Today Medicine challenges

- Increase of elderly people
  - Cronical diseases
  - Cardiovascular diseases
  - Cancer
  - Neuropathologies
- Infectious diseases
- Genetic causes of diseases
- Diseases prevention (epidemiology)
- Rehabilitation
- Home care monitoring and surveillance
- Citizens/patients ask more medical information
Needs of health Care and biomedical research

- Knowledge, information and data sharing and accessing for better management, control and maintaining high standards of Treatment and Care process;
- Population ageing with chronic diseases and necessity of continuously treatments, care and rehabilitation;
- Globalization of health, as market and request of more qualified health services.

Change of Paradigm

- Cost containment
- Changing demographies
- Peripheralization of Health care delivery
- Changing disease patterns
- Impact of ICT in supporting clinical decisions
- More informed and expectant patients
- Well-being factor (wellness paradigm)
- Moving information and knowledge
- Creation of health network
ICT in Health Care

Growing

- Globalisation
- Health care economics
- Patient process
- Medical profession
- New technologies (mobile videophone, mobile networks)

Information data and documents in Hospital/Health Organization

- More than 50% of activities in health care is data management

Information:
- on patient
- on structures
Medical Informatics

Methods and systems for electronic:

- Acquiring
- Exchanging
- Processing
- Management of
  - MEDICAL DATA present in:
    RECORDS, DATABASE AND INFORMATION SYSTEMS OF
    HEALTH CARE STRUCTURES (HOSPITAL OUTPATIENTS
    CLINICS, GP's......)

Medical record (BLOIS 1984)

Set of patient information useful to diagnosis and care at different level:
- outpatient clinic
- hospital
- emergency
- GPs
- ........

Clinical database
Set of medical records of different patients, useful for clinical research and epidemiological studies.
Health/Hospital Information Systems

- ADT
- Wards
- Outpatient clinic
- Diagnostics/therapeutical divisions;
- Emergency care
- GPs
- Public Health Services
- Epidemiology Networks
- ..................
Focus

- Medical record
  - Electronic patient record
  - Patient data card
  - .......
    - Record linkage
    - Integration of health database
    - Epidemiology
    - Evaluation of care and structures quality
    - Clinical research
    - Networking
    - Telemedicine (teleconsulting/telediagnosis)
    - Teleassistance/telemonitoring
    - Internet in health care
    - Medical www

INTEGRATION OF DIFFERENT BIO-MEDICAL DATA

At various levels for ‘personalized’ health care

- Molecule
- Cell
- Tissue
- Individual person (Clinical practice)
- Population (Epidemiology, Public Health)
Interaction

Synergy between Medical Informatics -MI & BioInformatics - BI
BioMedical Record Linkage: Synergy between MI and BI

Molecular Biology \rightarrow Genetic Data Banks

Method

Pattern matching

Computerization of Medical Record \rightarrow Clinical Data base

Integration/Interaction of Clinical-Genomics Data

Clinical Information Sources
(demographist, history, physiological, lab data images, signals, etc)

Clinical Information model and Ontology | Data Extraction Gateways
---|---
Data Mining, DSS Visualization | Genomic Data Models

Genomics engine

Genomic data sources
(DNA sequences, Gene Expression Profiles, etc)
Common Language and Communication

- Same coding and classification systems
  - ICD9CM/ICD10 (for diagnosis)
  - SNOMED CT (Clinical Terms)
  - ACR-NEMA (for Radiological Referals)
  - Tesauri of Terms
  - Ontology
  - .......

- Using ICT Standards
  - DICOM
  - HL7/CDA
  - XML
  - Protégé
  - Etc.
Another Project for
Translational Approach in Cancer Epidemiology, Research and Treatment

And the Network for Cancer registries in some Countries
Towards a BIG DATA Integration in DIABETES

Web Service Interface
(for Navigation and Query on Relations between tests/diagnosis/outcome)

Internet Connection

• Databanks
• Literature
• Genomics Data
• Guidelines
• ...

