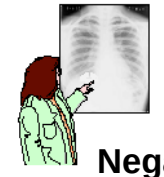
Report



Report Repository

Report

Workstation



Negatoscope

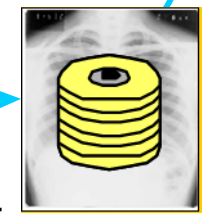
HIS

Scheduled Exam

Retrieval/Association with previous exams

PACS

Image Retrieval



Storage & management of image info

Radiograph Set

Exame Request

Scheduled Requests

RIS

Worklist

Exam procedure

Image Modality

Image Storage

Printing

Radiograph

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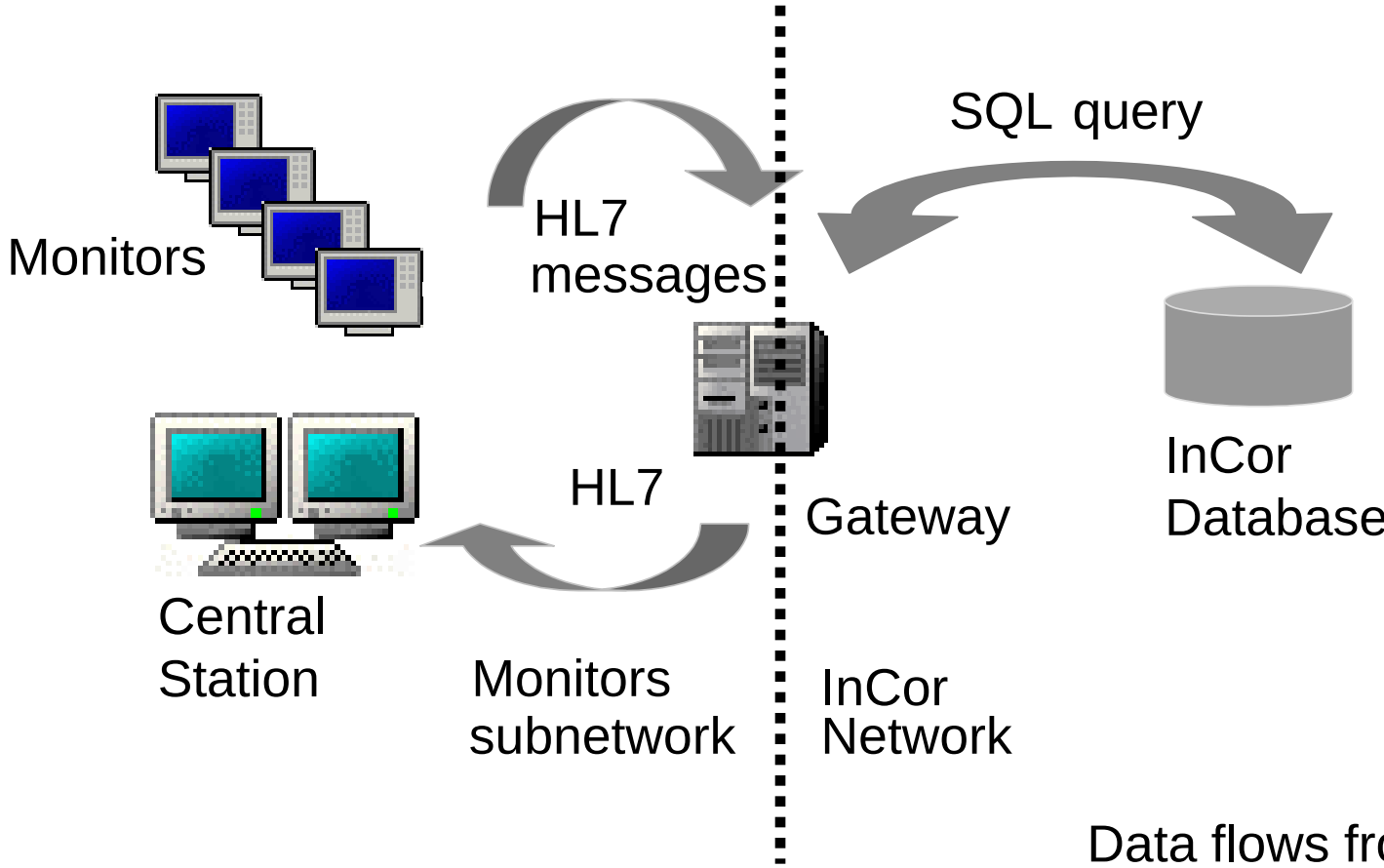
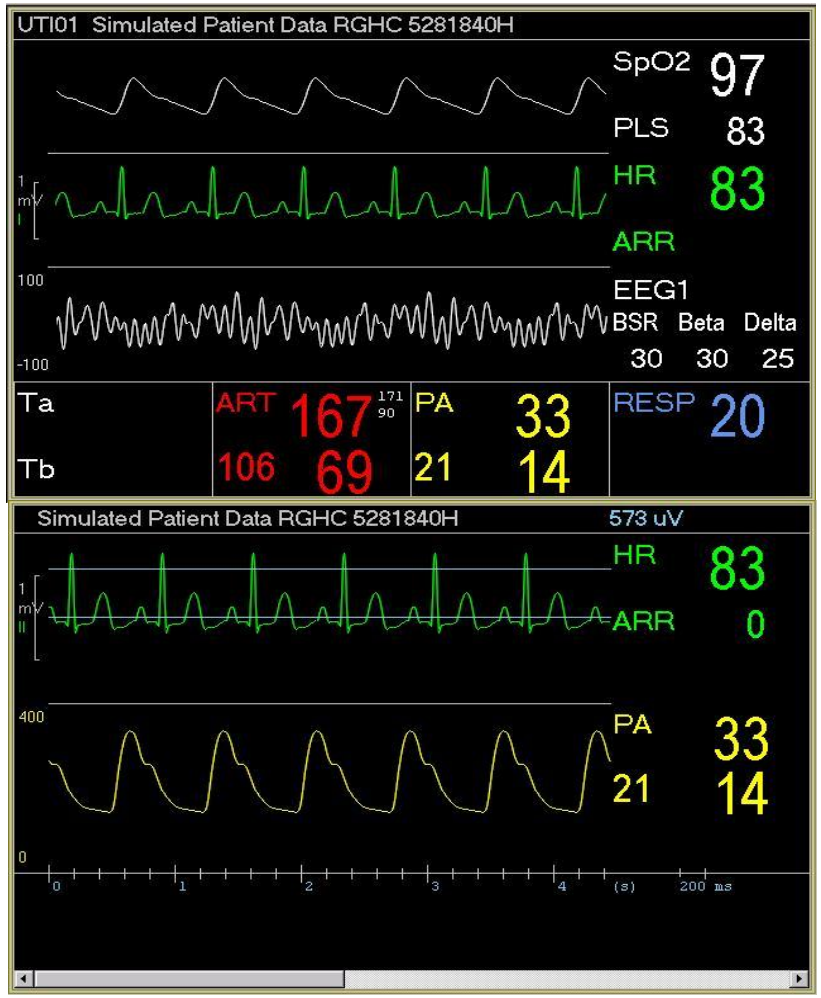
Integration of bedside monitors to the HIS

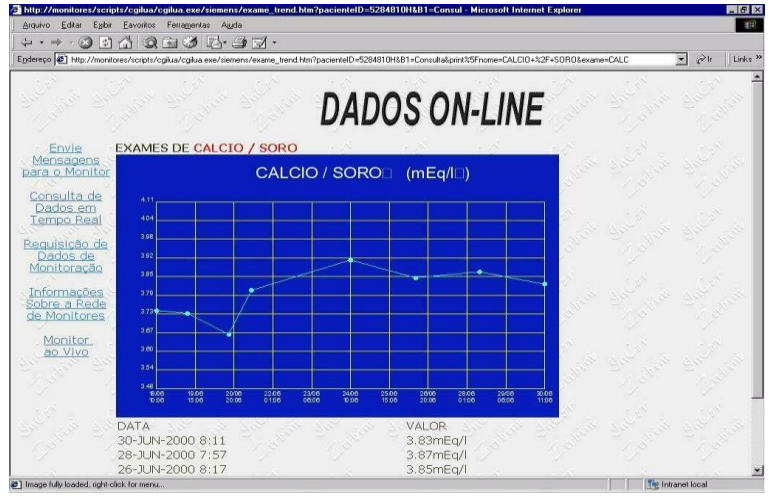


Data flows from the monitors' acquisition to data display on the Web

Integration of bedside monitors to the HIS



Real time presentation of bed-side monitors signals



Trend graphs

Dicom file storage and display allow measurements

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The problems

- Integration of heterogeneous and distributed systems;
- Huge amount of data structured and unstructured (500 beds > 20TB/yr);
- Robust access & control (privacy, confidentiality, auditable, …);
- Distributed access & mission critical (millions of hits/yr);
- Ubiquitous (every where/any time);
- Ability to perform complex searches and queries;

Basic X Comprehensive EMR (Clinical Documentation)

Requirement	Comprehensive	Basic
Demographic Characteristics of patients	X	X
Physicians' notes	X	
Nursing Assessments	X	
Problem Lists	X	X
Medication lists	X	X
Discharge Summaries	X	X
Advanced Directives	X	

Basic X Comprehensive EMR (Test & Imaging Results)

Requirement	Comprehensive	Basic
Laboratory reports	X	X
Radiologic reports	X	X
Radiologic images	X	
Diagnostic-test results	X	X
Diagnostic-test images	X	
Consultant reports	X	

Basic X Comprehensive EMR (CPOE)

Requirement	Comprehensive	Basic
Laboratory Tests	X	
Radiologic Tests	X	
Medications	X	X
Consultant Requests	X	
Nursing Orders	X	

Basic X Comprehensive EMR (Decision Support)

