The value of effective clinical data interchange among Healthcare Organizations. 13 years of experience in Catalonia

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27TH INTERNATIONAL CONFERENCE ON HEALTH PROMOTING HOSPITALS AND HEALTH SERVICES
Outline of this presentation

- Brief introduction to the Hospital Clinic
- The problem
- Proposed Solution
- Implementation
- New challenges, new projects ongoing
Hospital Clínica: a high-tech acute care hospital

- **High technology University Hospital** (2017 data)
  - Beds: 710; operating rooms: 31; delivery rooms: 7; outpatient offices: 240
  - Acute care hospital (43,135 admissions / yr)
  - Outpatient clinic for specialties (496,741 visits / yr)
  - Surgery (22,817 / yr) (Organ transplantation: 448 / yr)
  - Deliveries (3,083 / yr)
  - Emergency care (133,950 / yr)
  - One-day stay session (125,509 / yr)

- Human resources: 4,511
  - Physicians: 1,120
  - Nurses / Auxiliary nurses: 2,485
  - Administrative staff: 634
  - General services: 263
  - Management Board: 9

- Budget: 489,349,000 euros
Hospital Clínic: involved in translational research

**IDIBAPS:**
Research consortium sponsored by:

- Hospital Clínic
- University of Barcelona
- Consejo Superior de Investigaciones Científicas
- Generalitat de Catalunya

**Fundació Clínic:**
Research brand of the Hospital Clínic to collect private or public funds for research projects

Global Budget in 2017: 56,6 M euros
Hospital Clínic: a teaching hospital of the University of Barcelona

**Undergraduate programs with UB:**
- Biomedical Engineering
- Biomedical Sciences
- Medicine
- Nursing

**Postgraduate programs:**
- Residency programs
- Doctorate courses
- Master courses
- Postgraduate courses
- Continuous Medical Education
- Healthcare training

**Other programs:**
- Aula Clínica
- Clinic Summer School
- Scientific dissemination activities to the citizenship

Medical School at UB is the only Spanish academic center in among the 100 Medical Sciences Schools of the world (2018)
Information systems at Hospital Clínic

A highly integrated model with extensive and intensive use
A graphical summary of Hospital Clínica ICTs evolution

1984: HIS - textual interface without structured information – Financial S.


1997: ERP. SAP® R3


2007: Full clinical record.

2010: eMedication & data-based “CDS”


2018-…..: Functional improvement And knowledge-based “CDS”
Information Systems: a highly integrated model

• **Clinical Imaging (PACS)**
  - Imaging Database
  - Standard Format
  - Full integration with core business system
  - Repository for:
    - Image distribution through corporate system
    - Image sharing with modalities or departmental applications

• **Radiological modality** (Rx, TC, etc.)

• **ERP-EPR:**
  - Master Tables
    - Organization
    - Structure
    - Catalogs
    - Services
    - Drugs
    - ……
    - Patients
    - Business partners
  - Processes
    - Master data creation and maintenance
    - Users creation and maintenance
    - Representation of Main business processes
    - Permissions
    - Service requests
    - Planning
    - Activity registration
    - Documentation
    - Exploitation

• **Integration Manager (IM):**
  - HIS to DIS:
    - Request (patient, episode, service, time, health problem) [Planning]
  - DIS to HIS:
    - Result
    - Activity, Documentation (report, data, image, time)

• **Departmental Systems (DIS):**
  - Best solution for extended business processes
  - Avoiding corporate processes and data competition
  - Strong relationship with technology
  - Specific reporting
  - Maximum integration

-- Data warehouse:
  - Extraction
  - Debugging
  - Transformation
  - Summarization
  - Aggregation
  - Analysis
  - Balance Scoreboard

-- Management

-- Clinical Workstation
  - Users
    - Roles
    - Categories
    - Permissions
    - Specialties
    - ……

-- Administrative Workstation
  - ……

-- Image

-- Diagnostic or therapeutic units

-- DWH-BI

-- ERP-EPR:
  - Master Tables
  - Processes

-- RIS

-- DIS

-- D1

-- D2

-- D3

-- DIS1

---- Radiological modality (Rx, TC, etc.)

---- Image

---- Diagnostic or therapeutic units

---- DWH-BI

---- ERP-EPR

---- RIS

---- DIS

---- D1

---- D2

---- D3

---- DIS1

---- Clinical Workstation

---- Administrative Workstation

---- Users

---- ERP-EPR

---- Integration Manager (IM)

---- Processes

---- Radiological modality

---- Clinical Imaging (PACS)

---- Data warehouse:

---- Management
Registration of the main business processes in healthcare facilities

Achievement: business process standardization
2019: Hospital Clinic IS usage

Extensive
- Full availability in all the hospital
- Users: 6,500 users (aprox.)
- Devices
  - 4,000 PCs (aprox.)
  - Computers (generic and personal workplaces)
  - Laptops
  - Tablets
  - Mobile phones
  - 400 printers
- Connectivity
  - Wire and wifi connection
  - VPN for remote access

Intensive
- High implication of health personnel
- Nearly paperless
- All stakeholders involved
- Concurrent users: 3,000 (11:00-14:00)
- Non-stop operation
Is it all right?