VPN Connection

• Clinical DB
• Images DB
• DT Protocols
• Ontologies
• Epidemiological Registers

• Knowledge Base
(Diabetes, ocular, Cerebrovascular Diseases, ecc)

• Ontologies
• Epidemiological Data

Medical informatics

Health telematics (telemedicine)

e-Health

e-health includes:

- medical information systems,
- public health surveillance,
- e-learning for health professionals,
- telehomecare
- telemedicine
e-Health

Access to care

- Telemedicine
- Teleconsultation
  - Home care
  - Monitoring

Quality of care

- Image assistant by computers
- Continuous education
- E-prescription

- Electronic health record
- Digitalized health system
- Hospital information systems
- Regional networks
- E-reimbursement/procurement
- Smart cards

Technology CONVERGENCE
DEFINITION OF TELEMEDICINE

The definition of telemedicine adopted by an international consultation group convened by the WHO in Geneva in December 1997 says:

“Telemedicine is the delivery of health-care services, where distance is a critical factor, by health-care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, and for the continuing education of health-care providers as well as research and evaluation, all in the interests of advancing the health of individuals and their communities.”

Internet in medicine

- Diffusion of Internet services in healthcare;
- Building of web sites and portals in medicine fields;
- Sharing and accessing to clinical information (protocols of care, guidelines, etc.);
- Teleconsulting and telediagnosis in peripherical health structures and also at home (Telemedicine).
TELEMEDICINE METHODS and Services

<table>
<thead>
<tr>
<th>Method</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teleconsulting</td>
<td>clinicians ← clinicians → clinicians</td>
</tr>
<tr>
<td>Telediagnosis</td>
<td>clinicians ← phisicians → physicians</td>
</tr>
<tr>
<td>Telemonitoring</td>
<td>clinical centers ← patients</td>
</tr>
<tr>
<td>Telesurveillance</td>
<td>health structure ← patients</td>
</tr>
<tr>
<td>Tele-emergency</td>
<td>first aid ← health operators (ambulances) → patients</td>
</tr>
</tbody>
</table>

TELEMEDICINE APPLICATIONS

The main application areas of telemedicine systems are:
- telehomecare and telecardiology,
- teleradiology,
- telepathology
- teleophthalmology
- ........
- TeleHome Care

(There are other specialties that use telemedicine services, as teledermatology, telesurgery, telepsychiatry etc., but these are poor of applications at moment).
Tele-Cardiology

TeleRadiology
Teleophthalmology

Device

Retinograph ➔ JPEG IMAGE OF RETINA
TELECARE

- Tele-Home Care allows to offer medical assistance to the patients directly to their home
- Tele-Home Care may improve the quality of life of patients
- Home-care and community based health service are becoming an increasingly important part of the healthcare services, allowing the so called “Continuity of care”

Telemonitoring - TeleHomeCare
T-Care Project

T-Care is an innovative integrated system in order to support and to favour the independent living of the elderly or disabled people, especially those suffering with chronic diseases, in the meanwhile ensuring them timely health assistance, alert, using a basic home appliance like a TV as a main user interface.

Communication tools

◆ Mobile phones or Smart Phones / PDA connected with the simple biomedical devices for “at home” data acquiring and data transmission;
Horizon 2020 What's new

- **A single programme** bringing together three separate programmes/initiatives*
- **Coupling research to innovation** – from research to retail, all forms of innovation
- **Focus on societal challenges** facing EU society, e.g. health, clean energy and transport
- **Simplified access**, for all companies, universities, institutes in all EU countries and beyond
H2020:

- Excellent Science
- Industrial leadership
- Societal challenges

EIT:
- Spreading Excellence and Widening Participation
- Science with and for society
- Joint Research Center (JRC)
ICT in Horizon 2020

ICT & “Societal Challenges”

Addressed essentially through the “Excellency in Science” and LEIT initiatives

E.g., “Smart cities” (SC3) e “Ageing” (SC1) are in these “cross-cutting” challenges

8. Health, demographic change and wellbeing

1. Understanding health, ageing and disease PHC 1-3
2. Effective health promotion, disease prevention, preparedness and screening PHC 4-9
3. Improving diagnosis PHC 10-12
4. Innovative treatments and technologies PHC 13-18
5. Advancing active and healthy ageing PHC 19-22
6. Integrated, sustainable, citizen-centred care PHC 23-29
7. Improving health information, data exploitation and providing an evidence base for health policies and regulation PHC 30-34

