It was our pleasure to welcome the pHealth community to the beautiful and dynamic city of Lyon and host the very stimulating and productive 8th International Conference on Wearable Micro and Nano technologies for Personalised Health, pHealth’2011, 29th June–1st July 2011.

WHAT IS pHEALTH?

Modern healthcare systems have generally evolved around the treatment of acute disease and are therefore largely organised to cope with patients’ episodic and acute needs. Chronic conditions (health problems which require ongoing management over a period of years or decades) have now overtaken acute problems, constituting the major, and growing, healthcare burden. Unfortunately, using a reactive acute care model to address the needs of a population that now suffers primarily from chronic conditions, i.e., waiting until something goes seriously wrong rather than optimally managing the chronic condition on an ongoing basis, leads to excessive, inefficient and ineffective use of secondary care services. As a consequence, chronic conditions, such as cardiovascular disease, cancer, diabetes and obesity, now consume up to 75-85% of health and social care expenditure in developed countries, causing a growing economic strain on the world’s healthcare systems (Continua Health Alliance). For example, France presently spends an estimated 3,600 USD per person per year on healthcare. This is an estimated 11% of its GDP.

It is widely agreed (by, for example, the World Health Organisation and the European Commission) that it is imperative that healthcare leadership implement a more sustainable form of care, improving healthcare quality whilst reducing unnecessary costs. This is to be achieved by shifting away from today’s reactive model of care to an integrated approach which enables, encourages and supports individuals and their families to continuously monitor and manage their health from the comfort of their homes, cars and even work place, avoiding, to a great extent, costly acute intervention. The emphasis...
now is therefore on “self-management,” “personalised health,” “pervasive healthcare,” and “preventative healthcare”; terms reflecting key aspects of the new approach.

It has been shown that Ambient Assisted healthcare delivery, where appropriate, is much less costly and the patient’s perceived quality of life is generally much higher. It is interesting to note that, even in cases where the elderly know that they are more at risk, when given the choice, they prefer to continue to live at home, even on their own, rather than opting for some form of institutionalised care (Cook & Das, 2007).

Home-based care is less expensive on a ‘per day’ basis and more appreciated by the patient. More importantly, it is generally more effective, therapeutically and financially, to encourage and support the patient to manage their chronic condition at home; to detect and act on symptoms as early as possible.

The (European) Commission has been supporting research and development activities for the application of Information and Communication Technologies (ICT) in health since the 1990s. Over the last decade, it has promoted person-centric healthcare systems -so-called ‘Personal Health Systems’ (PHS) -the aim of which is not to replace but rather support health professionals via monitoring and diagnostic data which can help them to make accurate decisions.

PHS is a relatively new concept. It is centred on the use by patients of wearable or implantable systems, such as body sensors that measure physiological information like heart or respiratory rate as people do their normal activities. The systems process the information automatically and send it to health centres where physicians can remotely evaluate the individual’s health status. According to the Commission, the aim of these personalised systems is “to help health professionals and individuals monitor more efficiently chronic conditions like diabetes and heart failure outside the ordinary hospital environment (“The European Commission is promoting,” 2008).

There is therefore an urgent need of novel monitoring systems which include new sensor technologies, mobile technologies, embedded systems, wearable systems, ambient intelligence and pervasive solutions which are capable of conveniently, discreetly and robustly monitoring patients in their homes and whilst performing their daily activities without interfering significantly with their comfort or lifestyle.

WHAT ARE THE CHALLENGES TO PERSONALISED HEALTH?

It is interesting to note that, in contrast to many of the Healthcare advancements in the past, the present (r)evolution is due more to governmental-pull than to (solely) technological-push.

Although early trials, pilot studies and a few major programs have had promising results, the widespread adoption and commercialisation of such personalised Health systems has to date been very slow – much too slow to radically improve health and quality of life and dramatically reduce healthcare costs. This can be attributed to a number of reasons; technology costs, complexity of integrating with existing practice, interoperability challenges and the lack of full support from the clinical domain.

The problem with the ‘disruptive’ approach (a disruptive technology or innovation is one that, when introduced, either radically transforms markets, creates wholly new markets or destroys existing markets for other technologies/strategies) sought for by the EC and WHO is that no single organization or group has the resources needed to address the complex public health issues that must be resolved to facilitate the introduction and implementation of effective and efficient management of chronic disease and the ageing. New ‘Connected Health’ coalitions will need to be established between the various sectors involved to ensure that the advancements in prevention, control, and treatment of chronic diseases benefit all. Fortunately, the critical mass of interest and political will is now coming together in many countries, including in the EU – with the goal of connecting the various elements of Healthcare provision required for this potentially advantageous ‘disruptive’ approach.
The pHealth Forum seeks to bring together the key players (largely by invitation) in the healthcare provision chain to help identify and tackle the remaining challenges to successful “pHealth” provision.

