Health-Enabling Technologies for Pervasive Health Care:
A Pivotal Field for Future Medical Informatics Research and Education?[*]

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Abstract. Our societies are changing worldwide. Life expectancy has increased in many societies and this increase is often related to an increase in the relative amount of elderly persons. Health-enabling technologies are information and communication technologies for creating sustainable conditions for self-sufficient and self-determined lifestyles. Sensor-enhanced health information systems play a major role in this context. The question is discussed, whether health-enabling technologies for pervasive health care can be regarded as a pivotal field for future medical informatics research and education.

Keywords. health-enabling technologies, pervasive health care, ambient-assisted living, medical informatics, research, education

1. Introduction

The question is raised and discussed, whether health-enabling technologies for pervasive health care can be regarded as a pivotal field for future medical informatics research and education.

2. Background

Our societies are changing worldwide. Life expectancy has increased in many societies and this increase is often related to an increase in the relative amount of elderly persons. As a consequence of this development "the number of persons aged 60 years or older is estimated to be 629 million in 2002 and is projected to grow to almost 2 billion by 2050, at which time the population of older persons will be larger than the population of children (0–14 years) for the first time in human history" [1]. In addition, the so-

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called potential support ratio, i.e., the number of persons aged 65 or older relative to the number of persons between 15 and 64, steadily decreases (Table 1).

Table 1. Potential support ratio (PSR) for selected years in the world and in Europe [2], see also [3]

Year	PSR worldwide	PSR for Europe
1950	12	8
2000	9	5
2050	4	2

Having this development in mind, it might be obvious to look for solutions, how future health care can be organized in a way, where quality and efficiency of care can be preserved in societies, where less health care professionals may be available to support in particular senior citizens.

3. Health-Enabling Technologies and Pervasive Health Care

Health-enabling technologies are information and communication technologies for creating sustainable conditions for self-sufficient and self-determined lifestyles [4]. Sensor-enhanced health information systems play a major role in this context [5]. By utilizing advanced health-enabling technologies, individual quality of life is intended to be enhanced, while sustaining the efficiency of health care [6].

According to Jakob Bardram, pervasive health care is a field, investigating how pervasive computing technologies can be applied to health care with the intention to help to mitigate problems of aging societies. He compared existing health care versus pervasive health care in the following aspects [7]:

- *Existing versus pervasive health care*:
- acute versus continuous,
- hospitalization versus home and out-patient care,
- reactive versus pro-active and preventive care,
- IT versus assistive technology,
- centralized versus pervasive,
- sampling versus monitoring,
- doctor-centric versus patient-centric.

Introductions to this field have been given in a couple of publications. In particular [8–16] are recommended for further reading.

4. Health-Enabling Technologies and Medical Informatics

Having in mind the mentioned development of our societies on the one hand and health-enabling technologies for pervasive health care on the other hand, one may ask, whether pervasive health care is a challenging new field of its own, or if it should better be regarded as a new subfield of medical informatics.

Jakob Bardram argued in his excellent paper that pervasive health care should be regarded as a new discipline of its own with roots in biomedical engineering, medical informatics and ubiquitous computing, and with a specific research agenda.

Doing research and education in medical informatics, one might also come to different conclusions and regard health-enabling technologies simply as a new area of research and education within medical informatics. As a discipline, dealing with the systematic processing of data, information and knowledge in medicine and health care and with the aim of contributing to improving quality and efficiency of care [17], medical informatics can easily include this area. Also, medical informatics in its history has continuously adapted new fields, dealing with both, information processing methodology / information technology *and* health care organization. Often storage of and access to a person's health data, e.g., in electronic health records, is also relevant. All these properties fit well for health-enabling technologies.

Due to our experience health-enabling technologies can also be well integrated in a medical informatics curriculum. Since the academic year 2005/2006 we offer courses in health-enabling technologies to our medical informatics students at the University of Braunschweig, Germany. In our opinion these courses fit well in the portfolio of medical informatics courses on the master level. Some students, who attended these courses, later started Ph.D. research in this area.

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