(PHC= personalising health and care)
Personalising health and care PHC

- Effective health promotion, disease prevention, preparedness and screening
  - PHC 4 – 2015: Health promotion and disease prevention: improved inter-sector co-operation for environment and health based interventions .................................................. 10
  - PHC 5 – 2014: Health promotion and disease prevention: translating ‘omics’ into stratified approaches ......................................................................................................................... 11
  - PHC 6 – 2014: Evaluating existing screening and prevention programmes ........................................................................................................................................................................................................................................ 12
  - PHC 7 – 2014: Improving the control of infectious epidemics and foodborne outbreaks through rapid identification of pathogens (see also societal challenge 2) .................................................................................................................. 13
  - PHC 8 – 2014: Vaccine development for poverty-related and neglected infectious diseases: Tuberculosis ........................................................................................................................................................................ 15

Personalising health and care PHC

- Improving diagnosis ........................................................................................................................................................................................................................................ 18
  - PHC 11 – 2015: Development of new diagnostic tools and technologies: in vivo medical imaging technologies ........................................................................................................................................................................................................................................ 19
  - PHC 12 – 2014/2015: Clinical research for the validation of biomarkers and/or diagnostic medical devices ........................................................................................................................................................................................................................................
Personalising health and care PHC

- Innovative treatments and technologies
  - PHC 13 – 2014: New therapies for chronic non-communicable diseases ........................................ 22
- PHC 14 – 2015: New therapies for rare diseases .................................................................................. 23
- PHC 15 – 2014/2015: Clinical research on regenerative medicine .......................................................... 24
- PHC 16 – 2015: Tools and technologies for advanced therapies ............................................................ 25
- PHC 17 – 2014: Comparing the effectiveness of existing healthcare interventions in the elderly ........ 26
- PHC 18 – 2015: Establishing effectiveness of health care interventions in the paediatric population ................................................................................................................................. 28

---

Personalising health and care PHC

- Advancing active and healthy ageing
  - PHC 19 – 2014: Advancing active and healthy ageing with ICT: Service robotics within assisted living environments ........................................................................................................... 29
- PHC 20 – 2014: Advancing active and healthy ageing with ICT: ICT solutions for independent living with cognitive impairment ................................................................................................................. 30
- PHC 21 – 2015: Advancing active and healthy ageing with ICT: Early risk detection and intervention ................................................................................................................................. 31
- PHC 22 – 2015: Promoting mental wellbeing in the ageing population ........................................... 32
Personalising health and care PHC

- Integrated, sustainable, citizen-centred care
- PHC 23 – 2014: Developing and comparing new models for safe and efficient, prevention oriented health and care systems: ................................................................. 33
- PHC 24 – 2015: Piloting personalised medicine in health and care systems ......................................................... 34
- PHC 25 – 2015: Advanced ICT systems and services for Integrated Care ............................................................... 35
- PHC 26 – 2014: Self-management of health and disease: citizen engagement and mHealth ........ 37
- PHC 27 – 2015: Self-management of health and disease and patient empowerment supported by ICT ........................................................................................................................................ 40
- PHC 28 – 2015: Self-management of health and disease and decision support systems based on predictive computer modelling used by the patient him or herself ......................................................... 42
- PHC 29 – 2015: Public procurement of innovative eHealth services ................................................................. 43

Personalising health and care PHC

- Improving health information, data exploitation and providing an evidence base for health policies and regulation .................................................................
- PHC 30 – 2015: Digital representation of health data to improve disease diagnosis and treatment ................................................................. 45
- PHC 31 – 2014: Foresight for health policy development and regulation ................................................................. 46
- PHC 32 – 2014: Advancing bioinformatics to meet biomedical and clinical needs ............................... 47
- PHC 33 – 2015: New approaches to improve predictive human safety testing ........................................ 49
- PHC 34 – 2014: eHealth interoperability ................................................................. 50
Personalising health and care PHC
Co-ordination activities

