INTRODUCTION

In most Western countries, healthcare systems are in economic crisis. It is not possible to increase available resources, but at the same time, there is a growing demand for publicly funded healthcare services, e.g., because the number of aged people is rising. To solve this problem, countries can either increase the effectiveness and efficiency of their present healthcare activities and/or decrease public demand. Public demand can be controlled by raising user charges for publicly funded services, redefining those services, encouraging self-care, and/or subsidizing services that are privately financed. However, so far there are not many countries that encourage self-care in order to control demand, but it is considered one possibility with strong future potential (Moore, 1996). Self-care means shared responsibility in healthcare. The formal system is no longer the only institution that is responsible for individuals’ health status; individuals must also take care of their own health. One of the most widely used methods for encouraging self-care is providing and sharing knowledge (Smee, 1997).

One way to enhance knowledge sharing and thus one possible way to increase the efficiency of activities in healthcare is the exploitation of information technology (IT). As Tapscott (1996) has envisioned, healthcare may be one of the primary beneficiaries from the new information technology-based networked economy. However, so far IT has provided only the infrastructure for telemedicine, expert systems, and multimedia, which have supported doctors in making diagnoses, and for databases, which have been efficient platforms for patient records, and thus, IT has mainly supported healthcare personnel and governmental institutions (e.g., Griep et al., 1996; Iakovidis, 1998; Kalra, 1996). Apart from improving the infrastructure enabling the integration of the various stakeholders within healthcare, we need IT-based tools to support and activate the individual patient. These tools
specifically aim at empowering the patient, at the same time resulting in reductions in the healthcare demand, and thus the need for public funds. To make this happen, as pointed out by Moore (1996), there must be many social changes in healthcare, besides these technical innovations.

In this chapter, we describe an interactive Web-based system which is aimed at encouraging and aiding a diabetic in self-care by offering a convenient way to record and access essential data related to diabetes using a Web browser or a mobile phone. The system also gives healthcare personnel access to a more detailed and up-to-date data of the status of their diabetic patients and a possibility to give immediate feedback via a mobile phone or the Web. As a logical and technical construction, the system is rather straightforward and its potential benefits can clearly be seen. However, the system’s benefits are only potential as long as the system is implemented properly. The implementation of the system calls for changes in the daily routines both by the diabetics and the healthcare personnel: the diabetics must record their data carefully using the new technology and the healthcare personnel must change their working habits and division of labor. Putting these changes into effect requires acceptance of the system by all parties. Initial training must be given to all participants in order to gain acceptance, but the future use is dependent on the perceived long-term benefits of the system.

The remainder of this chapter is organized as follows. The next section offers background information on the prevalence of diabetes and the current trends in diabetes care and management. Then a schematic description of the Web-based system in an experimental phase in Finland is given, and the differences between the old and the new care procedures are highlighted. The following section presents results from the first phase of the field experiment, in which about 100 diabetics used the system. The final section includes a summary of the results and discusses the implications of the system from the point of view of self-care, clinical diabetes care and healthcare management.

**DIABETES: PREVALENCE AND CURRENT TREATMENT APPROACHES**

Diabetes is one of the main chronic diseases in the world. There are two main types of diabetes: Type I diabetes and Type II diabetes. Type I diabetes (previously called insulin-dependent diabetes mellitus IDDM or juvenile diabetes) is considered an auto-immune disease, in which the pancreas produces little or no insulin. Thus a person with Type I diabetes needs daily injections of insulin to live. Type II diabetes (non-insulin-dependent diabetes mellitus NIDDM) usually develops in adults over the age of 40 and is most common among adults over age 55. In Type II diabetes, the pancreas usually produces insulin, but for some reason the body cannot use the insulin effectively. Approximately 40% of diabetics with Type II diabetes require insulin. (e.g., NIDDK, 1999)

The prevalence of diabetes is increasing globally. It has been estimated (King et al., 1998) that there are at present over 100 million diabetics in the world, and by the year 2025, there will be about 300 million adults with diabetes. The reasons why prevalence of diabetes is increasing are related to the fact that people live longer, have unwholesome diets, are overweight, and do not take physical exercise. Type 1 diabetes accounts for about 5 to 10% of diagnosed diabetes in the United States, but the figure is much higher in Finland. There the figure is about 18% (Diabetesliitto, 1998). There is also a tremendous geographic
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