1984: HIS - textual interface without structured information – Financial S.


1997: ERP SAP® R3


2007: Full clinical record

2010: eMedication & data - based “CDS”

2011-2017: IPA. Better customization to professional needs and patient safety

2018-…..: Functional improvement And knowledge-based “CDS”

Are we (Hospital Clínic) alone in the healthcare business?
Are we taking care of the whole care process of the patient?
Is the patient really in the focus of our activities?
2004, fifteen years ago: Primary – Specialized Care

- The mean time to establish a lung cancer diagnosis by the specialist after the initial consultation of patient to the Family physician was 50 days.
- Top-down measures from Health Authorities hadn’t be successful to improve such situations.

Houston, we have a problem !!!
a glimpse of Hope
Public Healthcare Insurance
Catsalut: 7 health regions
Health region of Barcelona
Health Consortium of Barcelona city
4 Integral Healthcare Areas (AIS)

Mission:
To offer an integral health care to the population in a territorial framework by effective coordination between institutions and health care professionals

Population: 517,880 inhabitants
- Aging
- Immigration
Hospital Clínic: “dual” model a real challenge

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Keep the threshold reached as a high tech hospital and...
Face and lead the challenge of “Continuous Patient Care” in AISBE

- Leading the reengineering process between Primary and Specialized care to deliver a true “Integrated care” including Home care & chronic patients programs (COPD, HF, AIDS, Cancer) and Long Term Care and Mental Health connection over a reference population about 520,000 inhabitants.
the real world
Departure situation in AISBE

Healthcare facilities:
- 23 Primary Care centers (6 providers)
- 2 Outpatient Specialized centers (1 provider)
- 4 Acute care Hospitals (4 providers)
- 6 Mental health centers (6 providers)
- 4 Long-term care centers (3 providers)

Very BIG differences in many dimensions:
- Size
- Complexity
- Organization
- Equipment
- Human resources
- ICTs
Complains:
Poor communication among HC professionals
Delay in diagnosis and treatment
Destination to Specialized Center by chance
Technical resources always at the Hospital
No update of clinical info from the hospitals
WE WANT THE PATIENT’S DISCHARGE REPORT !!!
a new Model
Reengineering the relationship between Primary and Specialized Care

1st Goal: Improve the patient care with a new approach over the relationship among family physicians and clinical specialists.

Patients’ flow regulated by agreements and clinical protocols based on scientific evidence
- Family physician
- Specialists
- Diagnosis / treatment resources
keep it simple
Searching the proper technology

Patients’ flow regulated by agreements and clinical protocols based on scientific evidence

xml clinical messaging platform
technical interoperability using HL7 v 2.5

Affordable approach
Quick wins
Scalability
Connecting EPRs with a **Technically Interoperable Platform** based upon accepted and affordable communication **standards** for interchanging meaningful clinical information to share the processes with **added value**.
a coordinated team
Stepwise approach: from middle-out with the professionals

- All the partners with the same recognition
- Professional involvement
- Good management of professional teams: leadership and transparency
- Reduce complexity
- Clear definition of the goals
- Technical Interoperability based upon standards
- Evaluation
- Governance

Institutional representatives

Territorial Health Care Commission

AISBE

Technical Management Team

Operational Committees:

- Emergencies
- Specialized Care
- Social Care
- Health Transport
- Home Care
- Pharmacy
- Mental Health
- Pediatric Care
- ICTs

Process 1 (COPD)
Process 2 (HF)
Process 3 (Diabetes)
Process 4 (Breast cancer)
Emergencies
Social Care
Health Transport
Home Care
Pharmacy
Mental Health
Pediatric Care
ICTs
Working Group on Information and Communication Technologies

- **Composition:**
  - For each provider Institution
    - ICT responsible
    - Responsible of patients’ management
    - Technological partners
  - One responsible of the Public Health Insurance (Catsalut)

- **Method:**
  - Yearly objectives
  - Global monthly meeting
  - Group sessions according ongoing projects

- **Working meetings**
- **Coordination tasks**
  - With the Executive Committee
  - With ongoing projects (HC3, WIFIS, etc...)

- **Support tasks**
  - Monitoring.
  - Security audits and updates.
  - Operating Support Systems.

- **Diffusion tasks**
  - Sessions, workshops and meetings.
  - Academic courses.
following a method
Clinical processes: functionality and status

Clinical information tracks:

- Specialists activity done at PC center
- Interconsultation to SC at the hospital with appointment
- Pre-scheduled interconsultation to SC at the hospital
- Relevant Clinical Documentation
- Service requests to hospital and delivery of reports and images
- Teleconsultation (dermatology, vascular surgery, hematology,...)
- Patient’s derivation between Emergency Deps.