- HCO 1 – 2014: Support for the European Innovation Partnership on Active and Healthy Ageing ............................................................... 61
- HCO 3 – 2015: Support for the European Reference Networks: Efficient network modelling and validation .................................................................................................................................................................................................................................................. 64
- HCO 4 – 2014: Support for international infectious disease preparedness research ................................................................. 66
- HCO 6 – 2015: Global Alliance for Chronic Diseases: 2015 priority ................................................................................................................................. 71
- HCO 7 – 2014: ERA-NET: Establishing synergies between the Joint Programming on Neurodegenerative Diseases Research and Horizon 2020 ................................................................. 71
- HCO 8 – 2014: ERA-NET: Aligning national/regional translational cancer research programmes and activities ........................................................................................................................................................................................................................................... 72
- HCO 9 – 2014: ERA-NET: Systems medicine to address clinical needs ................................................................................................................................. 74
- HCO 10 – 2014: ERA NET: Rare Disease research implementing IRDiRC objectives ................................................................................................................................. 75
- HCO 11 – 2015: ERA-NET: Collaboration and alignment of national programmes and activities in the area of brain-related diseases and disorders of the nervous system ................................................................................................................................. 76
- HCO 12 – 2015: ERA-NET: Antimicrobial Resistance ................................................................................................................................. 78
- HCO 13 – 2015: ERA-NET: Cardiovascular disease ................................................................................................................................. 80
- HCO 14 – 2014: Bridging the divide in European health research and innovation ................................................................................................................................. 81
- HCO 15 – 2014: Mobilisation and mutual learning action plan ................................................................................................................................. 82
- HCO 16 – 2014: National Contact Points ........................................................................................................................................................................................................................................... 83
Personalising health and care PHC
Other actions

- HOA 1 – 2014/2015: Subscription fee: Human Frontier Science Programme Organisation ........ 89
- HOA 2 – 2014/2015: Tenders for programme evaluation, studies and impact assessment and for conferences, events and outreach activities. ................................................................. 89
- HOA 3 – 2014/2015: Presidency events - eHealth ................................................................. 90
- HOA 4 – 2014/15: Independent experts assisting in proposal evaluations and project reviews ... 90
- HOA 5 – 2014: Grant to the Global Alliance for Chronic Diseases ......................................................... 90
- HOA 6 – 2014: Stem cell research outreach ........................................................................ 91
- HOA 7 – 2015: eHealth Sectoral Inducement Prize ................................................................. 92
- HOA 8 – 2015: Inducement prize ...................................................................................... 93

Calls dealing with the eHealth domain:

1. Calls with deadline **15 April 2014**:
   - PHC-19-2014
   - PHC-26-2014: Self-management of health and disease: citizen engagement and health (this call includes the *mHealth* topic);
   - PHC-34-2014: eHealth interoperability.

-------
2. Calls with deadline 21 April 2015:

- PHC-25-2015: Advanced ICT systems and services for integrated care;
- PHC-27-2015: Self-management of health and disease and patient empowerment supported by ICT;
- PHC-28-2015: Self-management of health and disease and decision support systems based on predictive computer modelling used by the patient him or herself;
- PHC-29-2015: Public procurement of innovative eHealth services;

These calls are all 'single stage':
only one evaluation round instead of two.
Ogni call è caratterizzata da

Topic Description

Topic Conditions & Documents

Submission Service
International cooperation actions / 2014-2015 (overall budget 27 M€)

- Coordinated calls
  - •EU-Brazil (7 M€)
  - •Cloud computing, including security aspects
  - •High performance computing
  - •Experimental platforms

- •EU-Japan (6 M€)
  - •Technologies combining big data, internet of things in the cloud
  - •Optical communications
  - •Access networks for densely located users
  - •Experimentation and development on federated Japan-EU testbeds
  - ► Warning: still subject to Commission Decision
  - •International partnership building and support to dialogues with high income countries (USA, Canada, East Asia and Oceania) (3 M€)
  - •International partnership building in low and middle income countries (11 M€)

EU-Japan Research and Development Cooperation in Net Futures

- •• EUJ 1 – 2014: Technologies combining big data, internet of things in the cloud
- •• EUJ 2 – 2014: Optical communications
- •• EUJ 4 – 2014: Experimentation and development on federated Japan – EU testbeds
EU-Brazil Research and Development Cooperation in Advanced Cyber Infrastructure

- EUB 1 – 2015: Cloud Computing, including security aspects
- EUB 2 – 2015: High Performance Computing (HPC)
- EUB 3 – 2015: Experimental Platforms