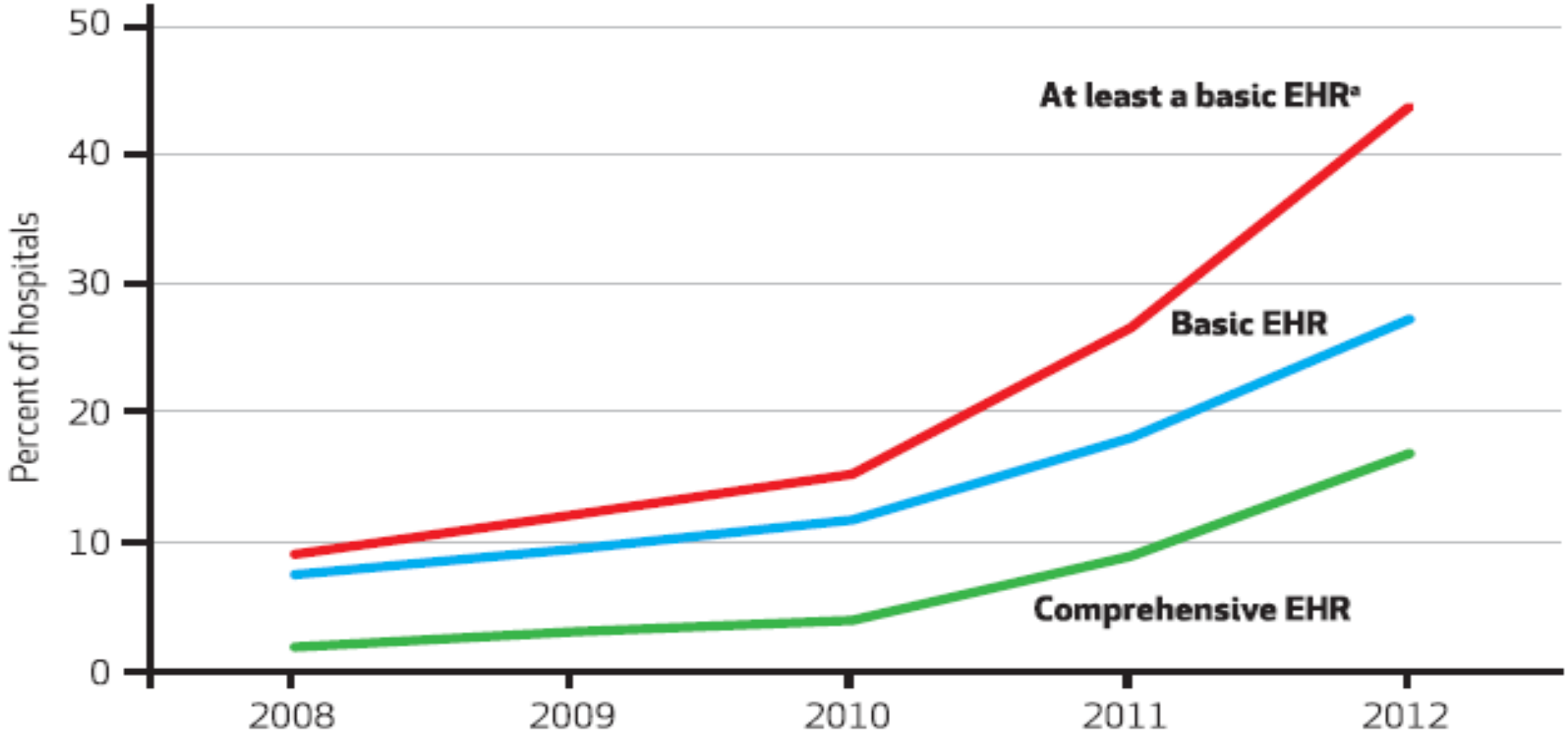
Requirement	Comprehensive	Basic
Clinical Guidelines	X	
Clinical Reminders	X	
Drug-Allergy Alerts	X	
Drug-Drug Interaction Alerts	X	
Drug-Lab interaction Alerts	X	
Drug-Dose Support	X	

Rate of Adoption: EMR & CPOE

	Germany	Australia	Canada	USA	Netherlands	England
Clinics						
EMR (%)	42	79	20	24	95	89
CPOE (%)	59	75	5	9	85	90
Hospitals						
EMR (%)	<5	<10	<10	<3	<5	<8
CPOE (%)	<5	<1	<1	<5	<5	<3

A.K. Jha, et al., The use of health information technology in seven nations. Int J Med Inform. 77(12):848-54, 2008

Hospitals' Adoption Of Electronic Health Record (EHR) Systems, 2008–12



SOURCE Authors' analysis of data from American Hospital Association, Annual Health Information Technology Supplemental Survey, 2012. **NOTE** All analyses were statistically weighted to account for potential nonresponse bias. [a]Hospitals with either a basic or a comprehensive system.

Value of EMR

- Improved Quality, Outcomes, and Safety;
- Improved Efficiency & Productivity;
- Time Savings;
- Cost Reduction;
- Improved Service and Satisfaction.

Computerized Physician Order Entry (CPOE)

What is it?

- The definition for CPOE as it is being promulgated for patient safety is:
  - **The use of an institutional computerized health record by physicians to electronically enter their orders.**
- There are THREE major reasons to support this initiative - they all refer to the IN-PATIENT environment.

Reasons for CPOE

1. Order Communication
   - Clarity of Orders
   - Ease of Identifying the Ordering Physician
2. Standardization of Care
   - Clinically validated order sets for
   - Clinical diagnoses
   - Procedures
   - Situations (post-op order sets)
3. Alerts and Reminders (Real Time Decision Support)
   - Drug Safety Database (Conflict Checking)
   - Clinically validated rules

Reasons for CPOE

- CPOE can **reduce 55% of prescription errors** and **7% of adverse events** (Bates et.al., 1998);
- CPOE can reduce the drug use and exams (Kaushal et al., 2003; Teich et al., 2000);
- A multicentre study identified a **relationship** between the use of CPOE and **reduction in mortality** and **costs** (Amarasingham et al., 2009);

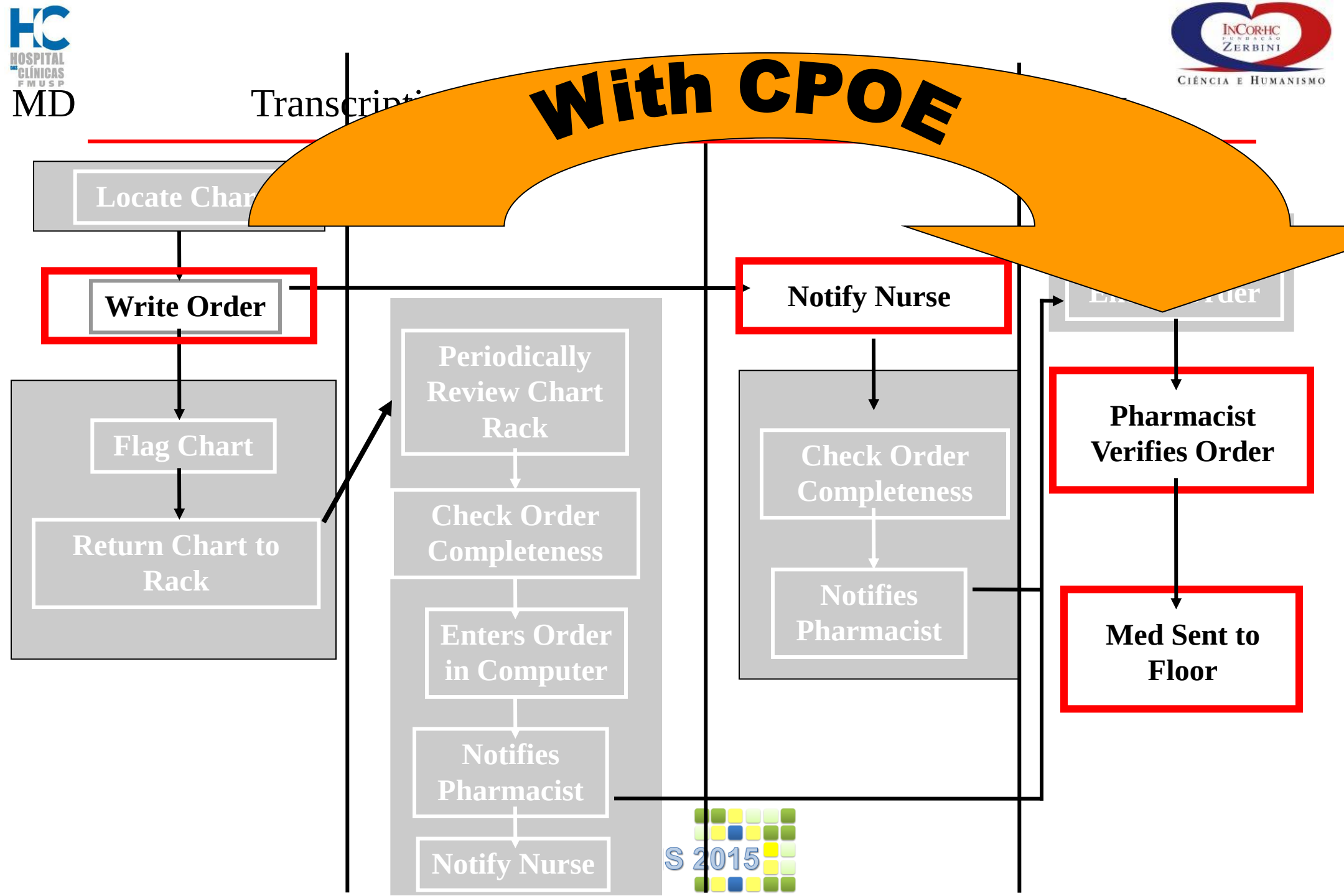
Bates, D. W., Leape, L., Cullen, D. J., Laird, N., Petersen, L. A., Teich, J. M., et al. Effect of computerized physician order entry and a team intervention on prevention of serious medication errors. Journal of the American Medical Association; 280(15), 1311—1316, 1998;

Kaushal, R., Shojania, K. G., & Bates, D. W. Effects of computerized physician order entry and clinical decision support systems on medication safety: A systematic review. Archives of Internal Medicine, 163(12), 1409—1416, 2003;

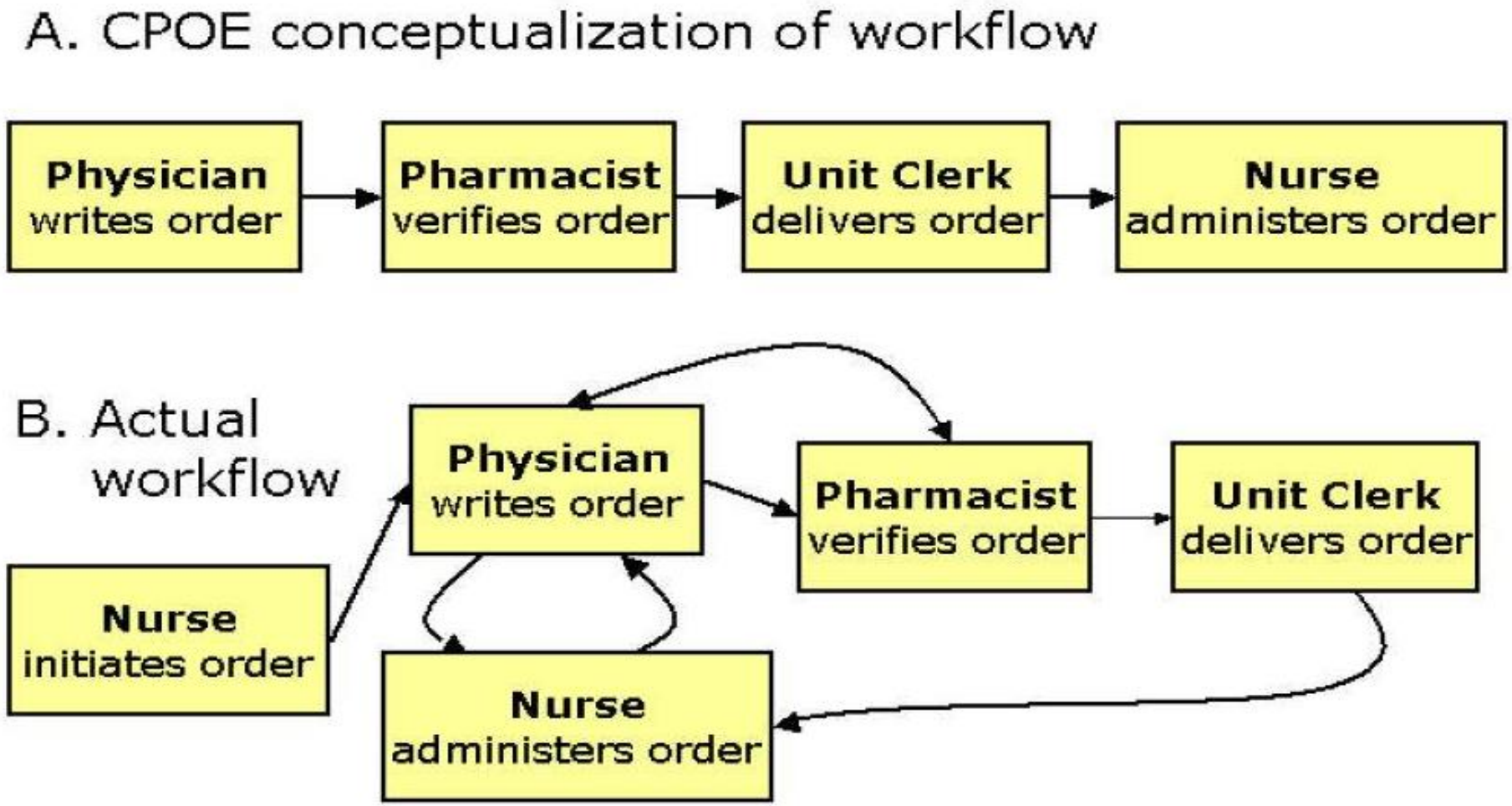
Amarasingham, R., Plantinga, L., Diener-West, M., Gaskin, D. J. e Powe, N. R. Clinical information technologies and inpatient outcomes: A multiple hospital study. Archives of Internal Medicine, 169(2), 108—114, 2009;