WHAT ARE THE EU’S pHEALTH FORUMS?

Organised since 2003 at the request of the personalised Health community and with the support of the EU, the pHealth forums seeks to identify and tackle the key challenges to successful “pHealth” provision, challenges which hinder the commercialisation and clinical uptake of viable healthcare solutions. This is achieved through the strategic bringing together of key players (largely by invitation) in the healthcare provision chain – patient groups, medical doctors, industrialists, hospital administration, healthcare policy makers, researchers and other interested bodies. pHealth is therefore not just another conference of academics but rather an arena for interaction, discussion and action. Its goal is to identify solutions to the challenges of pHealth and hence to move one step closer to a large scale implementation of real industrially backed and clinically supported service provision.

As the event addresses converging technologies (NANO-BIO-ICT) in addition to the other non-technical issues that are critical for EU innovation & industry and for the EU citizen, the pHealth conference has emerged as the leading international meeting on wearable micro and nano technologies for personalized medicine. It has given visibility to the tremendous potential of micro and nano technologies, not only for the future of medicine, but also for the improvement of healthcare processes today.

Previous pHealth Forums

7. Berlin, Germany. May, 2010

Ambient Assistive Living

“Monitoring of patients with chronic diseases.”
Pr. Thomas Hilbel, University Hospital Heidelberg, Germany

Personal Health, especially aspects pertaining to the cardiovascular system, for example, can be influenced by lifestyle habits. Healthy diet and physical activity are beneficial in maintaining a healthy cardiovascular system. However, a person cannot avoid inherited diseases, unhealthy environmental surroundings, infections, and aging. Emotional stress and accidents also adversely influence health. Therefore, the key to personal health is either in prevention or in the control and monitoring of an existing disease. Many technical monitoring applications are already available to support a healthy personal lifestyle. For example, pedometers can measure physical activity, devices can check blood pressure at home, Smartphones can monitor caloric intake, and sports monitors can track heart rate and transmit data to a personal health portal.

Unfortunately, there is presently not a lot of support in place from healthcare providers for these preventive personal health activities. Although we can envisage computer-aided diagnostic systems that could do some aspects of the preventive monitoring before involving a medical expert when needed, Healthcare organizations are generally unwilling or unable to monitor this data or to provide help when monitored values exceed normal ranges.

The situation is different if you have experienced a cardiac event and you qualify for a telemedicine disease management program. In the case of chronic heart failure, telemedical monitoring of weight, blood pressure, and a daily computerized assessment of the patient’s overall condition can help to avoid recurrent hospitalization. When necessary, the health care provider can intervene before a patient’s
condition becomes critical. This form of home monitoring therefore provides a positive impact on a patient’s care, quality of life and the associated healthcare costs.

As another example, pacemakers and implanted cardiovertor defibrillators can be checked automatically by the supporting telehealth systems without requiring a visit to a doctor’s office. Malfunctions due to device failure may be recognized before a patient experiences an adverse event. If a patient has suspected supraventricular arrhythmias, a heartphone can send the ECG so that a telemedicine center can classify the rhythm before the patient presents to the hospital with a false alarm. This quickly reassures the patient and saves healthcare resources.

As a conclusion, Personal monitoring by patients with chronic disease can have a positive impact on both personal care and healthcare costs. It is suggested that the general value and potential health cost savings of such preventive personal health activities and disease monitoring - especially as implemented via smartphone applications - may presently be underestimated by healthcare providers.

This first issue of IJEHMC on pHealth presents 7 papers, selected from the International Conference pHealth '2011, on the topic of Ambient Assisted Living:

- “Fusion of Multiple Sensors Sources in a Smart Home to Detect Scenarios of Activities in Ambient Assisted Living,” Norbert Noury et al.
- “Ethernet Motion-Sensor Based Alarm System For Epilepsy Monitoring,” Stéphane Bonnet et al.
- “Creating and Using the Knowledge Archive in the Internet Medical Consultant for Decision Support at the Point of Care,” Draško Nakić and Suzana Loškovska.
- “An Architectural Approach to Building Ambient Intelligent Travel Companions,” Sule Yıldırım Yayılgan et al.

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Claudine Gehin
Chris Nugent
Norbert Noury
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REFERENCES
