PROFITER
Prevention of falls initiative in Emilia-Romagna

Author/reference person
Lorenzo Chiari - University of Bologna - lorenzo.chiari@unibo.it

Background and aims / type of innovation

Building on a number of seminal regional initiatives involving different Local Health Trust, research institutions and industrial stakeholders, the PROFITER project aims to establish a regional network for falls prevention.

Falls are a major determinant of morbidity and mortality for the older population. Disabling injuries and fear of falling among the survivors seriously limit their participation in activities of social life and threaten their independence. According to the international scientific literature, falls affect almost one third of the population 65 or older (approximately 300.000 people in Emilia-Romagna). By means of the proposed actions we aim to reach 10% of this target population through informative initiatives, preventive programmes, direct screening through different levels of care (including the network of 3,134 general practitioners most of them already reached through the SOLE network) involving inpatients and outpatients.

The action will substantiate in the following steps: collection, digitalisation, and retrospective analysis, within the FSE (Electronic Health Record) of relevant fall-related information (Registro Regionale Cadute, RRC); development and validation of a personalised fall risk model, integrating known fall risk factors, clinical balance measures, and parameters extracted from wearable inertial sensors through appropriate epidemiological methods and psychometrically sound techniques; deployment and evaluation of tailored ICT-based solutions for fall detection and prevention; classification of fall risk factors according to the International Classification of Functioning, Disability and Health (ICF) to allow interoperability among different clinical specialties and, in perspective, across European Regions; mapping of the identified fall risk model into an operational programme for the prescription of personalized interventions and/or ICT-based assistive devices for falls prevention and rehabilitation in community dwelling older subjects; intensive monitoring of high-risk patients at hospital discharge; specific training for personal carers of high-risk subjects.

Models and operational programmes for fall risk estimation and prevention clearly represent key elements towards the headline target of increasing by 2 the average number of HLYs in the EU by 2020, affecting both duration and quality of life. Model-based ICT solutions for fall prevention also aim to shrink healthcare costs associated to hospitalization, medical treatments and personal carers. The use of up-to-date wearable sensors and innovative ICT platforms in a strategic public-private partnership will strengthen the industrial competitiveness of the regional Biomedical Cluster, will encourage existing SMEs to update their products towards emerging societal needs, and will stimulate new start-up initiatives.

The aim of the ICT solutions used in the PROFITER Project is to provide systems and services to support an evidence-based healthcare decision system. They are based on a wearable inertial sensor unit and/or a Smartphone/Tablet to collect and process data captured by the sensor. The Smartphone/Tablet platform has been used because of its high-level processing and interaction units. The Smartphone, beyond a mere communication tool, will also become a transparent companion ultimately able to early detect changes in the fall risk profile of its users and to timely involve carers and family, as and when needed. An ad hoc wearable monitoring unit has been also designed and will be validated on-field to assist high risk individuals in different settings and conditions. High risk patients with a high incidence of falls will include patients with advanced Parkinson's disease, dementia, epilepsy, stroke, multiple sclerosis, and also nursing home residents, rehabilitation inpatients who start to ambulate again.

This technological cocktail will allow the measurement and analysis of movement patterns, vital signs, and environmental/contextual information to identify fall risk factors (by means of gait variability, transfer capacity, sway analyses), and to provide instrumented version of well-accepted and standardized functional tests of mobility.

A set of advanced movement analysis and data processing techniques are being used to extract robust and quantitative information about the subject mobility skills. In essence, the systems used in PROFITER incorporates this quantitative methodology in the "art" of clinical practice, so as to make the framework for clinical decisions more objective by better reflecting the evidence from a quantitative data analysis.

PROFITER aims to develop a predictive model of mobility and risk of falls in elderly individuals by introducing and exploiting some unique features offered by pervasive but unobtrusive ICT solutions that are suitable for developing population-based approaches and new primary preventive strategies for community dwelling older persons.

The definition of evaluation procedures and testing protocols to assess the fall risk, as much independent as possible from the specific pathologies, can be considered as an innovation key point for the diffusion and the interoperability between clinical specialties. Moreover, the definition of restricted ICF domains and items should be considered as a major key point for the usability and diffusion of our initiative and to allow interoperability among different clinical specialties and, in perspective, across European Regions.

Scalability-replicability, trasferibility

It is clearly important to ensure wide dissemination of scientific and technological progress to many stakeholders, older people themselves being perhaps at the top of the list, but researchers, clinicians, technologists, policy makers, planners, commissioners and providers of services, and all players in the marketplace must be included. Traditionally scientific researchers and academics have published their results in scientific journals with little consideration of the impact this will have on the wider society, but this must change if we are to achieve significant advancement and implementation of knowledge into practice and the market. There must be good lines of communication between the players, SMEs or academics, and the results generated by a project such as PROFITER must be moved smoothly and in a timely fashion from "laboratory bench to bedside, or home" or more generally into the community. To date this has not always been the case. A number of communication channels do exist and probably the most useful in terms of breadth and reach is the internet.

The PROFITER dissemination strategy, strongly supported by the Region, targets individuals, large companies, SMEs and (local) governments to raise awareness, knowledge and skills.

The link with two European Thematic Networks (ProFound and eNoFalls) active on falls prevention and several European projects (FARSEEING-FP7, I don't Fall-CIP PSP, among others) will facilitate the transferability of results and good practices towards other European Regions.

Outcomes

The outcome is the implementation, within the next 3 years, of a regional collaborative model involving caregivers across at least 5 regional Local Health Trusts, researchers and technological providers. The care model will include innovative wearable devices integrated with the eHealth network used by the GPs and public hospitals already using the SOLE infrastructure, plus a considerable number of yet uninvolved professionals and final users engaged in screening and prevention, including home-based monitoring for high-risk subjects.

The PROFITER Project will have a positive impact with a well demonstrated approach for the objective characterization of mobility decline and an accurate and early prediction of fall risk. In particular:

- the ICT approach offers unique advantages for detecting fall risks and dynamically monitoring its evolution;
- PROFITER aims at maintaining and increasing the quality of life in older persons using a proactive approach. This means that the project engages independent older persons as much as possible to maintain autonomy and support their social roles in order to maximize participation.

Future deployment of the PROFITER systems, services and approaches to falls management will also contribute to the sustainability and efficiency of regional health services:

- better and faster fall risk assessments will reduce hospital stays and the number of repeated visits of older subjects for re-diagnosis and treatment (currently estimated at 20% of hospital costs);
- subject specific at-home interventions will reduce the work-load on health professionals and reduce person transport associated with falls and fractures;
- reduced cost of hospital diagnostic services (currently about 60% of hospital costs) as far as the traumatic events related to balance impairment and falls are concerned.

Grafica a cura di Federica Sarti - Agenzia sanitaria e sociale regionale dell'Emilia-Romagna
maggio 2013