Order Communication

- Clarity of Orders
  - A large percentage of written physician orders are not clear;
  - 100% of electronic orders are…
- Physician Identification
  - Between 20 and 50% of Physician signatures are illegible;
  - Electronic Identification is absolute (almost…);
  - Worse with larger medical staff;


MD
With CPOE
Locate Chart
Write Order
Flag Chart
Return Chart to Rack
Periodically Review Chart Rack
Check Order Completeness
Enters Order in Computer
Notifies Pharmacist
Notify Nurse
Notify Nurse
Check Order Completeness
Notifies Pharmacist
Pharmacist Verifies Order
Med Sent to Floor

CPOE and Workflow



Standardization of Care

- Rules and order sets must be clinically and locally validated (medical staff must approve of them before use);
- Provide a clinically validated care path for the situations to which they refer;
- Most Physicians are opposed at first (“cookbook medicine”) but rapidly become comfortable with these order sets as they use them.

Real Time Decision Support

Pharmacy Rules (alerts) must appear if there are conflicts

- **Drug-Drug; Drug-Lab; Allergy; Maximum Dose**;
- Must be aware that the more granular these rules are, the more they will be ignored by the users (**Alert Fatigue**[1]);
- Rules must appear only for the most frequent and serious situations.

[1]*CW Carspecken, A Clinical Case of Electronic Health Record Drug Alert Fatigue: Consequences for Patient Outcome. PEDIATRICS Vol. 131 No. 6 June 1, 2013 pp. e1970 -e1973*

What to Look for

CPOE WILL **delay rounding time** for visiting MD's at first. **Expect months of grousing**;

- The module's must be intuitive and reflect how MD's currently write orders;
- Electronic Signature **must be available** by groups of orders;
- Order Sets must be easy to find and use;
- Obtaining local physician input on the **ease of use** is essential.

What to Look for

Options on Order Communication to Nursing

- How does a nurse or pharmacist know that an order has been written?
- Nursing and Pharmacy **must be involved** in selecting the method of communication;
- Most software vendors will offer flexible ways to communicate to the nurse / pharmacist that electronic orders have been written;
- Nursing Alerts - Real time;
- Log-in alerts;

What to Look for

Ease of Insertion of Rules and Reminders

- Most software vendors already have this
  - At various stages of development
- Need to have these “tailorable” by institution
  - Density is an issue
  - Adding or subtracting rules should be easy

Physician Acceptance and Use

- Physicians are spending less time in the hospital;
- CPOE will be viewed by many as a waste of their time and put in place mostly for the hospital's benefit ("…now they want us to be unit secretaries…");
- There must be significant local physician (not only the leadership) input at **multiple levels in developing and tailoring the system** before it goes live (physician participation).

Physician Acceptance and Use

- Physician Input:
  - Screen Flow (how the orders are actually put in)
  - Decision Support (which rules go in and which do not)
  - Order Set Creation (best done by department or section and validated by medical staff)

- Find a “Physician Champion” to help implement it;
- Provide adequate education and support weeks before a unit implements CPOE;
- Provide 24/7 support on the unit for weeks after go live;
- Wireless Computing will also help (usually not PDA’s).

Expectations ...

- Expect at first:
  - physician resistance
  - slow starting and high frustration levels
  - communication issues

- Expect ultimately:
  - clearer orders with ease of MD ID
  - improved nursing and MD satisfaction
  - better patient safety and clinical care

Be Patient and Persistent!

CPOE Resistance

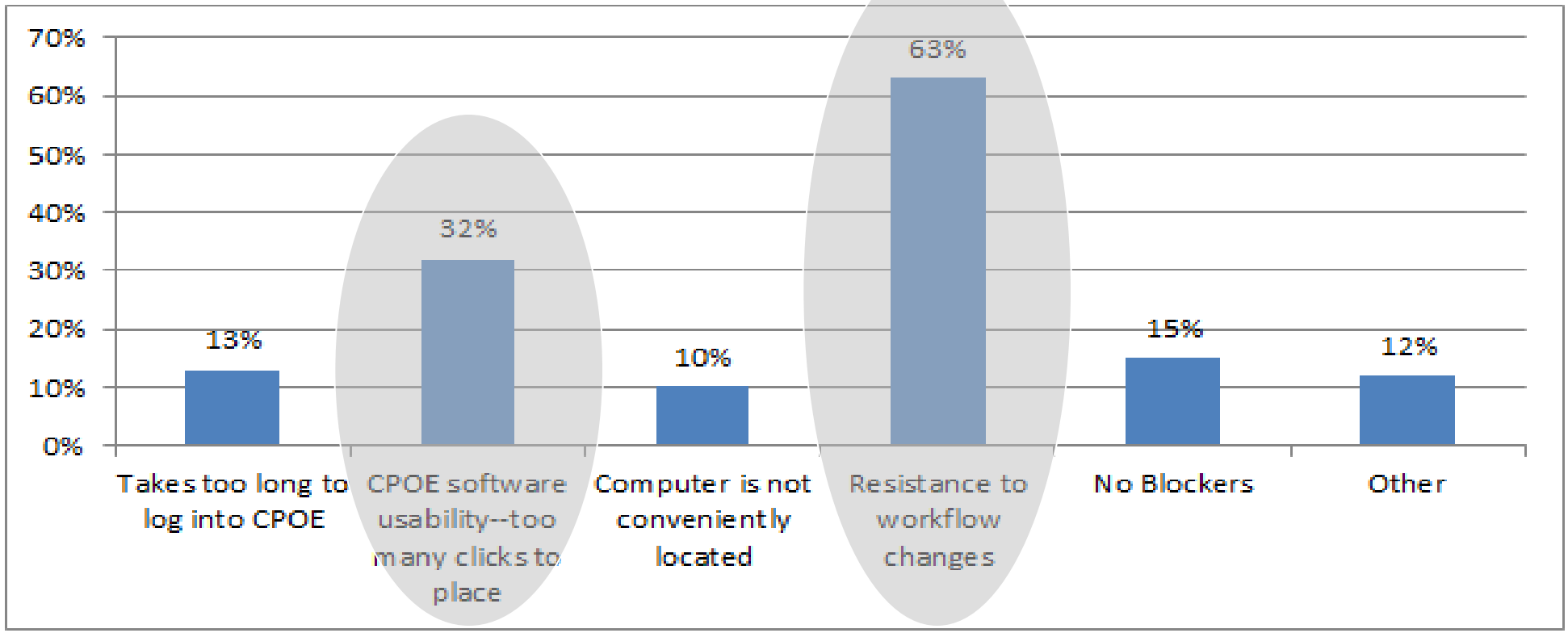


Figure 3: Key Blockers to CPOE Adoption

Reference: http://www.imprivata.com/content/2012-cpoe-and-meaningful-use-research-brief

US EMR Adoption Model℠

Stage	Cumulative Capabilities	2011 Q2	2014 Q1
Stage 7	Complete EMR, CCDA transactions; Data Analytics to Improve Care	1.1%	3.1%
Stage 6	Physician documentation (structured templates), full CDSS, full R-PACS	4.0%	13.3%
Stage 5	Closed Loop Medication Administration = Bar Code Enablement	6.1%	24.2%
Stage 4	CPOE, or e-Prescribing, Clinical Decision Support (clinical protocols)	12.3%	15.7%
Stage 3	Clinical documentation, CDSS (error checking)	46.3%	27.7%
Stage 2	CDR, Controlled Medical Vocabulary, CDS, HIE capable	13.7%	7.2%
Stage 1	Ancillaries - Lab, Rad, Pharmacy - All Installed	6.6%	3.2%
Stage 0	All Three Ancillaries Not Installed	10.0%	5.6%
		N = 5439	N = 5449

Data from HIMSS Analytics® Database © 2012 HIMSS Analytics

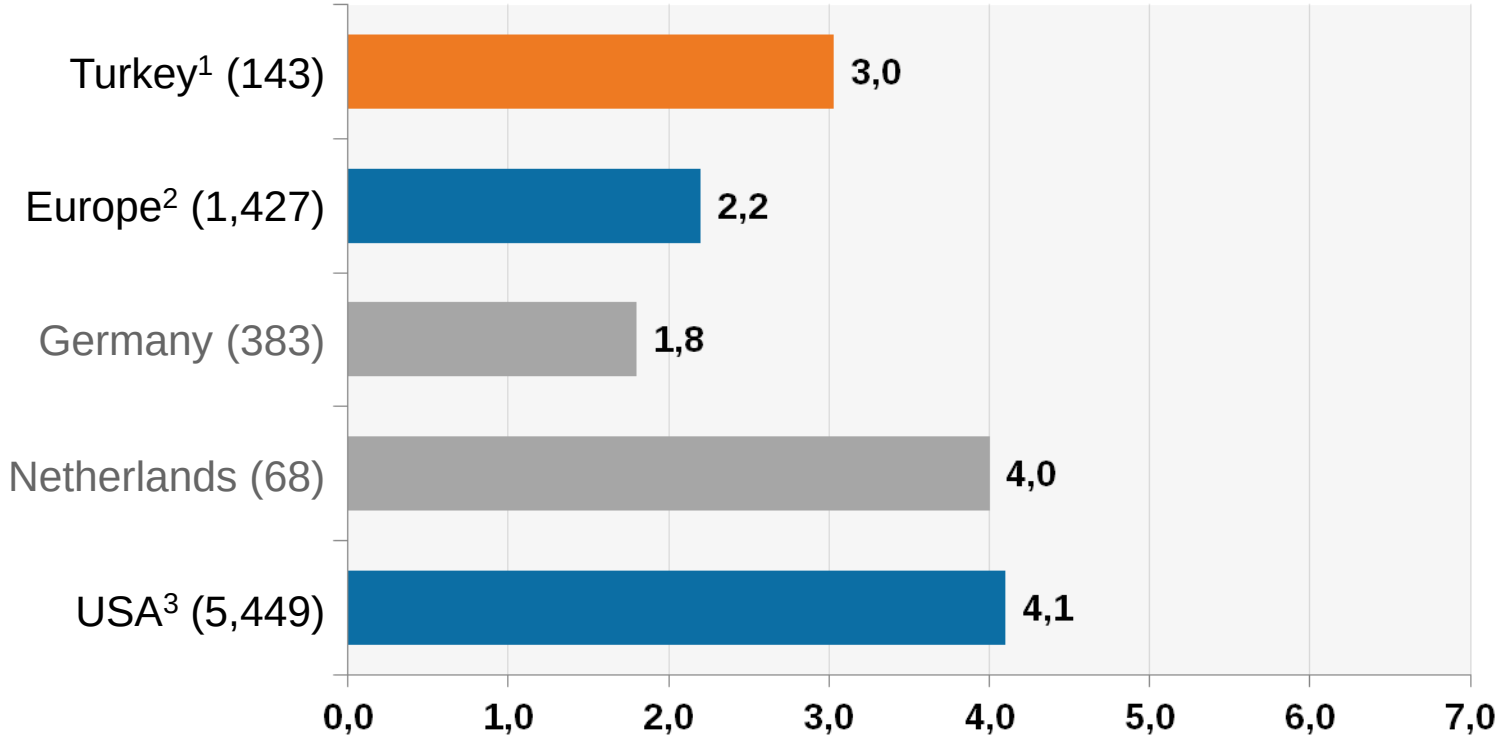
EMR Adoption in the U.S. Market Trended 2006 – 2014

