HUMANITAS
RESEARCH HOSPITAL

Panel:
How Big Data is Changing Healthcare

Elena Sini
CIO
Humanitas Research Hospital

Big Data in Healthcare

Gartner defines "big data" as high-volume, high-velocity and high -variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making.
According to Gartner the eight sources of healthcare big data are:

	Volume	Variety	Velocity
Physicians' free-text notes	Terabytes of stored text	Unstructured	NA
Patient-generated health data (PGHD)	Few patients at first, but will grow	Few data elements now, but will grow	NA
Genomics	~100GB per patient	Standard formats exist	NA
Physiological monitoring data	Very large with high resolution and continuous stream	A few waveforms of interest	May require immediate response to abnormalities
Publicly available data	Very large	Wide	NA
Credit card and purchasing data	Very large across all patients	Wide	NA
Social media data	Very large across all patients	Wide	NA
Medical imaging data	Petabytes	Unstructured	NA
NA = not applicable			

Source: Gartner (March 2016)

Humanitas Research Hospital

Humanitas has undertaken a multi-year initiative to **improve the quality of information** available to stakeholders.

We decided to set:

- ✓ the goals of our analytics program
- ✓ the approach to information management and data governance
- ✓ the IT platform

Analytics help us to refine our organizational model in line with the **continuous improvement strategy** of Humanitas

The challenge: *measure clinical performance in order to ensure clinical quality of the care delivered to the Patients*

Humanitas: the Hospital

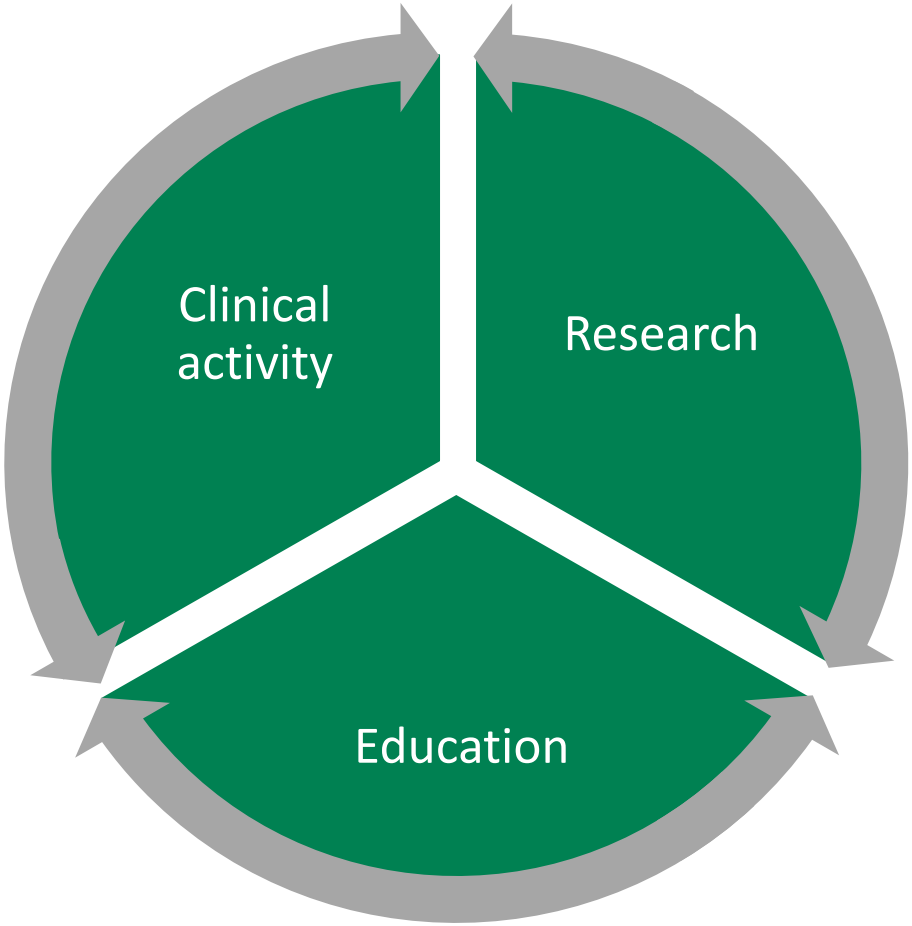
In Italy, private HDOs are accredited by the Region and provide health care service directly to the Italian citizens. The patients are free to chose where to get treated. The State reimburses the clinical services based on the DRG system.
Humanitas provides around 80% of its services to the NHS.

