Deployment of Integrated Care Services for Chronic Patients Supported by Information and Communication Technologies

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Disclosures

No relevant commercial interests
Agenda

- Healthcare in Catalonia
- Integral HealthCare area. Barcelona Esquerra
- Lessons learnt from deployment of Integrated Care
- Adaptive case management strategies
- The Nextcare project
Population 2017: 46,076,289
Life expectancy: 79.6 for males and 85.6 for females
Historical and political context

- Social Security reform: 1977
  *Separation of economic services from healthcare services*

- Catalunya’s autonomy statute: 1979

- Decentralization of the state: 1981
  *Transfer of responsibility for regional healthcare to the Catalan Autonomous Government*

- National Healthcare system. Universal Coverage
  *Progressive change in the Financing system*

- Catalunya’s autonomy statute: 2006
Catalonia
7.5 million inhabitants
GDP 108%
Rank 82
Healthcare system ranks 18

Gross Domestic Product (GDP) in purchasing power standards per EU regions in % EU28 average= 100
Health Plan for Catalonia 2016-2020

Health across all policies

1. Persons, their health and Health System
2. Healthcare professionals involvement

3. Public Health
4. Accessibility & Performance
5. Drugs & Pharmaceutical Policy
6. Integrated & Chronic Care
7. Health Research & Innovation

8. Excellence & Safety
9. Outcomes Evaluation & Transparency
10. Digital Health
11. Territorial Integration

12. Cross-ministerial and cross-sectoral policies

Generalitat de Catalunya
Departament de Salut
Government of Catalonia
Ministry of Health

Priority Areas & Strategic Projects

Vulnerable infants & teenagers
Elderly & people with disabilities
Mental Health
Minority Diseases
Communicable Diseases
Osteo-articular System
Respiratory System
Vascular System
Cancer
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Healthcare in Barcelona is provided in the framework of the public health system based on the model of the National Health Service.

The organization is structured in four integrated health areas, one of which is the Integrated Health Area of Barcelona Esquerra (Área Integral de Salud de Barcelona Esquerra – AIS-BE).
Barcelona Esquerra

534,955 inhabitants
21% > 65 years

19 Primary Care Teams
4 Hospitals
Hospital vs Territorial Healthcare

HOSPITAL

Process Units

Transplant

CHF

COPD

Dementia

Community Care

Territorial Healthcare

Family physician

Nurse

Social worker

Home care

Organisational model

Territorial Health Care Commission
Barcelona Esquerra

Institutions -- Permanent Commission -- Technical Secretariat

Operating Committees:
- Accidents & Emergency
- Social-healthcare
- Healthcare transport
- Poor patient coordination
- Pharmacy

Cardiology processes
Endocrinological processes
Mental health processes
Vascular processes
Organisational model

- Deployment Clinical Groups, over 150 meetings a year and involving about 400 professionals.

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<thead>
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<th>Reordering Specialized Care (RAE):</th>
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<tr>
<td>❖ Vascular Surgery</td>
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<td>❖ General Surgery</td>
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<td>❖ Cardiology</td>
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<td>❖ Pneumology</td>
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<td>❖ Emergencies</td>
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<td>❖ Sanitary Transport</td>
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<td>❖ Mental Health</td>
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<td>❖ Information Systems</td>
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<td>❖ Pharmacy</td>
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<td>❖ Pediatric Care</td>
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<td>❖ Chronic Disease Care</td>
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<td>❖ Tropical Diseases</td>
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<td>❖ Sexually Transmitted Infections</td>
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Chronic Care Model

World Health Organization – Innovative Care for Chronic Conditions – 2002

Community
Resources and Policies

Health System
Health Care Organization

Self-Management Support

Delivery System Design

Decision Support

Clinical Information Systems

Informed, Activated Patient

Productive Interactions

Prepared, Proactive Practice Team

Improved Outcomes

Wagner EH, Austin BT, Von Korff M. Organizing care for patients with chronic illness. Milbank Q 1996;74(4):511-44
However, it can not work alone