Status:

- Reception
- Rejection
- Appointment
- Re-appointment
- Cancellation
- Activity done
- Documentation
- Image
- Closure
Requests, appointment and activities

- Order
- No OK
- Platform
- Verification + scheduling
- New App
- Cancel
- Done
- Docs
- End

Patient: agenda management

Hospital

Requests, appointment and activities

- Order
- No OK
- Platform
- Verification + scheduling
- New App
- Cancel
- Done
- Docs
- End

Clinical Documentation

- Done by physician or nurse
  - Patient
  - Document type
  - Non structured document (pdf)

Admission, Emergency, Outp.

Clinical Documentation

- Done by physician or nurse
  - Patient
  - Document + closure

Primary care

- Discharge report
- Emergency report
- Etc...

Specialized care

- Clinical process + discharge
  - Clinical
  - Documentation
  - Discharge report
  - Emergency report

1,707,884 services offered to patients and professionals between 2007 to 2017

AISBE 1st goal: Interchange of meaningful information
AISBE 2\textsuperscript{nd} goal: innovation. Teleconsultation

1. Image capture
   - Done by the GP
2. Request for Teleconsultation
3. Integration
4. PACS
5. Sending message (report and link to the images)
   - Done by specialized physician
6. Report pdf + link
7. Image access

Platform

DICOM convertor

Done by the GP

Done by specialized physician

Platform
Some results
Some results (1)

Improving and growing activity of the system in “classical” processes

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Services requested by PC

Images provided by SC
Teledermatology: a successful example of a new process mediated by ICTs

- **Patient destination after teleconsultation (%)**
  - Discharge: 14.5%
  - PC control: 33.8%
  - Dermatologist at PC: 41.8%

- **Period**: Jan 13 – Jun 14
- **PC physicians**: 68 cases (13.5 TC by Phys)
- **Teleconsultation**: 920 cases
- **Dermat. answer**: 1.84 days (mean)
- **Picture quality**: 94.3%
- **Visits saved**: 535 cases (58.2%)

**Patients biopsied and results**

- **Biopsies**: 124
- **Malignancies**: 74
- **Melanoma**: 6
Lessons learned: the case of Teledermatology

Organizational disturbances of previous agreements in the clinical workflow by the unilateral decision of one provider
satisfaction
2014: The AISBE model extended to the rest of Catalonia

AISBE IOP platform 2007-2014

IS3
Catalonian Healthcare
IOP platform 2014 - ....
Shared eHealth resources in Catalonia today

- **SIMDECAT**
- **RCA**
- **REC@T**
- **HC3**

**Central Repository of Clinical Documentation**

**Requests Images Interconsultation Activity**

**Central Image Repository**

**Data / Documents publication**

**Data / Documents consultation**

**Tecnic Mon.**

**Func Mon.**

**OntoCR**

**Ontology driven clinical repository**

**Insured citizens**

**Appointments Reports Images Activity**

**Primary Care System**

**Specialized Care system**

**Citizen at home**

- **Formulaires**
- **Specific Clinical Data**
- **Specific Clinical Data**
always  transparency
Functional monitoring: tracking capabilities

**Monitoratge de dominis**

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**Informació detallada**

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**Individual patient process**

**Process status**
Reporting (1)

from one Primary Care Center

to the Hospital destination

Monitoratge de dominis

Informació detallada
# Monitoring of Domains

**Domain:** TOTS, Period: 2019-06, Data sol·licitat: 2005/06/01 00:00:00

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**Status of the process and time lapse**
The ongoing C-17 project

- Tertiary care
  - Oncology
  - Surgery
  - Complex diagnosis

- Specific patient data
  - Oncology
    - Lung Cancer
    - Breast Cancer
    - Leukemia / Lymphoma
    - Ovarian cancer
Facing new challenges

- Full coverage of the implemented processes
- Development of new functionalities
  - Event notifications
  - Patient’s connection
- Decentralized management
  - Monitoring improvement
  - From reporting towards a Territorial Clinical Scorecard
- Governance and Quality issues
  - Functional refinement
  - Cancer registry
2019: Public healthcare collaboration

- Spain
- Catalonia

Interoperability platform

Healthcare providers

Insured patients
Cancer
ePresc.
Cat. EHR

Citizen access

Upcoming
Concluding remarks

It’s possible to redesign and improve healthcare processes with ICT support

Key factors for success are:

- Leadership
- Transparency
- Governance
- Professional involvement
- Agreements
- Methodology

Return of investment includes more things than savings or revenues:

- Better quality of care
- A big field for research and growth of new ideas
- Stimulus for organizational development and improvement
- Trust to afford new objectives

... and satisfaction because

- Milestones reached → Project accomplishment
- Professional acknowledgement → Real added value
- Patient’s reconnaissance → “Healthcare has improved” ....
At last but not least be patient
Thank you very much for your attention!!!

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