Humanitas Research Hospital is the flagship hospital of Humanitas Group

- **40.000** inpatients per year
- **2.400.000** outpatient visits per year
- **2.300** Professionals
- Certified by the **Joint Commission International**
- Teaching hospital
- Research Hospital

The Humanitas Model

Private capital – Public Service



A close integration between health care, research and training to offer our patients the world's best affordable care: this is the mission at Humanitas

Humanitas: excellence centers

Cancer Center
- Oncology
- General surgery
- Thoracic surgery
- Plastic surgery
- Urology
- Gynecology
- Breast Unit
- Dermatology
- Nuclear Medicine
- Radiotherapy

Cardio Center
- Heart surgery
- Cardiology
- Vascular surgery
- Electrophysiology
- Hemodynamics
- Echocardiography
- Cardiac care unit
- Rehabilitation

Ortho Center
- Orthopedics
  - prosthetics
  - shoulder
  - knee
  - hand
  - foot
- Traumatology
- Rehabilitation

Neuro Center
- Neurosurgery
  - head
  - spinal column
- Functional neurosurgery
- Neurology
- Stroke Unit
- Rehabilitation

Internal medicine *(medical clinic, gastroenterology, hepatology, nephrology, endocrinology, pneumology)*

Specialty activities *(ophthalmology, Fertility Center, Day Surgery, Dental Center)*

Services *(radiology, ultrasound, endoscopy, clinical lab, anesthesia, intensive care unit, dialysis)*

Emergency Department - EAS

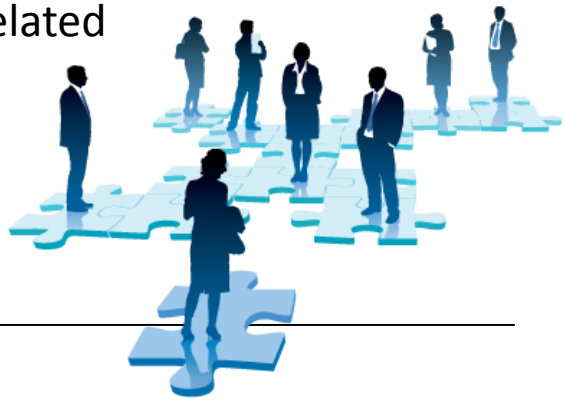
Patient care continuum

In order to assess clinical quality we had to exploit the full **potential of clinical data**

Thanks to the **EHR** we transformed how information is managed, shared and processed across the **continuum of care** – to become a paperless hospital, while removing barriers to more collaborative working - '***coordinated patient care'***

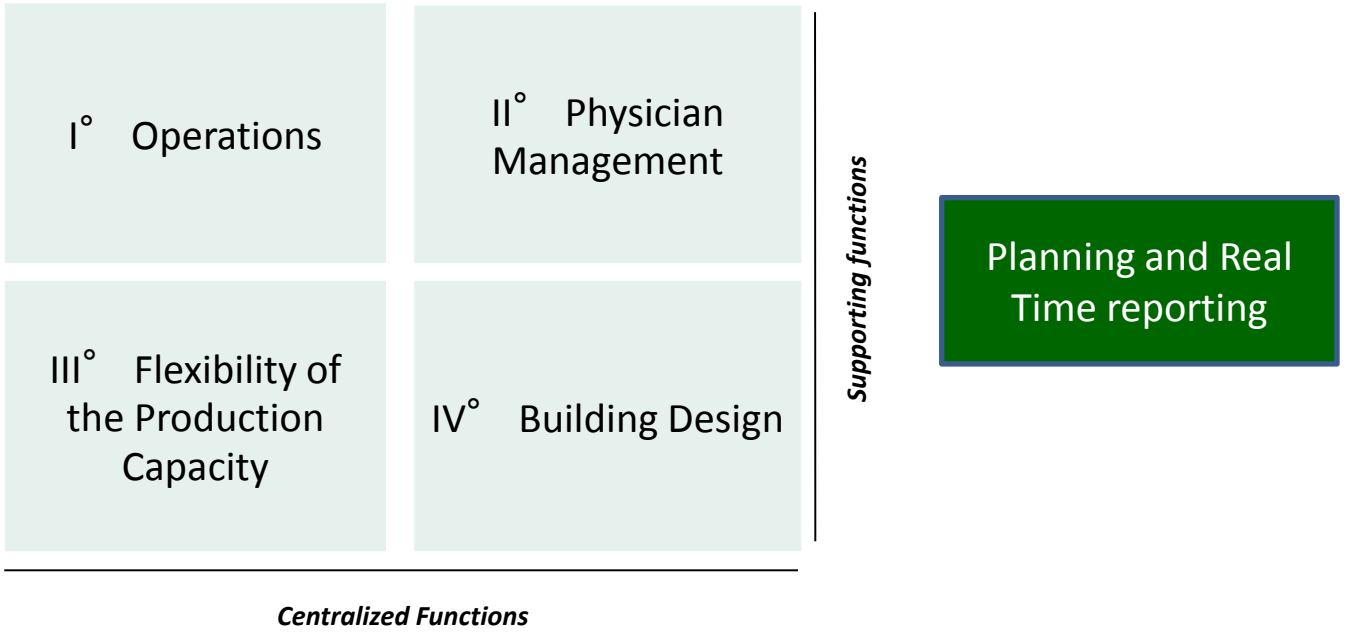
- ✓ From data siloed to a 'patient centered' architecture
- ✓ Easy access to digital healthcare services to Patients