Cochrane Database of Systematic Reviews 2015, Issue 9. Art. No.: CD002098

TECHNOLOGY IS A NOT A DEBATE
Integrated Care Services are the core component of the care model for chronic patients

An Integrated Care Service is an articulated set of standardized actions aiming at covering the patient’s health needs, taking into account his/her environment and conditions

- Patient-centered, not necessarily disease-centered
- Designed to achieve target health goals within a comprehensive plan for the patient. Based on process design with a longitudinal approach which duration varies for each service
- A patient can be assigned to one or more integrated care services
Assessment of deployment of 4 Integrated Care Services

- Wellness and rehabilitation
- Enhanced care for frail patients
- Home hospitalization
- Remote support for diagnosis

EU Grant 225025; CIP-PSP Program. 2008-2013
Deployment of the Integrated Care Model

Service model

- Target patients
- Management by programs
- Well standardized interventions
- Patient-centered care

Patient

Patient Gateway

Support center

providers network

- Triage
- Self-management
- Remote monitoring
Deployment of the Integrated Care Model

Integrated Care model

Work plan definition

Normalisation of practices
Reallocation of roles
ICT application

Follow-up & event handling

Discharge
Home Hospitalization/Early Discharge

Transitional Care

Patients with complex medical conditions
We defined Home Hospitalization/Early Discharge as a service providing acute, home-based, short-term complex interventions aiming at fully (Home Hospitalization) or partially (Early Discharge) substituting conventional hospitalization.

The service was delivered by trained hospital personnel for a period of time that should not be longer than the expected length of hospital stay for the patient’s diagnostic related groups involved.

The Hospital retained clinical, fiscal, and legal responsibility for the pharmaceutical input, medical supervision, and nursing care of the hospital at the patient’s home.

Shepperd S, et al. (2011) and Goncalves-Bradley DC, wt al (2017) Cochrane Database
Hospital at Home: Feasibility and Outcomes of a Program To Provide Hospital-Level Care at Home for Acutely Ill Older Patients

Bruce Leff, MD; Lynda Burton, ScD; Scott L. Mader, MD; Bruce Naughton, MD; Jeffrey Burl, MD; Sharon K. Inouye, MD, MPH; William B. Greenough III, MD; Susan Guido, RN; Christopher Langston, PhD; Kevin D. Frick, PhD; Donald Steinwachs, PhD; and John R. Burton, MD

Ann Intern Med 2005;143:798-808


Home hospitalisation of exacerbated chronic obstructive pulmonary disease patients.


Servei de Pneumologia (ICPCT), Hospital Clinic, IDIBAPS, Barcelona, Spain.

Segura
Coste efectiva en grupos de pacientes seleccionados
Influye el tipo de intervención y los profesionales involucrados
Hospital in the Home

The Hospital in the Home (HITH) service provides hospital-level care for patients in their home environment. It is a safe and efficient substitution for acute in-hospital care for a wide range of conditions.
The Ironic Business Case For Chronic Care In The Acute Care Setting

Patients with chronic illnesses already have an impact on the financial health of hospitals—and that impact is growing.

by Albert L. Siu, Lynn H. Spragens, Sharon K. Inouye, R. Sean Morrison, and Bruce Leff

Health Affairs 28, nº 1 (2009):113-125; 10-1377

Portafolio services:
- Day hospital
- Short stay unit
- Hospital at home
- Transitional care
- Home care (long term)
- Paliative Care
- Nursing home
- Etc..
Objective – To evaluate implementation and 10 years follow-up of Home Hospitalization (HH) and Early Discharge (ED) as an ICS into an urban healthcare district in Barcelona (ES).