Stage	2006	2007	2008	2009	2010	2011	2012	2014 Q1
Stage 7	0.00%	0.00%	0.30%	0.70%	1.00%	1.20%	1.80%	3.10%
Stage 6	0.10%	0.80%	0.50%	1.60%	3.20%	5.20%	7.30%	13.30%
Stage 5	0.50%	1.40%	2.50%	3.80%	4.50%	8.40%	11.50%	24.20%
Stage 4	3.10%	2.20%	2.50%	7.40%	10.50%	13.20%	14.00%	15.70%
Stage 3	18.70%	25.10%	35.70%	50.90%	49.00%	44.90%	41.70%	27.70%
Stage 2	40.00%	37.20%	31.40%	16.90%	14.60%	12.40%	11.40%	7.20%
Stage 1	17.40%	14.00%	11.50%	7.20%	7.10%	5.70%	4.80%	3.20%
Stage 0	20.40%	19.30%	15.60%	11.50%	10.10%	9.00%	7.50%	5.60%
# of Hospitals	n = 4,237	n = 5,073	n = 5,166	n = 5,235	n = 5,281	N=5,337	N=5,310	N= 5,458

This is how long it takes to make "significant" national progress
Data from HIMSS Analytics™ Database

EMR Adoption in Turkey, Europe and the US

EMR Adoption Model Scores, Means per Country
(data from 4/13 – 5/14 (Turkey), 4/12 – 3/14 (Europe), 4/13 – 3/14 (US), no weighting etc. applied)



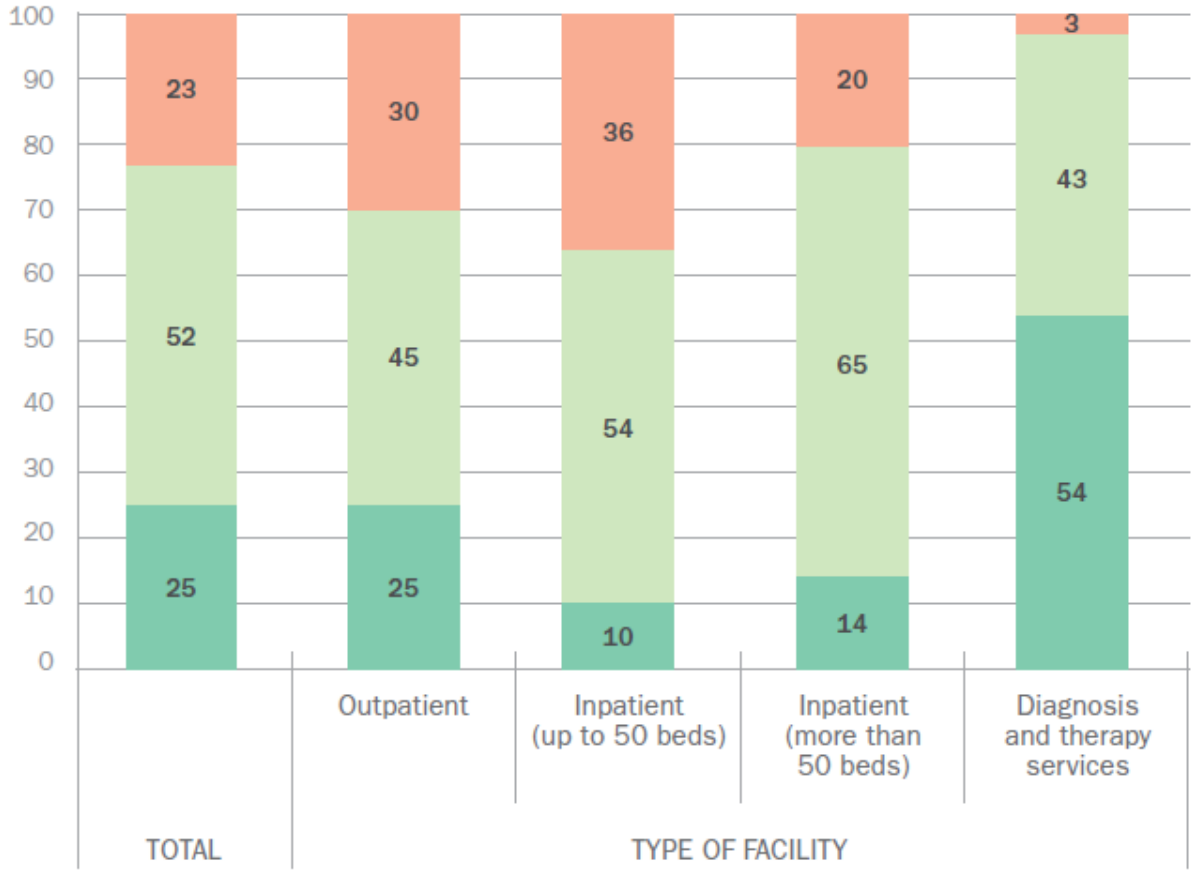
1) Only public hospitals, of those 90% with >200 beds
2) Excl. Turkey; incl. Austria (42), Belgium (1), Denmark (16), Finland (3), France (17), Germany (383), Ireland (2), Italy (524), Netherlands (68), Norway (3), Poland (83), Portugal (29), Slovenia (2), Spain (220), Sweden (1), Switzerland (8), UK (25)
3) The EMRAM algorithm between Europe and the US differs in some degrees in order to reflect HIT implementation of that particular region

Source: HIMSS Europe Database (05/2014)

EMR Adoption in Brazil

PROPORTION OF HEALTHCARE FACILITIES BY METHOD USED TO INPUT INFORMATION IN PATIENTS' MEDICAL RECORDS

Percentage of the total of healthcare facilities that have used the Internet in the last 12 months



ICT in health 2013 : Survey on the Use of Information and Communication Technologies in Brazilian Health Care facilities. Comitê Gestor da Internet no Brasil, 2014 (www.cgi.br).

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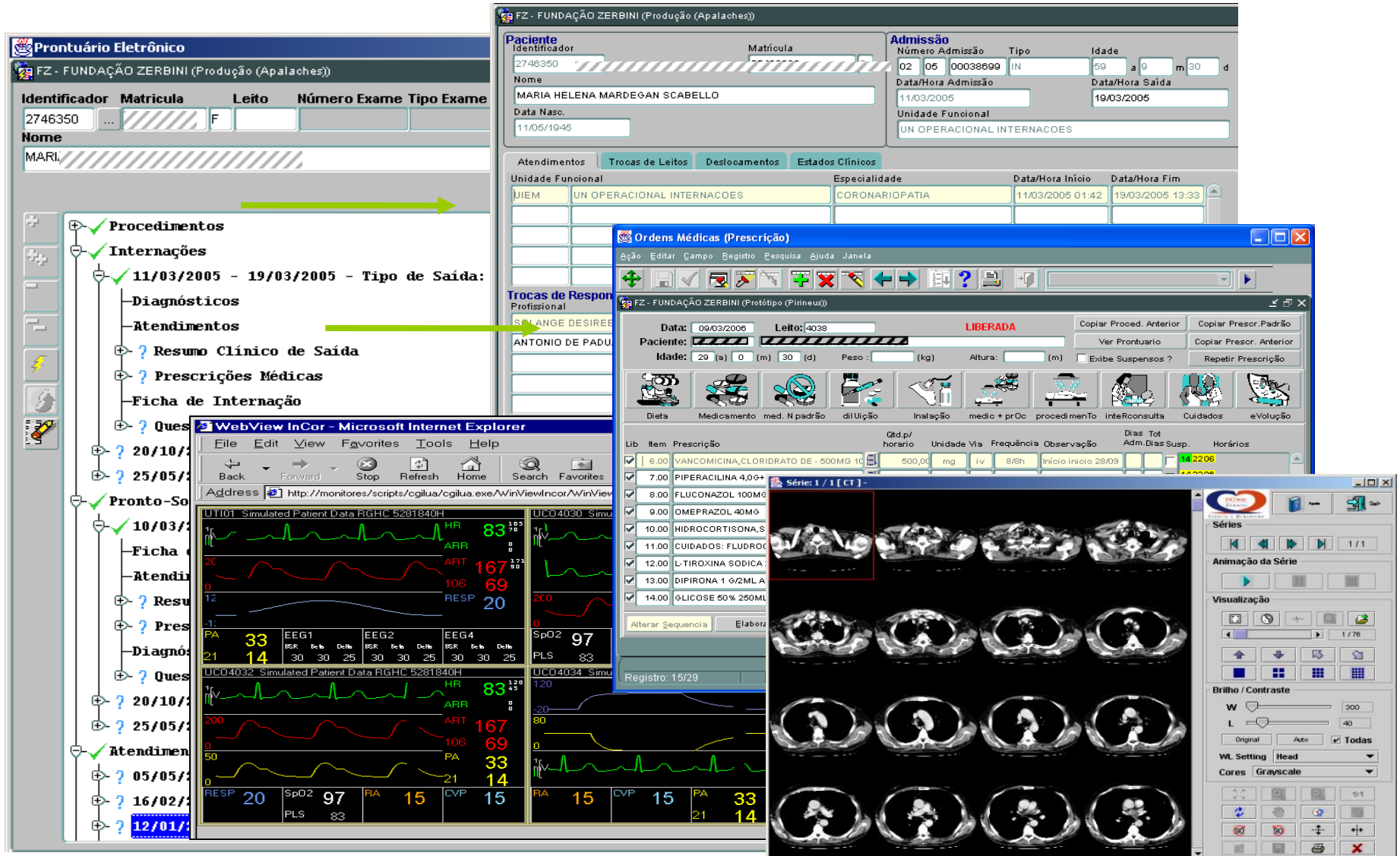
EMR with 1.3M patients