- ➢ The goal was to improve **information sharing and collaboration**
- ➢ The challenge was to build a **comprehensive information system**
- ➢ The need was to consolidate of all the forms of patient related content in an **unique clinical data platform**



Asset-Based Management

Humanitas has developed an Asset Focus business model with the aim of optimizing capacity utilization of the various processes within the hospital. The model is based on **four key success factors**:



Clinical Area: Laboratory, Clinical Audit, Research

Staff: Finance and Administration, IT System, Building Management, Internal Auditing, HR, Supply Chain and Business Development

Clinical outcome and 'take care': Humanitas definition of quality

Clinical quality
«the best hospital»

=

Clinical outcome
«the best care delivered to the patient»

KPIs:
- Patients outcome[1]
- Process indicators[2]
- PROM[3]

+

Take care
«the best path for the patient treatment»

- Clinical service lines
- Zero queues
- Social needs support[4]

1. Outcome direct measures e.g. mortality, infections, survival curves,…
2. Process quality, success prediction e.g. CAT in 30 minutes in the stroke unit, aspirin in case of infarct,…
3. Patient Reported Outcome Measures e.g. pain, functional rehabilitation, transition back to work,…
4. Psychological support, support in situations of fragility, support during the after hospitalization phase,…

Monitoring the quality of clinical performance

Physicians are highly motivated to provide the very best care for their patients and they will adjust their clinical practice if presented with trusted, high quality data

CPIS - **Clinical Performance Information System**:

- ✓ KPIs for the single professional (physician scorecards,..)
- ✓ KPIs for the single Medical Unit (mortality, infection, average stay, patient satisfaction data, …)
- ✓ KPIs for the professionals working on the single course of treatment

The system enables quality outcome tracking and makes available a series of quality parameters inherent our clinical activity

