

PERSONAL HEALTH SYSTEMS

Enabling health promotion and preventive actions against health deterioration as people age would be beneficial¹. Personal Health Systems (PHS) target to support these measures, for instance, by following long term health status changes. Telemetric activity monitoring provides long term information about person's activity patterns, for instance, by including activity monitoring technology into a wrist-worn social alarm system, an unobtrusive method to measure continuous activity of the user that has been accomplished². So, daily activity and sleep/wake profiles can be followed, which relate to personal well-being in general and to health status changes³⁻⁶. Actigraphic measures are useful for characterizing and monitoring sleep and circadian rhythm patterns and to document treatment outcome among community dwelling older people⁷, of whom 40-70% suffer from chronic sleep disturbances⁶.

As people have different activity patterns⁸ it will be essential to store the long term history of personal activity to achieve an adaptive system for noticing possible negative changes and enable early interventions for alleviating normal age related decline in physical functionality. The traditional social alarm systems are widely accepted by the older users and by the health- and social-care professionals. Telemetric actigraphy has had good compliance among its users⁹, one motivating factor being the integration of social alarm and telehealth monitoring.

Employees in sheltered housing facilities have reported enhanced ability to provide quality of care to their clients due to PHS. Comprehensive service packages including housing, dining, and health services for older people have become popular and added value can be supplied, for instance, by technologies that register physical activities. Recently a personal well-being management solution has been launched

with improved features and design¹⁰. One option is that users would at first maintain their health with help of the same system that later on would indicate any health problems.

References

1. Cruz-Jentoft AJ, Franco A, Sommer P, Baeyens JP, Jankowska E, Maggi E, Ponikowski P, Ryś A, Szczerbińska K, Milewicz A. European silver paper on the future of health promotion and preventive actions, basic research, and clinical aspects of age-related disease. *Gerontechnology* 2008;7(4):331-339; doi:10.4017/gt.2008.07.04.001.00
2. www.vivago.fi; retrieved October 16, 2008
3. Paavilainen P, Korhonen I, Lötjönen J, Cluitmans L, Jylhä M, Särelä A, Partinen M. Circadian activity rhythm in demented and non-demented nursing-home residents measured by telemetric actigraphy. *Journal of Sleep Research* 2005;14(1):61-68; doi:10.1111/j.1365-2869.2004.00433.x
4. Paavilainen P, Korhonen I, Partanen M. Telemetric activity monitoring as an indicator of long-term changes in health and well-being of the elderly. *Gerontechnology* 2005; 4(2):77-85; doi:10.4017/gt.2005.04.02.003.00
5. Lötjönen J, Korhonen I, Hirvonen K, Eskelinen S, Myllymäki M, Partinen M. Automatic Sleep/Wake and Nap Analysis with a New Wrist Worn Online Activity Monitoring Device Vivago WristCare[®]. *Sleep* 2003;26(1):86-90; doi:10.1111/j.1365-2869.2004.00433.x
6. Someren EJW van. Circadian and sleep disturbances in the elderly. *Experimental Gerontology* 2000;35(9):1229-1237; doi:10.1016/S0531-5565(00)00191-1
7. Morgenthaler T, Alessi C, Friedman L, Owens J, Kapur V, Boehlecke B, Brown T, Chesson A, Coleman J, Lee-Chiong T, Pancer J, Swick TJ. Practice Parameters for the Use of Actigraphy in the Assessment of Sleep and Sleep Disorders: An Update for 2007. *Sleep* 2007;30(5):519-529
8. Virone G, Alwan M, Dalal S, Kell SW, Turner B, Stankovic JA, Felder R. Behavioral Patterns of Older Adults in Assisted Living. *IEEE Transactions on Information Technology in Biomedicine* 2008;12(3):387-398; doi:10.1109/TITB.2007.904157
9. Särelä A, Korhonen I, Lötjönen L, Sola M, Myllymäki M. IST Vivago[®] - an

intelligent social and remote wellness monitoring system for the elderly. In Proceedings of the 4th Annual IEEE EMBS Special Topic Conference on Information Technology Applications in Biomedicine (ITAB2003), Birmingham; 2003; pp 362-365; doi:10.1109/ITAB.2003.1222554

10. Mattila E, Korhonen I, Merilahti J, Myllymäki M, Nummela A, Rusko H. A concept for personal wellness management based on activity monitoring. In Proceedings of Workshop on Ambient Technologies for Diagnosing and Monitoring Chronic Patients (ATDMCP), January 29,

2008, Tampere, Finland, paper# 2727; doi:10.1109/PCTHEALTH.2008.4571020

Juho Merilahti
Tampere, Finland
E: Juho.Merilahti@vtt.fi

Ilkka Korhonen PhD
VTT Technical Research Centre of Finland
Tampere, Finland
E. Ilkka.Korhonen@vtt.fi
doi:10.4017/gt.2008.07.04.010.00

TELEREHABILITATION FOR COGNITIVE AND MOTOR FUNCTIONS

The European Silver Paper recommends measures to restore health and to maintain the highest possible level of independence and physical and mental autonomy¹. During the last decade we assisted in rehabilitation studies and in technological development. From the combination rises telerehabilitation – a subfield of telemedicine consisting of a system to control rehabilitation from a distance – as an actual application and a promising development in the future².

In recent years a great number of telerehabilitation projects has been developed in order to remotely treat patients at home. A subset dealt with the recovery of upper-limb functionalities in patients affected by neurological diseases as stroke, traumatic brain injury (TBI)² and multiple sclerosis (MS)³. Important results were also obtained in the field of gait analysis⁴ and speech pathologies⁵. However, almost none of the rehabilitation systems in the above projects took into account specific needs coming from the 65+ population, which should be considered and treated as a separate group⁶, managed with a multidisciplinary, multimodal, and integrated approach¹. On the other hand, project results showed that the market does offer a wide set of products potentially effective in telerehabilitation⁷, mainly based on technologies like virtual reality⁸, video conference⁹, sensor-based platform¹⁰, and wearable devices¹¹.

From the above experiences and knowledge, and taking into account the ‘well-ageing’ paradigm, products and implemented services might usefully be adapted and used for maintaining residual functionalities and motor/cognitive activities of 65+ people.

Besides technological issues, important organizational and societal changes, i.e. cost reduction policies and an ageing population, should be taken into account as driving forces for the development of a successful home telecare system¹². Up to now, communication technologies in the health care delivery process seemed to be successful only if (i) the model reflects the National Health Systems directives¹³, and (ii) the offer is as wide as possible in terms of technologies and pathologies considered. These two aspects are extremely important especially in a long-term perspective, where sustainability is a critical aspect¹⁴. With this in mind, a supervision and harmonization process conducted at a European level seems a fundamental step for sharing knowledge and experiences from local contexts, and for overcoming barriers and difficulties related to the service implementation¹⁵.

References

1. Cruz-Jentoft AJ, Franco A, Sommer P, Baeyens JP, Jankowska E, Maggi E, Ponikowski P, Ryś A, Szczerbińska K, Milewicz A. European silver paper on the future of health promotion and