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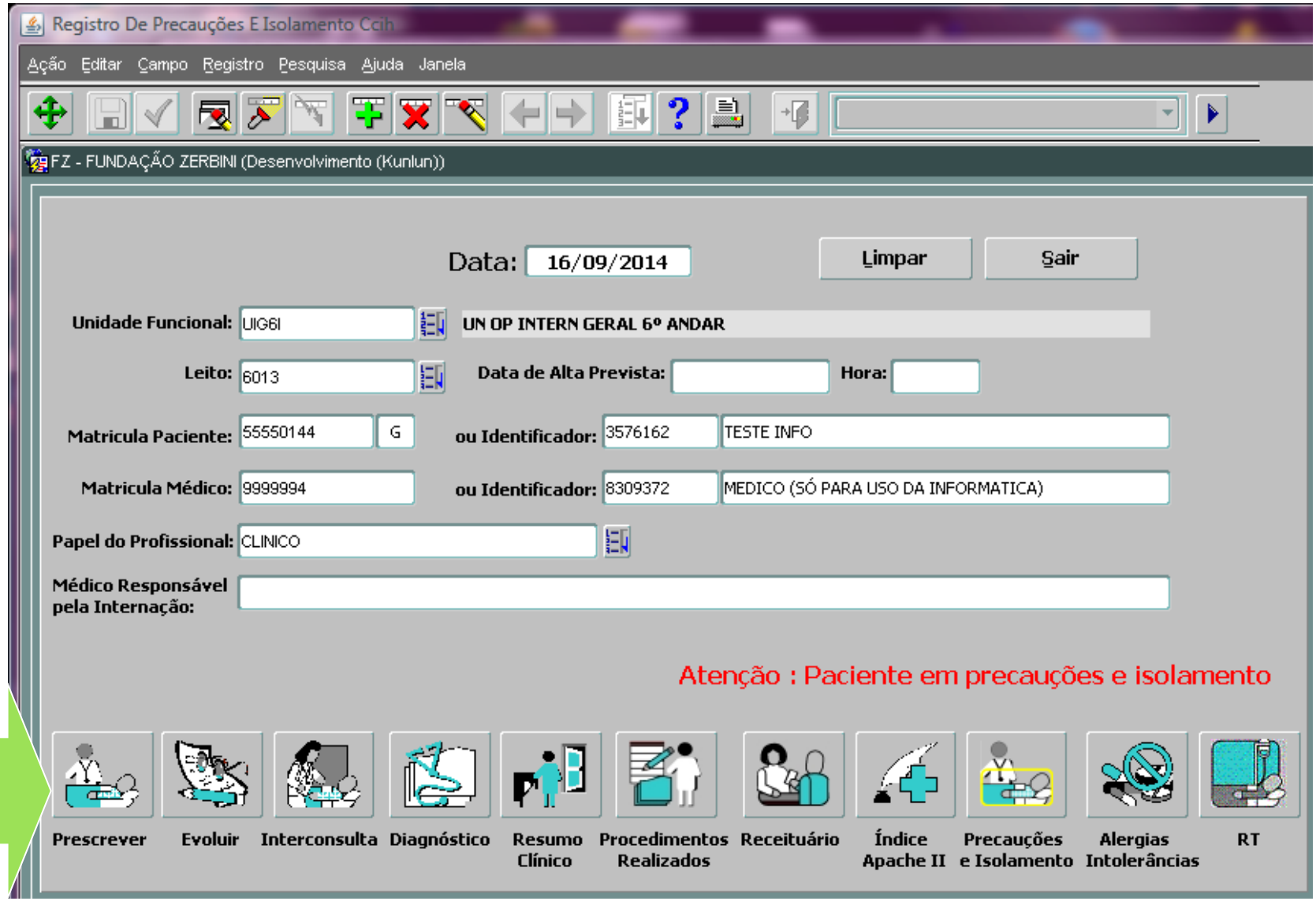
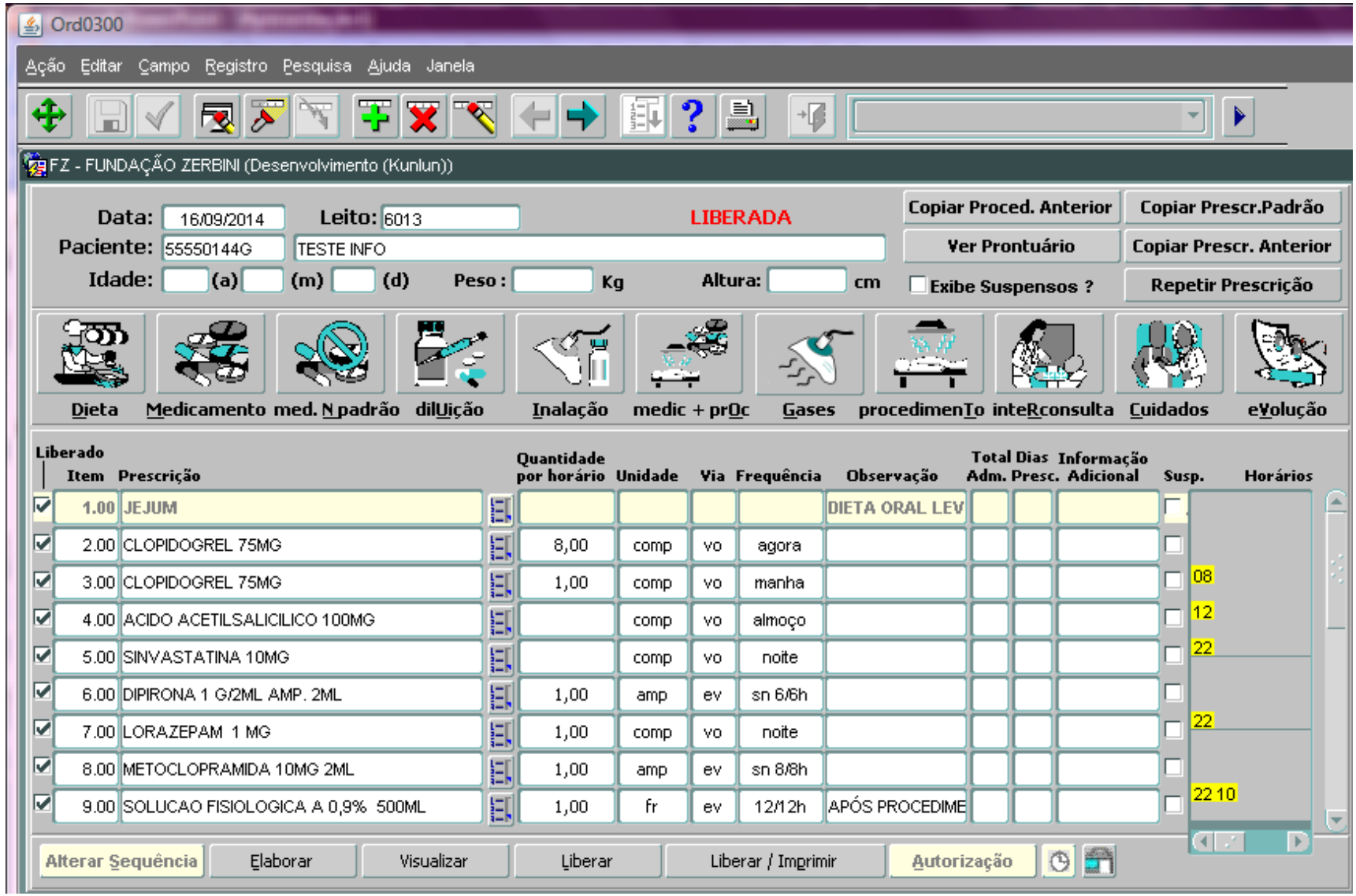
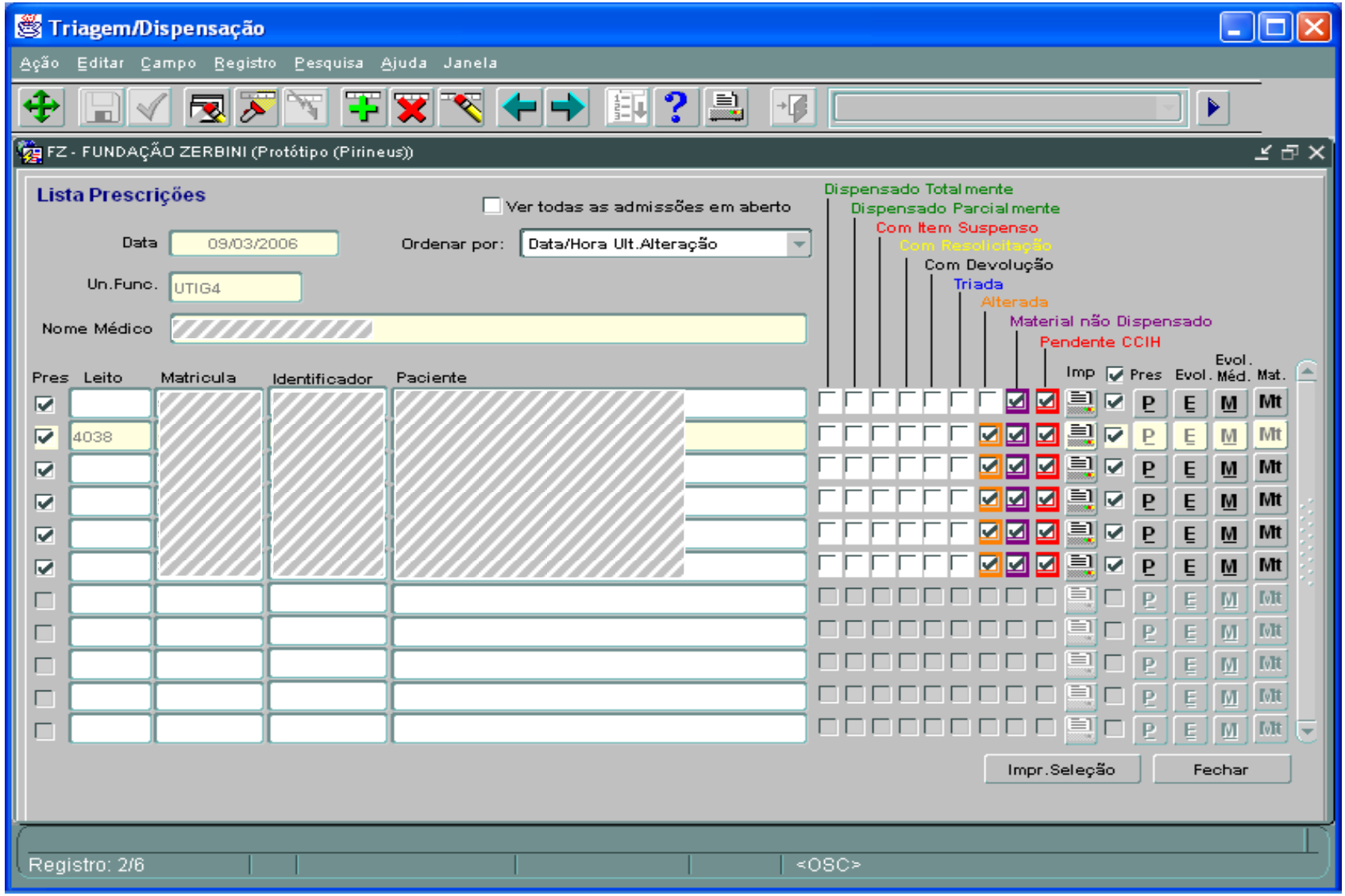
CPOE after 10 years, 20K/mo, ...