Monitoring the quality of clinical performance

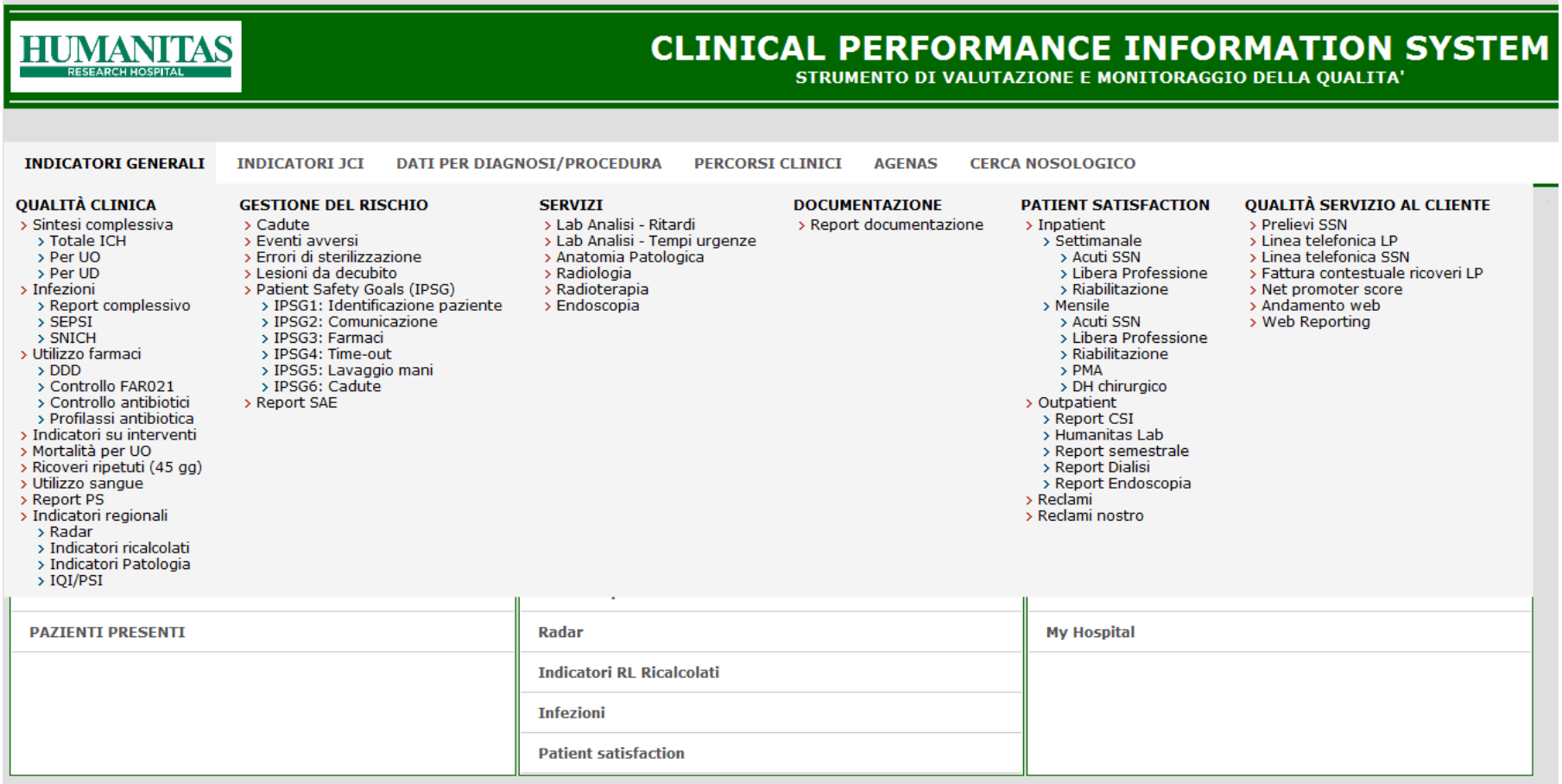
HUMANITAS
RESEARCH HOSPITAL

CLINICAL PERFORMANCE INFORMATION SYSTEM
STRUMENTO DI VALUTAZIONE E MONITORAGGIO DELLA QUALITA'

INDICATORI GENERALI | INDICATORI JCI | DATI PER DIAGNOSI/PROCEDURA | PERCORSI CLINICI | AGENAS | CERCA NOSOLOGICO

REAL TIME	RIUNIONI DI PRESIDENZA	BUILDING AND FACILITY MANAGEMENT
CERCA	Agenas	Valutazione servizi outsourcing
GRAFICI	Mortalità per UO	Piani FMS
PAZIENTI PRESENTI	Radar	My Hospital
	Indicatori RL Ricalcolati	
	Infezioni	
	Patient satisfaction	

Monitoring the quality of clinical performance



Case Study 1

We are using real-time information and predictive models to solve operational and clinical delivery problems.

Case study 1: algorithms to prevent Sepsis

Sepsis is a complex condition. It is a life-threatening medical condition that arises when the body's attempt to fight an infection results in the immune system damaging tissues and organs

EWS = Early warning score

- ✓ The EHR continuously monitors key clinical indicators, recognizes a potentially septic pattern and notifies the care team of the risk for sepsis for a given patient
- ✓ Algorithms allow the hospital to focus on a targeted set of high–risk patients, optimizing safety and improving operational costs

Case Study 2

We are using the potential of analytics in operations to drive transparency and efficiency into operational processes.

Case study 2: algorithms to achieve operational efficiencies

We decided to tackle the problem of Emergency Room delays…

Process KPIs

- ✓ Increase patient throughput by accelerating admissions
- ✓ Intervening more rapidly when patients conditions deteriorate
- ✓ Reduce cost by optimizing the utilization of assets

You have to make sure that data scientists work together with clinical and business leadership in order to reap true value from analytics

What's next… back to Big Data

As IT, we continuously have to focus on the problem our organization is tying to solve and have to consider whether specific sources of healthcare big data could significantly improve our current analytics effort

A step forward in our journey to Big Data:

(Gartner's reference table)

- ✓ Physicians free text notes
- ✓ Patient-Generated Health Data (PGHD)
- ✓ Genomics
- ✓ Physiological monitoring data
- ✓ …..

You have to make sure that data scientists work together with clinical and business leadership in order to reap true value from analytics

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Thank you

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¡gracias

Grazie

Ευχαριστώ

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merci