Design – Prospective study with pragmatic assessment of the deployment of HH/ED. Setting and patients: Surgical and medical acute and exacerbated chronic patients requiring admission into a highly specialized hospital (Hospital Clinic).


Intervention – Home hospitalization for a period equivalent to the hospital stay for the DRG. Integrated care intervention

Target variables – Reduction of days of in-hospital hospital stay, early readmissions, visits to emergency department, 30-day mortality, costs

Safe and effective – for acute and chronic patients. Average savings of 5 inhospital days per patient. Early readmissions 10%; mortality 0.3% during admission and 2% at 30 days post-discharge. Increased complexity over time with identical outcomes.

Synergies – High potential for coordination with other integrated care services for chronic patients. High degree of satisfaction of both patients and families. Initial resistance in hospital staff and primary care professionals that decreased through the implementation period.

Sustainability – Cost reduction at health system level and acceptable balance for the provider.
Objective 3

Assessment of home hospitalization and early discharge at the Hospital Clinic of Barcelona

Contributions

✓ Safe and cost-effective alternative to conventional hospitalization for properly assessed patients
✓ It requires highly prepared personnel
✓ The building blocks strategy for deployment allowed increase of complexity over time
✓ It should be considered in the portfolio of integrated care because of its potential for synergies with other services

Strengths and limitations

✓ Development and assessment as a real world service
✓ Low level of academic evidence because of the study design

Future areas of development

✓ Generalization and expansion of the service
✓ Adaptation to community based integrated care services
✓ Innovation of the service at tertiary hospital level
✓ Implementation of reimbursement modalities generating incentives
Transitional Care

Patients with complex medical conditions
Transitional Care

**Transitional care** – range of *time limited* services and environments that *complement others interventions* and are designed to ensure health care continuity and avoid preventable poor outcomes among *at risk* populations as they move from one level of care to another, among multiple providers and across settings.
Transition can be challenging

RAUL'S DIFFICULT TRANSITION INTO THE WIRELESS AGE
Evidence-based Models

- Care Transitions Intervention℠
- Transitional Care Model
- Bridge Program
- BOOST (Better Outcomes for Older Adults through Safe Transitions)
- GRACE (Geriatric Resources for Assessment and Care of Elders)
- Guided Care®

Mejorar las transiciones es un proceso complicado y multifactorial

Naylor et al

- Mejor estratificación de la complejidad
- Las alternativas a las hospitalizaciones convencionales
- La figura de la enfermera de práctica avanzada
- Equipo multidisciplinario que acompaña al paciente
- Comunicación entre proveedores
- Planificación del alta
- Estandarizar las transiciones, soporte 24 h/7 días
- Equipos preparados
- Si el paciente reingresa, preguntar el porqué

Coleman EA et al

- Una única intervención no es útil y cada paciente puede necesitar la combinación de varias actuaciones y estas pueden variar a lo largo del tiempo.
- Hacer mucho por muy pocos y poco para la mayoría, no tiene impacto en el sistema.
- Cambios importantes centrales en la calidad, eficiencia, seguridad, confort y la opinión del paciente.
Modelo de provisión.
Marco organizativo y funcional

Level 3
Complex co-morbidity 3 – 5%

Level 2
Poorly controlled single condition – 15–20%

Level 1
Self-Management
70-80% of LTC

Level Zero

Population Wide Prevention, Health Improvement & Health Promotion

Intensive Case/Care Management
Disease/care Management
Self management
Inequalities Targeted High Risk Primary Prevention

www.Kaiserpermanente.org
La mayoría de las intervenciones enfermeras están dirigidas a los pacientes con alto riesgo de reingreso.

Las visitas a UCIAS son de bajo riesgo.
Figure 1. Thirty-Day Readmissions by Day (0-30) Following Hospitalization for Heart Failure, Acute Myocardial Infarction, or Pneumonia

COPD
Conclusions and Relevance: Self-reported direct communication between inpatient and outpatient providers occurred at a low rate but was not associated with readmissions. This suggests that enhancing interprovider communication at hospital discharge may not, in isolation, prevent readmissions.
Reduction of Hospital Utilization in Patients With Chronic Obstructive Pulmonary Disease

A Disease-Specific Self-Management Intervention

Type of professionals?

