

# ICT technology to support personalised multifactor health promotion and early intervention

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Shift of emphasis from treatment of acute illnesses to prevention of their onset, management of chronic diseases, and health promotion has been called as a response to the resource crisis that our health care system is facing. Prevention of illnesses has a great potential as behavioural factors predict up to 40% of our health outcomes, and accordingly lifestyle related risk factors, such as obesity, insufficient physical activity and poor diet, account for more than a half of the disease burden in Europe. When this burden is translated into costs, not only direct health care costs are important but also losses due to declined productivity in working age citizen. The diseases responsible for most costs and lost productivity are mental disorders (13% of direct healthcare costs; 26% of lost productivity; 50% of early retirements); musculoskeletal disorders (11%; 21%); and cardiovascular diseases (17%; 12%).

Key factor to succeed in the health promotion and illness prevention is citizen empowerment. The Holy Grail of health promotion and illness prevention is behavioural change, and this may not be dictated or prescribed by anyone else than the citizen him/herself. The health care system, accordingly, will need to adopt new models of patient-provider relationship and shift towards coaching strategies, where emphasis is not on making and sharing treatment plans which the patient should follow, but on empowering or coaching the citizen to make and implement these personal and personalised plans as best suites his or her preferences and life situation. This approach is more familiar in psychological therapy, where especially methods based on cognitive behavioural approach have been successful also in managing and changing health related behaviours, e.g. related to weight management.

Traditional health promotion interventions, which are delivered for example through occupational health system, include group interventions, which mostly target single behaviours or health problems, such as exercise, weight management, or diabetes prevention. The results obtained through traditional intervention studies are diverse, but successes have been reported in increasing physical activity; reducing work stress; and improving nutrition. Unfortunately, the long-term maintenance of behavioural changes has proven difficult. In addition, as group interventions, they do not fit to all individuals or reach especially those not employed permanently with big companies with well-planned occupational health promotion programme. Finally, as these interventions target single behaviours they do not take into account the interactions between health risks nor the personal needs and health concerns of the subjects.

New ICT technologies – such as personal and wearable health monitoring tools, health diaries, and health portals and tools – have the potential to provide affordable, personal and personalized tools for health management. ICT may also promote long-term maintenance of lifestyle changes. However, limited evidence to support or reject this hypothesis has so far been provided.

In Nuadu project, we have developed a Nuadu concept for ICT assisted personal health management. The system supports multifactor approach for health interventions, i.e., it consists of modules for management of the main behavioural components of health, namely diet, exercise, sleep, stress, smoking and alcohol consumption. The system is integrated under Nuadu portal, which has modules for long-term health monitoring (Nokia Health Diary), diet analysis and management (Tuulia Hyperfit and NutritionCode), personal information, general health information, and messaging with a nurse or some other health coach. The mobile tools, running on an S60 mobile phone, allow day-to-day health monitoring and self-observations (Nokia Wellness Diary, which is synchronised with the portal), exercise planning and feedback (Firstbeat Mobile Coach), and guided relaxation (SelfRelax by RelaxLine). In addition, the system includes personal wearable health monitoring devices: IST Vivago Personal Wellness Manager for monitoring of sleep and activity, and heart rate monitor (Suunto SmartBelt) for exercise and stress monitoring. The philosophy of the project is that the citizen is offered a diversity of tools, from which s/he can choose which to use – depending on his/her personal preferences and needs.

A randomised controlled trial of 360 subjects was started in January 2008 in Espoo, to study the effectiveness of the Nuadu system in health promotion. In this study, the users having elevated health risks have been randomised to control group and two intervention groups. The intervention groups participate in a multifactor health promotion intervention programme consisting of 5 group meetings during first 4 months of the study. In addition, one intervention group is given access to the technology. The outcome is evaluated at 6 and 12 months. Our hypothesis is that the ICT intervention group benefits from the use of the technology especially after the group meeting programme has finished, i.e., that this group has less decay in the intervention effect than

in the traditional intervention group. In addition, we study which percentage of the users prefer ICT over traditional intervention.

In summary, ICT allows potentially more personal and personalised tools for health promotion and health management at affordable cost. The personal and personalised use should be emphasised, i.e., there should be simple and easy access to a diversity of tools, from which the user should be allowed to choose those options that fit his/her lifestyle and preferences the best. We believe that there will be a significant sub-group of citizen who will prefer ICT based approach over traditional group interventions, and this group may potentially include also some of those citizens who would drop out from traditional health promotion programmes. However, these hypotheses will be needed to be shown in the upcoming studies.

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