Utilizing Information Technologies for Lifelong Monitoring in Diabetes Patients

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Abstract

Background:

Information and communication technologies have long been acknowledged to support information sharing along the whole chain of care, from the clinic to the homes of patients and their relatives. Thus they are increasingly being considered for improving the delivery of health care services also in light of clinical and technological achievements that propose new treatments requiring a tighter interaction among patients and physicians.

Methods:

The multiagent paradigm has been utilized within an architecture for delivering telemedicine services to chronic outpatients at their domiciles and enforcing cooperation among patients, caregivers, and different members of the health care staff. The architecture sees each communication device such as a palmtop, smart phone, or personal digital assistant as a separate agent upon which different services are deployed, including telemetry, reminders, notifications, and alarms. Decoupling services from agents account for a highly configurable environment applicable to almost any context that can be customized as needed.

Results:

The architecture has been used for designing and implementing a prototypical software infrastructure, called LifePhone, that runs on several communication devices. A basic set of services has been devised with which we were able to configure two different applications that address long-term and short-term monitoring scenarios for diabetes patients. The long-term scenario encompasses telemetry and reminder services for patients undergoing peritoneal dialysis, which is a treatment for chronic renal failure, a diabetes complication. The short-term scenario incorporates telemetry and remote alarms and is applicable for training patients to use an artificial pancreas.

Conclusions:

Our experiments proved that an infrastructure such as LifePhone can be used successfully for bridging the interaction gap that exists among all the components of a health care delivery process, improving the quality of service and possibly reducing the overall costs of health care. Furthermore, the modularity of services allows for more complex scenarios encompassing data analysis or even involving actors at multiple institutions in order to better support the overall health care organization.

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