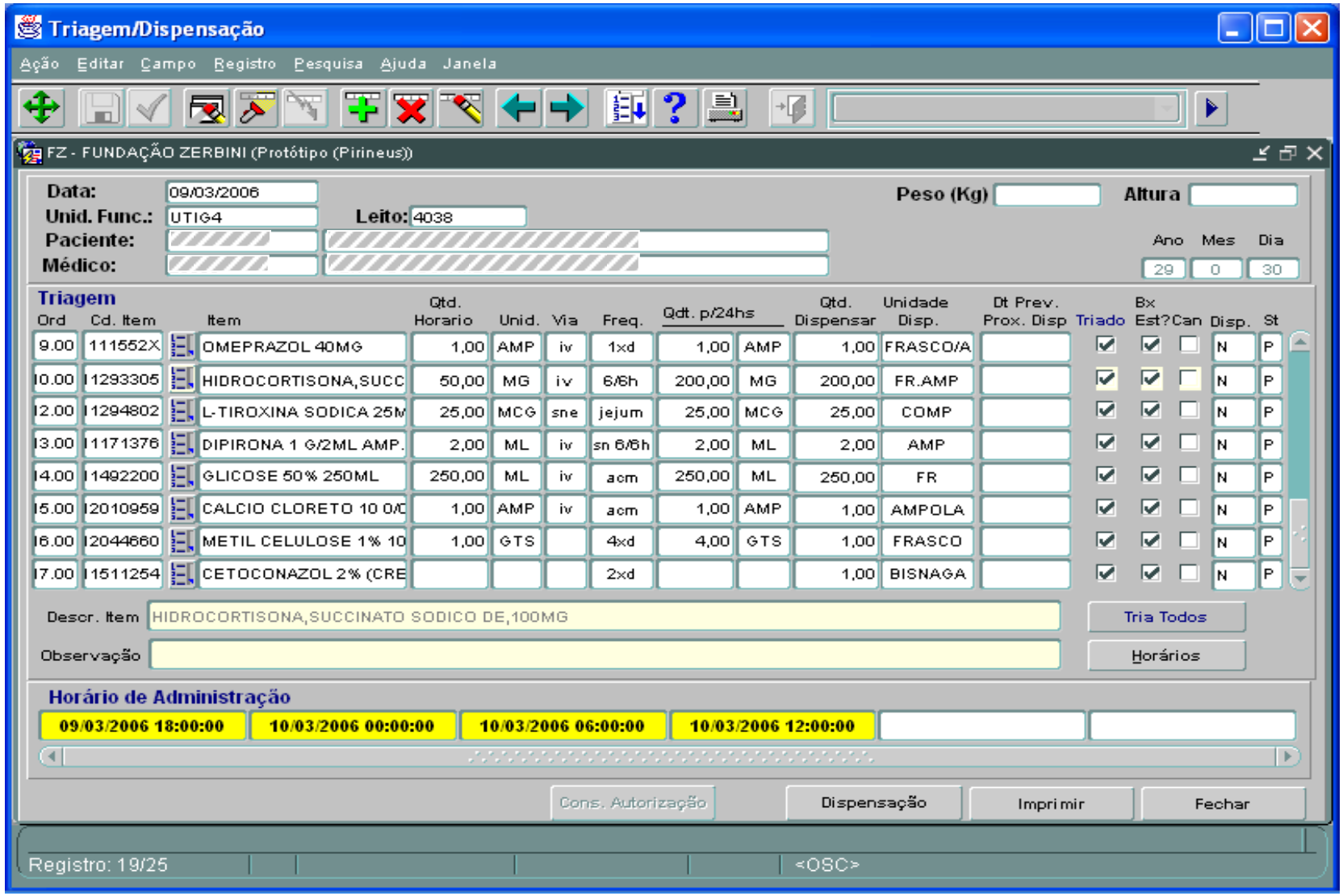
CPOE (Physician)



CPOE (Pharmacy)



CPOE (Pharmacy)



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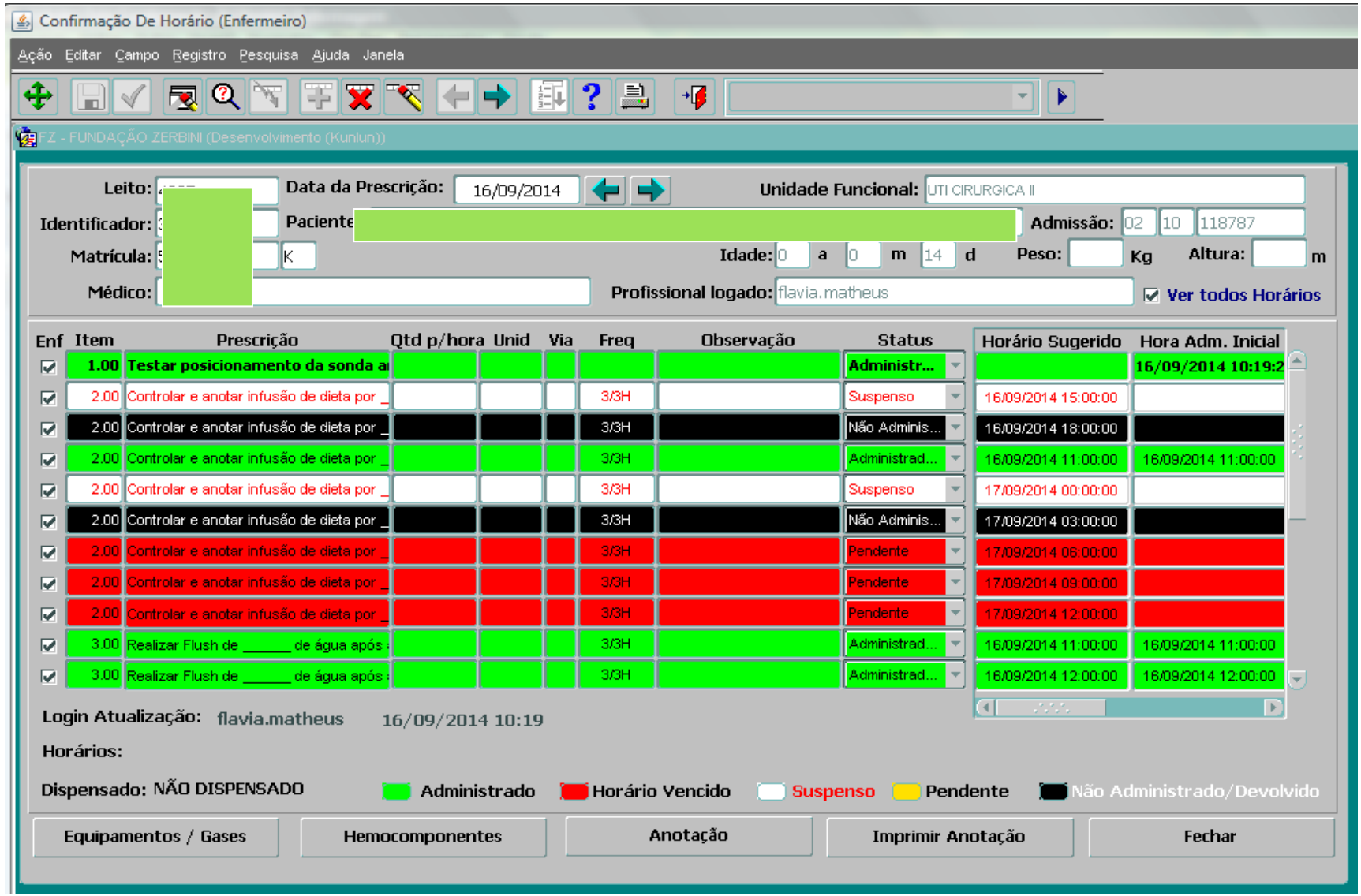
CPOE (Nurse)


Confirmação De Horário (Enfermeiro)
Ação Editar Campo Registro Pesquisa Ajuda Janela
FZ - FUNDAÇÃO ZERBINI (Desenvolvimento (Kunlun))
Leito:
Data da Prescrição: 16/09/2014
Unidade Funcional: UTI CIRURGICA II
Identificador:
Paciente
Admissão: 02 10 118787
Matrícula:
Idade: 0 a 0 m 14 d
Peso: Kg
Altura: m
Médico:
Profissional logado: flavia.matheus
Ver todos Horários
Enf Item Prescrição Qtd p/hora Unid Via Freq Observação Status Horário Sugerido Hora Adm. Inicial
1.00 Testar posicionamento da sonda a Administr... 16/09/2014 10:19:2
2.00 Controlar e anotar infusão de dieta por _ 3/3H Suspenso 16/09/2014 15:00:00
2.00 Controlar e anotar infusão de dieta por _ 3/3H Não Adminis... 16/09/2014 18:00:00
2.00 Controlar e anotar infusão de dieta por _ 3/3H Administrad... 16/09/2014 11:00:00 16/09/2014 11:00:00
2.00 Controlar e anotar infusão de dieta por _ 3/3H Suspenso 17/09/2014 00:00:00
2.00 Controlar e anotar infusão de dieta por _ 3/3H Não Adminis... 17/09/2014 03:00:00
2.00 Controlar e anotar infusão de dieta por _ 3/3H Pendente 17/09/2014 06:00:00
2.00 Controlar e anotar infusão de dieta por _ 3/3H Pendente 17/09/2014 09:00:00
2.00 Controlar e anotar infusão de dieta por _ 3/3H Pendente 17/09/2014 12:00:00
3.00 Realizar Flush de _____ de água após 3/3H Administrad... 16/09/2014 11:00:00 16/09/2014 11:00:00
3.00 Realizar Flush de _____ de água após 3/3H Administrad... 16/09/2014 12:00:00 16/09/2014 12:00:00
Login Atualização: flavia.matheus 16/09/2014 10:19
Horários:
Dispensado: NÃO DISPENSADO
Administrado
Horário Vencido
Suspenso
Pendente
Não Administrado/Devolvido
Equipamentos / Gases
Hemocomponentes
Anotação
Imprimir Anotação
Fechar

Next to the bedside (ubiquitous systems)

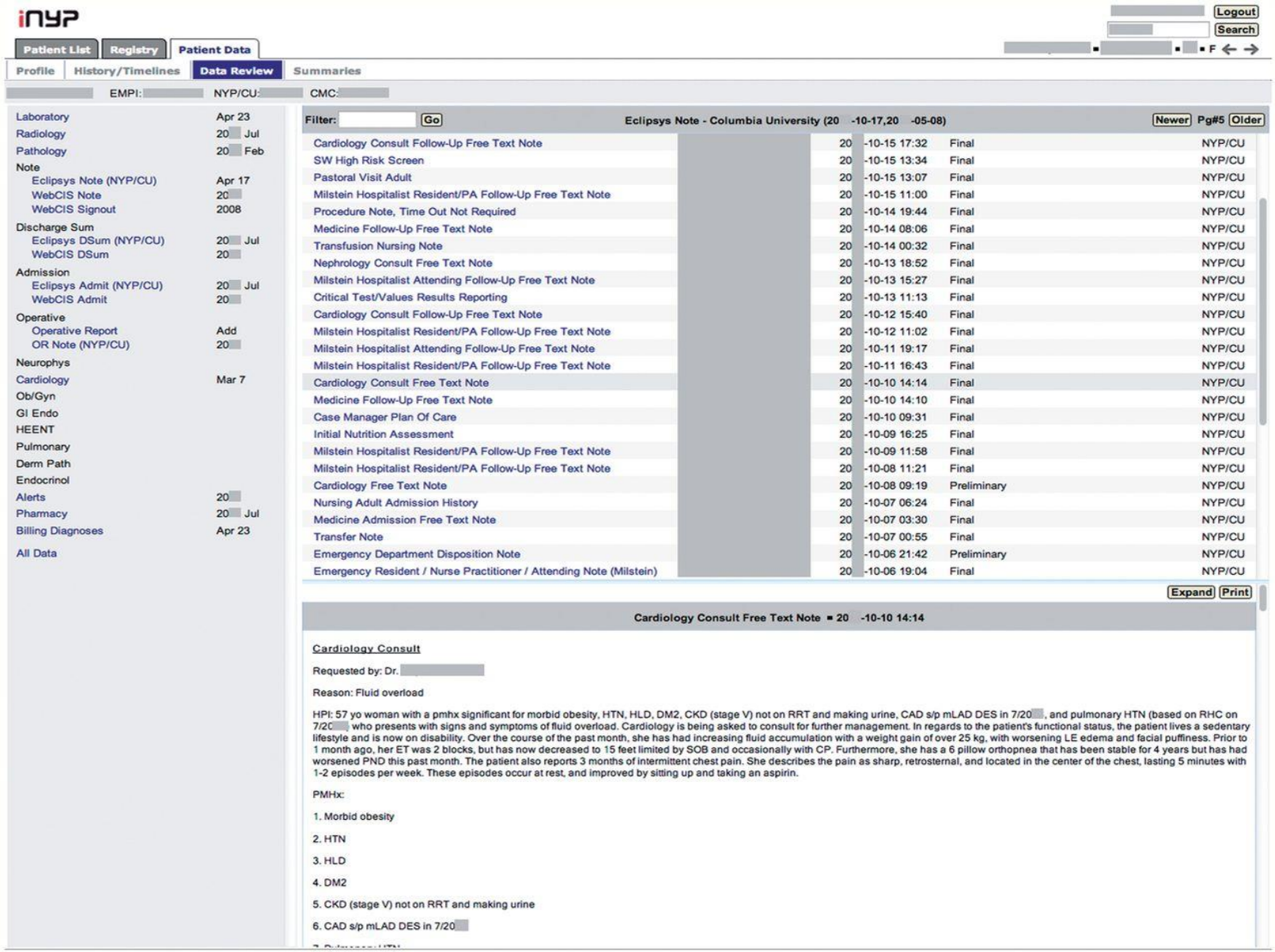
- Mobile (Wireless);
- Robust;
- Ergonomic (screen, heigth, length)
- Battery autonomy (> 6hrs);
- Easy do Clean (keyboard & mouse washable);
- Multiple users (Physician, Nurse and Pharmacist);

