Editorial

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Decision making is an eternal process in healthcare. Supporting it by means of information and communication technology tools has always been of paramount interest for clinicians (aka clinical decision support systems) despite the inherent fear of software overruling their own decisions. Recent technological advances have given rise to new forms of decision support by enabling the notion of collaborative decision making. In this process patients are supported by their healthcare professional to choose among different available alternatives.

The whole idea reforms the consultation or patient-doctor interaction by bringing in the best scientific evidence as well as the patient's values and preferences. The latter may be shaped by age, daily living activities, family beliefs or be informed by their own beliefs, personal or cultural constructs, emotional status etc.

However, supporting clinical decisions is not a merely a feature of disease or therapy per se. Recent literature already accounts for several clinical situations that would be prevented or better monitored and managed if a participatory model with respect to the patient were chosen. The key question though is what healthcare technology can do in this strand?

It is undoubted that mobile and web technologies as well as smart devices, sensors etc., give rise to a plethora of data: clinical, biological, therapeutic, behavioural, lifestyle and dietary and others. Combining these with concepts of promoting self-management and personal health systems or any predictive personalised models and algorithms results in the contemporary term of patient empowerment, which is nothing more than supporting the patient to participate in the management of her health by improving lifestyle and monitoring wellbeing while preventing disease.

This special issue brings together work across these many facets of decision support technology for person-centred healthcare and gives a snapshot of some of the latest research in this area. Such technologies focus on techniques to detect or predict early symptoms and/or prevent disease or simply enable the smart collection and management of suitable data that would enable decision support.

Clewett *et al.* look at the problem of hypoglycaemia unawareness which is a common condition associated with increased risk of severe hypoglycaemia; it is shown that a non-invasive EEG-based hypoglycaemia warning system for personal monitoring in the home is actually feasible as it is demonstrated through a single case study.

In another study, Baldewijns *et al.* examine the problem of fall incidents which form an important health hazard for older adults. In their paper a realistic simulation dataset is presented to fill the gap between real-life data and currently available datasets. The dataset was recorded while re-enacting real life falls which were recorded during previous studies. Evaluation showed that the dataset possesses some extra challenges compared to other publicly available datasets; the latter are also enhanced through the contributions of this paper.

Decision support may also be achieved through applications of ubiquitous healthcare systems as the latter offer the prospect of collecting human vital signs, early detection of abnormal medical conditions, real-time healthcare data transmission and remote telemedicine support. To this extent, there exists a need to overcome the emerging different technical constraints of sensor batteries. So Liao *et al.* provide a flexible quality of service model for ad-hoc networks supporting fast data transmission and energy efficient ubiquitous wireless body area sensor networks.

On another related technical front, Aristodimou *et al.* examine issues of privacy by preserving data publishing of categorical data through k-anonymity and feature selection based methods. The algorithm attempts to reduce the information lost thereby potentially increasing the accuracy of decision making of the tested datasets.

Finet *et al.* argue that the number of patients with complications associated with chronic diseases increases with the aging population, especially when complex chronic wounds are considered since these raise the re-admission rates in hospitals. They then discuss the implementation of a technical solution which allows the capture, recording and distribution of telemedicine application documents that could enable remote decision making.

In a logical flow, Menychtas *et al.* focus on point-of-care systems and how automated integration of wireless biosignal collection devices may facilitate patient-centered decision-making. Moreover, Charisis and Hadjileontiadis present a new capsule endoscopy image analysis scheme for the detection of small bowel ulcers that relate to Crohn's disease. The promising performance of a genetic algorithm improved hybrid adaptive filtering paves the way for a complete computer-aided diagnosis system that could support clinical practice.

Going more deeply into the core of person-centred decision making for aged populations, Frantzidis *et al.* describe a holistic decision framework that faces the combination of neurophysiological and neuropsychological data that could be applied in realistic occasions thereby facilitating the early identification and prevention of neurodegenerative phenomena. On the same track, Billis *et al.*, examine more 'wild data' to enable active and healthy ageing decision support systems with the smart collection of TV usage patterns. This is along the lines of smart monitoring of seniors: behavioural patterns and more specifically activities of daily living such as information about TV usage patterns may subsequently associate them with clinical findings of experts. This paper has actual day-to-day gathered data from four individual homes for a long period of time (some eleven months) thereby touching solidly on the notion of big data and decision support.

Getting into another chronic condition (asthma) where decision support is pivotal Killane *et al.* investigate the efficacy of a decision-support system designed for respiratory medicine to predict asthma exacerbations in a multi-site longitudinal randomised control trial monitoring adherence. The authors argue that decision support systems based on remote monitoring may enhance patient-physician communication to aid clinical outcomes and quality of life, in addition to reducing preventable adverse events.

Last but not least in this special issue, and perhaps for the first time, decision support systems are linked to medical/health education. Konstantinidis and Bamidis consider the online interactions between learners and tutors, the description, creation, reuse and sharing of educational digital resources and their inter-linkages in the light of education standards thereby providing the ground for organising the educational data and the paradata. In this way they delineate and identify the challenges for future medical education decision support systems.

I hope that you enjoy reading this special issue in which the challenges and domains mentioned at the beginning of this editorial are examined through a range of different technologies and applications covered by these eleven contributions.

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