Type of intervention?

Patients?

Arch Intern Med. 2003;163:585-591
There are No “Silver or Magic Bullets”!


The meaning of fragility and Complexity are unclear
YOU CAN DO ANYTHING, BUT NOT EVERYTHING.

- David Allen

“ALONE WE CAN DO SO LITTLE; TOGETHER WE CAN DO SO MUCH.”

- Helen Keller
Objective - Analysis of effectiveness of the service provided by the community teams

Design – Randomized Controlled Trial (1:1) in frail COPD patients with high hospitalization risk (n=155)

Area - Barcelona - Esquerra

Intervention – Integrated care with remote support of specialized nurses. Active follow-up during 12 months and passive during 6 years

Target variables – Hospital admissions, emergency department visits and mortality

### Transfer of prevention of hospitalizations in high risk COPD patients to the community

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<tr>
<th></th>
<th>OR* (95% CI)</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Hospital admissions due to exacerbations</td>
<td>2.17 (0.60-7.87)</td>
<td>0.237</td>
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**No reduction in the number of hospitalizations**

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<tr>
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<th>OR* (95% CI)</th>
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</thead>
<tbody>
<tr>
<td>Emergency room admissions due to exacerbations</td>
<td>0.33 (0.13-0.84)</td>
<td>0.020</td>
</tr>
<tr>
<td>Mortality by all-causes</td>
<td>0.36 (0.14-0.93)</td>
<td>0.034</td>
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* Adjusted for baseline differences between UC and IC group (influenza and pneumococcal vaccination)

### Reduction of visits to the Emergency Department and reduced mortality

- Improvement in self management of the disease and quality of life (p=0.02).
- Reduction of anxiety and depression (p=0.001) and major satisfaction of the patients (p=0.02) at 12 months.
Transfer of prevention of hospitalizations in high risk COPD patients to the community

Contributions

✓ Displayed the problems for generalization of RCT results
✓ Identified two key factors for a successful deployment at community level:
  Preparation of health professionals
  Prediction of individual risk and patient stratification

Strengths and limitations

✓ High level of evidence – RCT
✓ Highly representative study group
✓ Problems of generalization shown by RCTs

Future areas of development

✓ Development of risk prediction and stratification tools
✓ Implement innovative strategies for workforce preparation
Design and assessment of Integrated Care Services

historical evolution of the research team

Assessment of deployment of 4 Integrated Care Services

- Wellness and rehabilitation
- Enhanced care for frail patients
- Home hospitalization
- Remote support for diagnosis

EU Grant 225025; CIP-PSP Program. 2008-2013
Analysis of lessons learned in the NEXES project

**Welness and Rehabilitation**
*(Pragmatic design - Barcelona and Athens)*
*(Randomised Controlled Trial - Trondheim)*

**Enhanced care for frail patients with high risk for hospitalization**
*(Randomized Controlled Trials - Barcelona, Athens y Trondheim)*
*(Additional trials in en Barcelona)*

**Home hospitalization and early discharge**
*(Pragmatic design - Barcelona)*
*(Randomized Controlled Trial - Athens)*
*(No deployment - Trondheim)*

**Remote support for high quality diagnosis in primary care**
*(Randomized Controlled Trial - Barcelona)*
*(Observational study - Trondheim)*
*(No deployment - Athens)*
Organizational heterogeneity of the sites

*(transferability potential)*

**Trondheim**
- Driven by Primary Care
- Extensive and simultaneous transformation of clinical, technological and organizational aspects in the Norwegian pilot for the implementation of the Health System Reform