We still need new solutions

MedKart InCor com módulo para dispensação de medicamentos.

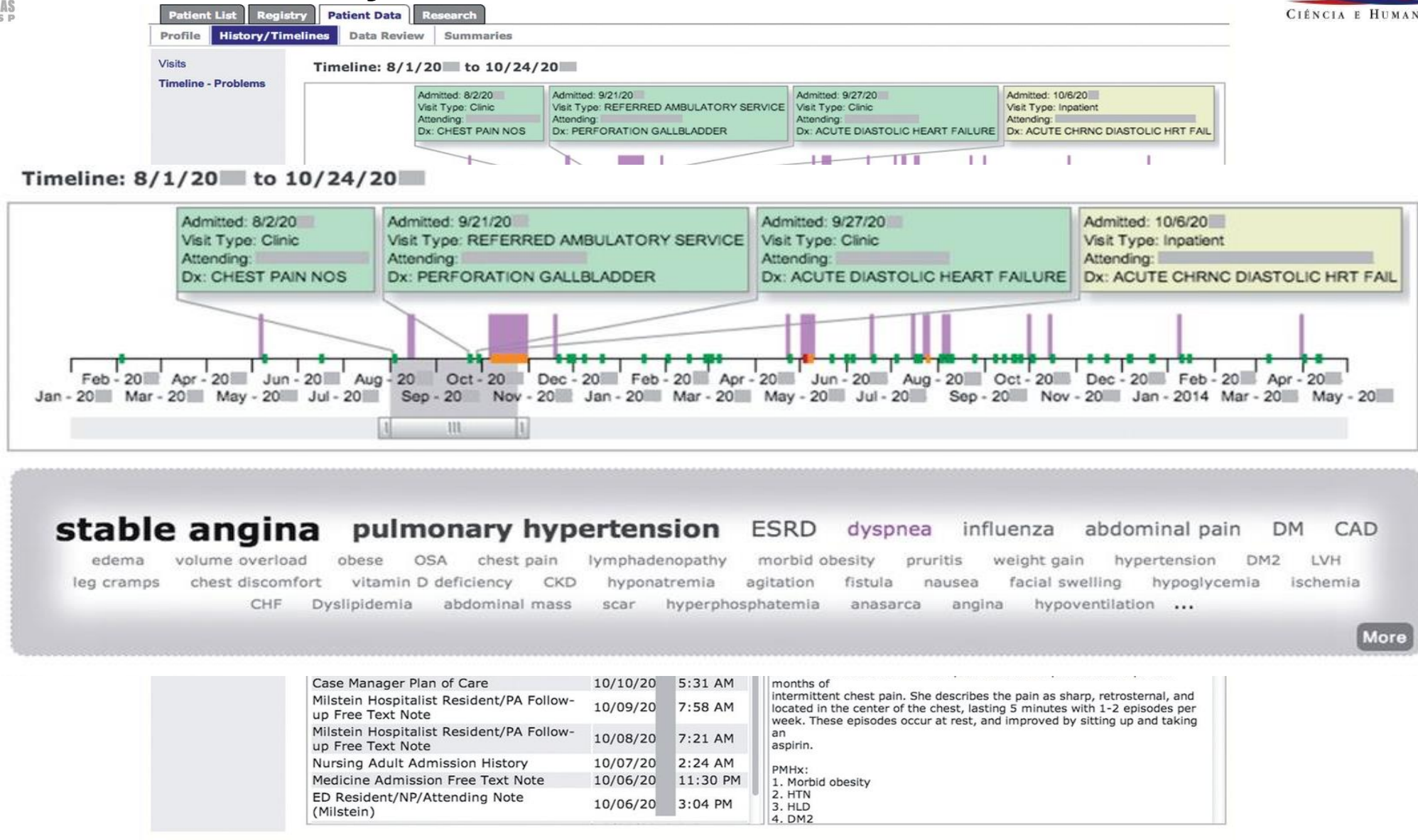
The last mile!
Drug administration controlled by the system (who accessed the drug case, what time, ...)

A typical clinical information review system



Jamie S Hirsch et al. J Am Med Inform Assoc 2015;22:263-274

Visual Analytics in Healthcare:The next wave



Jamie S Hirsch et al. J Am Med Inform Assoc 2015;22:263-274

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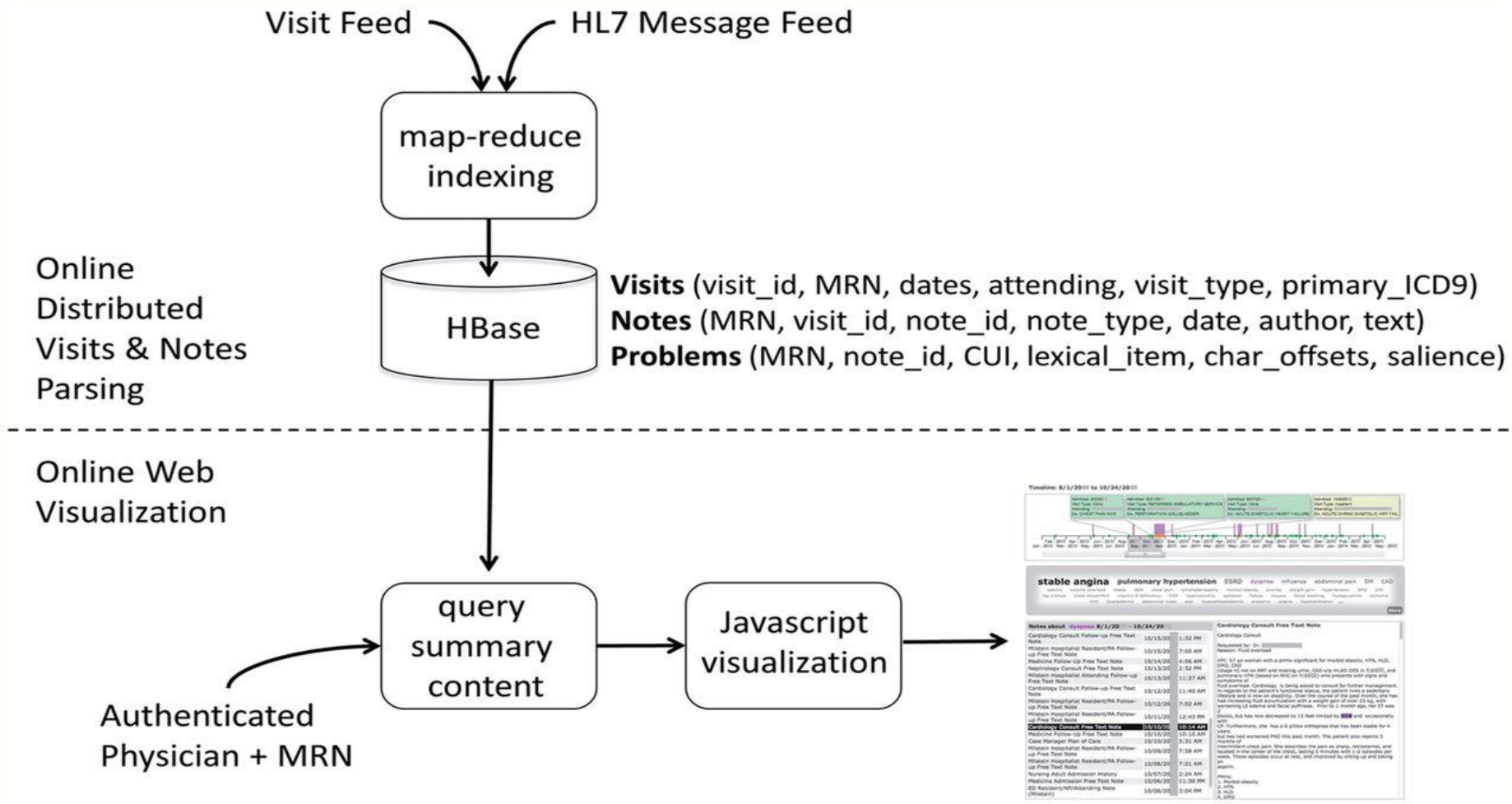
A proposal of architecture.