**Barcelona**
- Driven by a tertiary care hospital with high potential for scalability at regional level within the Catalan Health Plan
- The implementation of organizational changes in the reform of specialized care took place independently of the NEXES project

**Athens**
- Driven by a tertiary care hospital without a frame for change of the healthcare model
Welness and Rehabilitation

- Positive results in Barcelona
- Efficacy, relevance and high transferability potential
- Need for design and evaluation of cost-effective services
- Factors not related to the intervention explain the lack of results in Athens and Trondheim

Enhanced care for fragile patients

- Positive results in Athens
- The Barcelona trial showed efficacy, transferability potential and the need for training of professionals, risk assessment and stratification
- Need to articulate 4 sub-services:
  - Hospitalization prevention in high-risk patients
  - Support post-discharge
  - Management of complex stable patients
  - Palliative care
Analysis of lessons learned in the NEXES project

Home hospitalization

- Positive results in Barcelona and Athens
- Effectiveness, synergies with other services and transferability
- Potential limitation for deployment in areas (Norway) with insufficient collaboration between hospital and primary care, two different payers, and inadequate ICT support

Remote support for diagnosis

- Positive results in Barcelona and Trondheim
- Cost-effectiveness demonstrated
- Regional deployment ready
- Potential for transferability and generalization to other medical specialties
The ICT model is a relevant element for the success of the deployment.

Implementation of an integrated reimbursement system ("bundle payment")

Development of a business plan with shared risks among actors

Reinvestment of cost-savings in innovation of services and ICT

The randomized controlled trials assess efficacy, but show important limitations for assessment of deployment of the services.
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The electronic health record must be adapted to healthcare professionals' needs and it must be interoperable across healthcare layers and providers to facilitate collaborative tasks.
Planning at run-time is a fundamental characteristic of case management using well structured service flows. This implies the selection and scheduling of specific tasks for a case, and ad-hoc collaboration with other case managers on the task.

Decisions may be triggered by expected and unexpected events or new facts, such as completion of certain tasks or milestones or emergency room entry.

Long-term Oxygen Therapy - Collaborative Case Management is appropriate

Key unsolved needs
- Appropriateness of prescription
- Treatment adherence
- Interactions among actors

Patient

Personal Health Folder

Ambulatory Care Management

Specialists

Inpatient Care Management

Logistics & Administration

Hospital staff

Social worker

Social assistance Management
**Evaluation of the Long-Term Oxygen Therapy (LTOT) program at Barcelona-Esquerra**

**Objective**
- Analysis of prescriptions and adherence to LTOT
- Assessment of health status with emphasis on frailty and complexity
- Evaluation of need for integrated care

**Area**
- Barcelona Esquerra-Eixample

**Design**
- Observational cross-sectional

**Method**
- Structured questionnaires (*covering the 5 WHO domains*)
- Arterial respiratory blood gases, forced spirometry, hand-grip strength

**Target variables**
- Adequacy of prescription and adherence to LTOT
  - Health status
  - Frailty and complexity

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Socio-demographic and clinical characteristics of the study

- 62% moderate dependency
- 66% severely frail
- 35% anxiety
- 42% depression

Socio-demographic
- 67% > 75 yrs
- 13% social risk

Patient’s dependence factors

Risk factors and treatment

- 70% Ex-smokers
- 35% Obesity
- 43% walks 2 o 3 times a week
- 9 different types of pharmacological treatments

Healthcare related factors

- 34% specific control of LTOT
- 78% Emergency room (entry point)
- 36% ≥2 admissions
- 7% educational programs

Chronic Conditions

- 70% ≥1 chronic conditions
- Charlson Index 5±2
Evaluation of the Long-Term Oxygen Therapy (LTOT) program at Barcelona-Esquerra

- Adequacy of LTOT prescription (47%) and suboptimal adherence (67%)
- Need for re-design of the LTOT program

- Need for change in patient management increasing the role of community-based professionals

- Need for health individualized health risk prediction and stratification

- Need for elaboration of an operational definition of frailty
Clinical case

Socio-demographic

72 yrs, Live alone

Should we focus on LTOT ?, or …

Patient's dependence factors
Ex smoker (50 p/yr)
Sit all day
MRC: 3
IMC: 29.9
6 different treatments
LTOT (8 hrs/day)

Healthcare related factors
Follow up: 3 m
Home Care programs: NO
Therapeutic educational programs: NO
Rehabilitation: NO
Blood gases: pH: 7.44; PaO2:45, PaCO2: 38.5
6MWD: 76 % SatO2 without oxygen (final test).
Distance: 360 m
4 Hospital admissions

Should we focus on the patient?

Risk factors and treatment

Chronic Conditions
COPD
4 comorbid conditions
Evaluation of the Long-Term Oxygen Therapy (LTOT) program at Barcelona-Esquerra

Contribution

✓ Provides the bases for a change in management of complex patients based in the community
✓ The design of the LTOT program may help to fill current gaps

Strengths and limitations

✓ Comprehensive evaluation of these patients provided the information needed for the re-design of novel integrated care services
✓ 30% of the patients could not be evaluated

Future areas of development

✓ Re-design and evaluation of a new integrated care service
✓ Elaboration of an operational definition of frailty
✓ Regional deployment of the novel integrated care service
What have we learnt?

Multiple information sources and not always available
High patient turnover
Multiple prescribers (*even outside the region or private*)
Need for alignment among pneumologists
Fragmentation between levels of care
Uncovered needs
Importance of administrative support

Engagement of management should improve
Interoperability of ICT is a must
Roles of professionals should be clarified
Shared-Care should be adopted
Bundle payment systems should be explored
Conclusions

- Integrated Care shows high potential for generation of healthcare efficiencies; but its extensive deployment and adoption remains a challenge.

- Investigations to generate further evidence on efficacy of specific interventions, as well as on extensive deployment of integrated care are needed.

- Scale-up of integrated care will necessarily require incorporation of methodological approaches based on Implementation Research.

- The organizational change, including new profiles of professionals, are core components for successful deployment of integrated care.
A new Vision
Some ideas

“The face of health care is changing and as health care providers we must rise to the challenge.”

– Angie Chlupka
Cooperation between levels of care and services providers

The RIGHT patient, the RIGHT therapy, the RIGHT time and the RIGHT professionals

Needs to be delivered every time and something has to change
Areas for improvement

- Service evaluation
- Risk assessment/stratification and service selection
- Service workflow definition and execution

Which services are more efficient and which are the most interesting in the right term?
Please, get to know the patient better

- Socio-demographic characteristics
- Health care team and system-related factors
- Chronic conditions
- Risk factors and treatment
- Patient’s dependence factors

Goal-Oriented Patient Care — An Alternative Health. Outcomes Paradigm David B. Reuben, M.D., and Mary E. Tinetti, M.D.
“Nothing about me without me”
Patient Centered Care

“If we can view the health care experience through the patient’s eyes, we will become more responsive to patients’ needs and, thereby, better clinicians”
Continuous evaluation

- Survival
- Improvement rate (or conservation)
- Health status
- Recovery time
- Time to get back to “normal life”
- Relapses
- Long-term consequences

Value = \frac{Outcomes}{Cost}

IF "Plan A" Didn't Work. The alphabet has 25 more letters! Stay Cool.
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Regional deployment of ICT-supported integrated care services
design, evaluation and large scale implementation of five actions
aiming at generating healthcare-value at system level

Multimorbidity
(cardiovascular diseases; COPD; diabetes type II and anxiety-depression)
1. Service workflow definition
2. Risk assessment and service selection
3. Evaluation strategies
4. ICT as supporting tools of the services
   • adaptive case management
   • collaborative work
   • selective telemonitoring
Innovation contest