Jamie S Hirsch et al. JAMIA 2015;22:263-274

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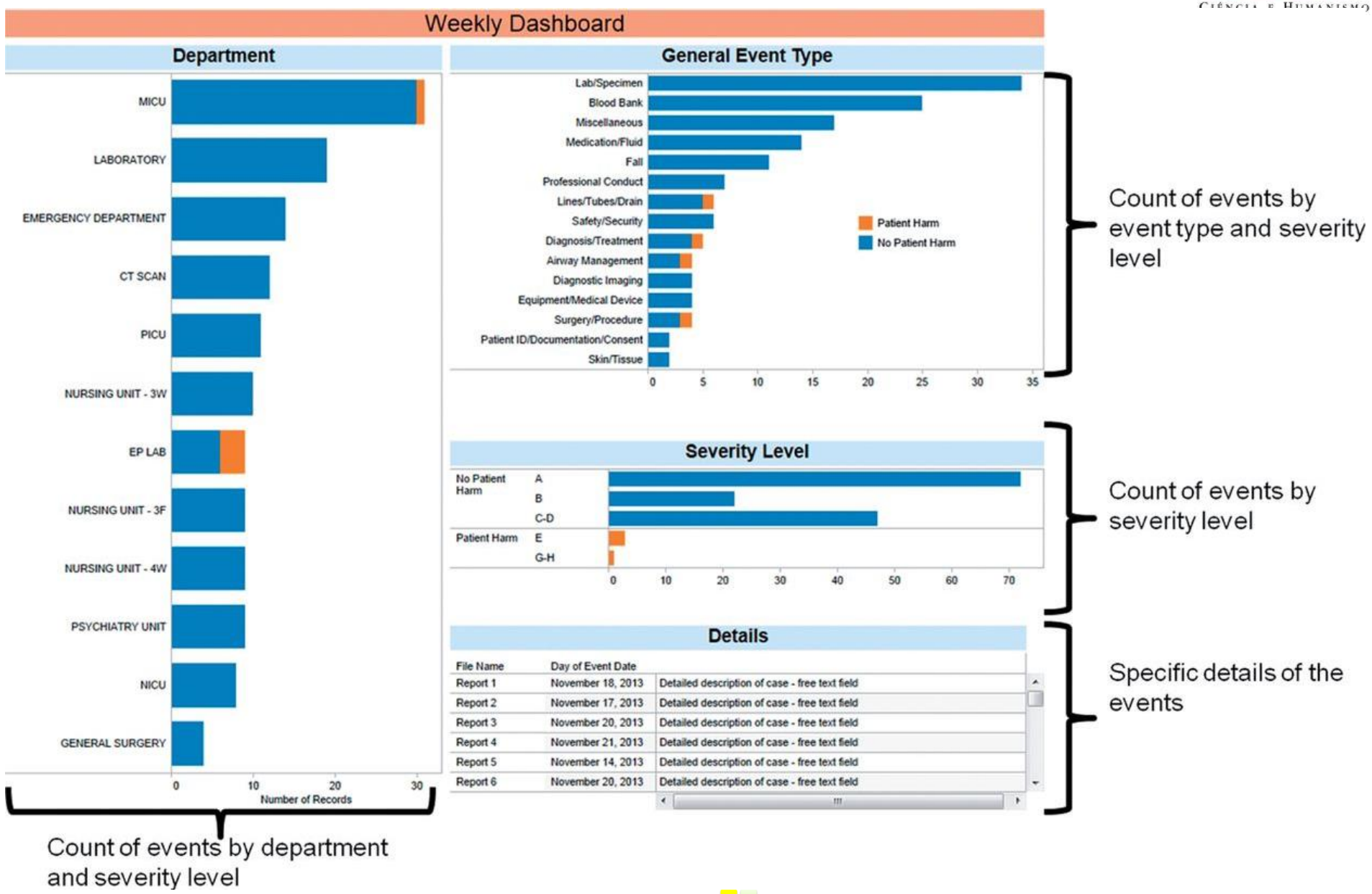
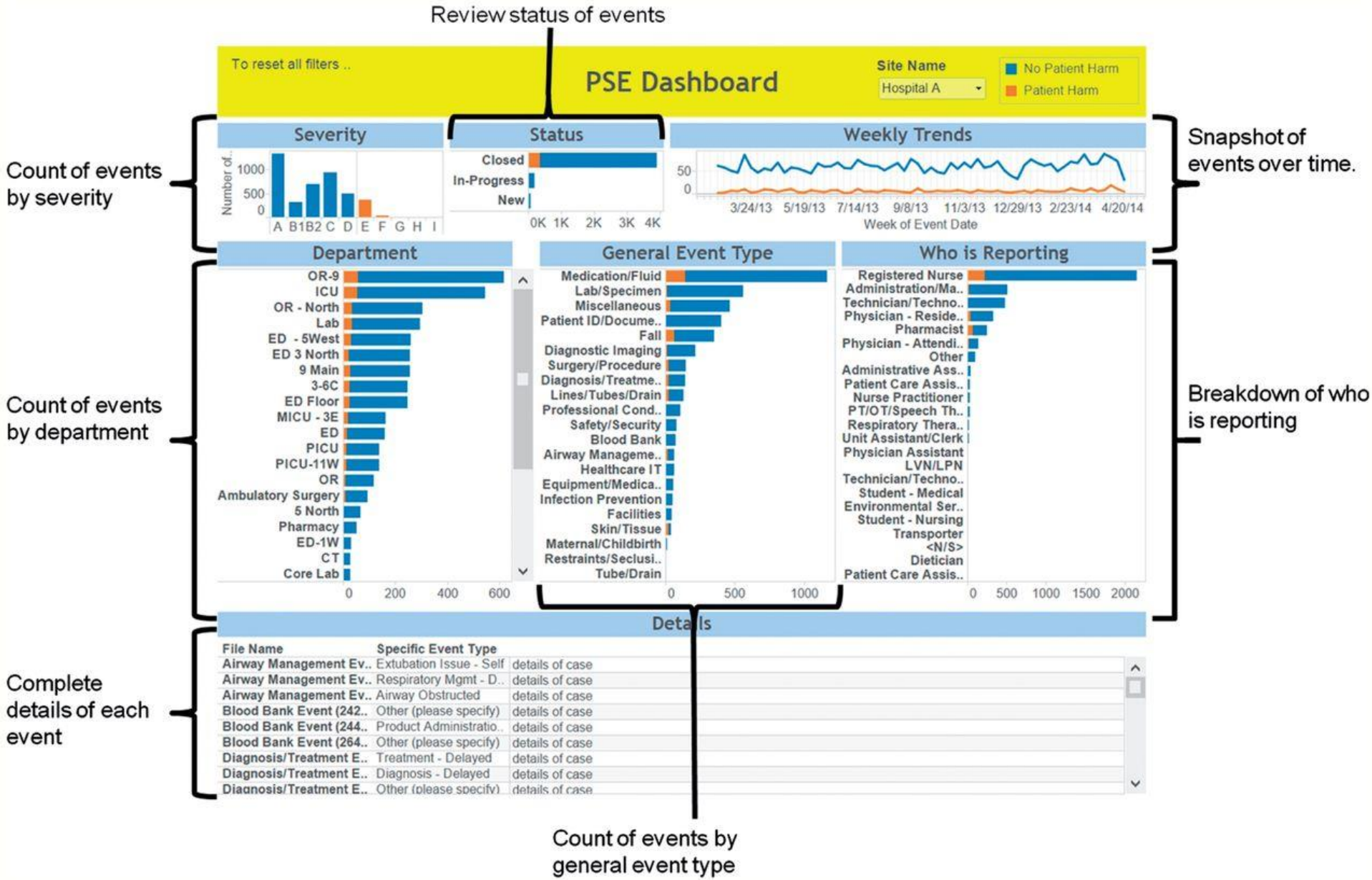
Analytics & Patient Event Reports



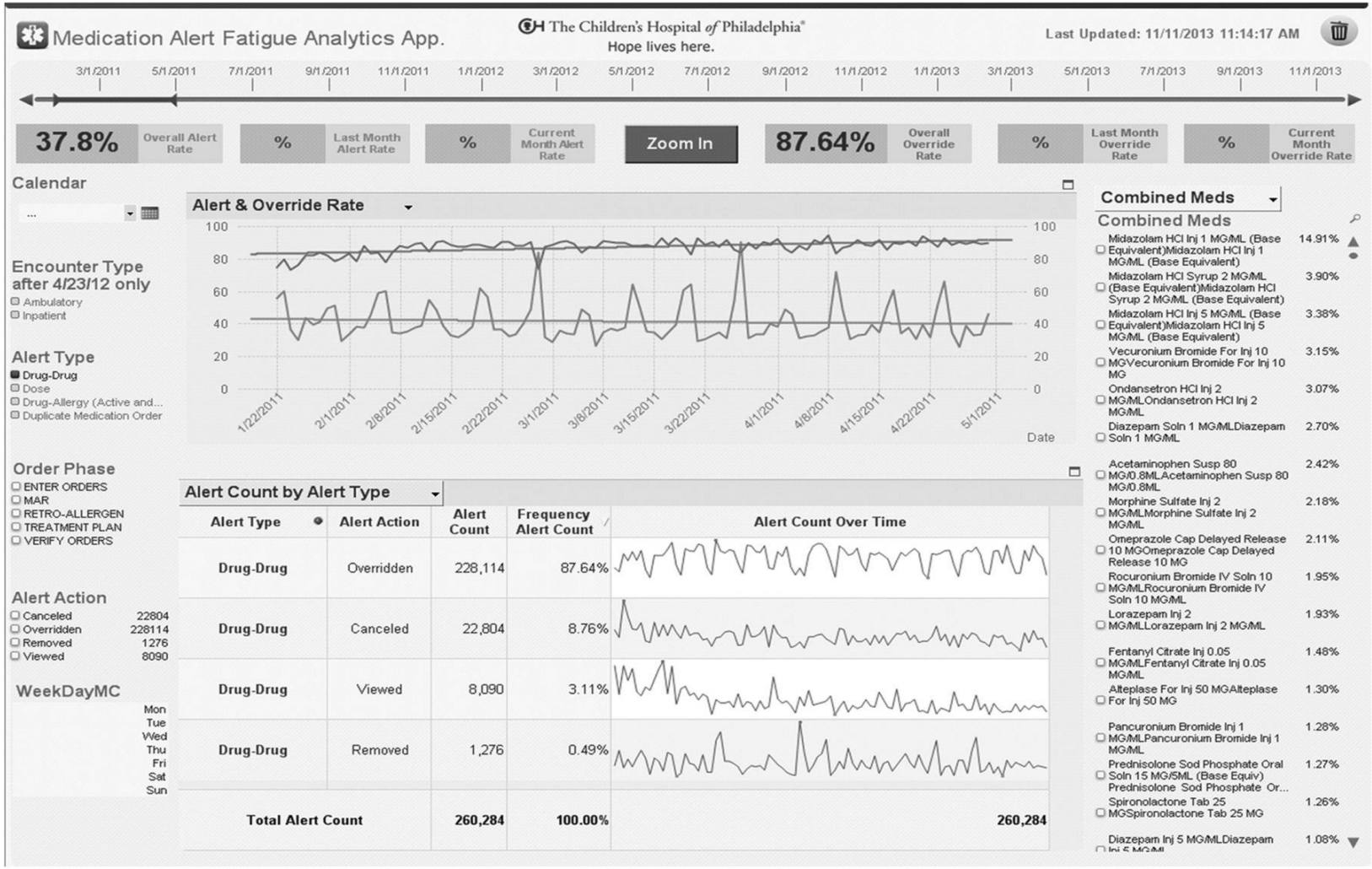
RM Ratwani, A Fong JAMIA 2015;22:312-317

Analytics & Patient Event Reports



CBMS 2015 *RM Ratwani, A Fong JAMIA 2015;22:312-317*

Analytics & Drug-Drug Interaction



The visual analytics dashboard user interface consists of a **central display region** with **tabular and graphical data representations**, as well as a variety of relevant filtering options framing the central display region.

AF Simpao et al. JAMIA 2015;22:361-369

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Summary

Information processing:

- **Is an important quality factor**, but an **enormous cost factor as well**;
- Is becoming a **productivity factor**
- Should offer a **holistic view of the patient** and of the hospital.

A hospital information system can be regarded as the memory and nervous system of a hospital;

IT has become economically important and decisive for the quality of healthcare. It will continue to change healthcare

Summary

- The integrated processing of information is important because:
  - **all groups of people and all areas of a hospital depend on its quality**,
  - **the amount of information processing in hospitals is considerable, and health care professionals frequently work with the same data**
- The systematic processing of information:
  - **contributes to high-quality patient care, and**
  - **reduces costs**
- Information processing in hospitals is complex and therefore we need:
  - the **systematic management** and **operation of hospital information systems**, and
  - medical informatics specialists responsible for the management and operation of hospital information systems

Thank you!

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Email: marco.gutierrez@incor.usp.br