

How can ICT improve Healthcare? Research topics for FP7

Summary of results from the networking session on ICT and healthcare at the IST Event 2006 in Helsinki, 23 November 2006

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Introduction

On 23 November 2006, Eurescom coordinated a networking session dedicated to ICT and healthcare at the IST Event in Helsinki, which was attended by about 50 ICT and e-health experts from industry and academia.

The interdisciplinary and interactive session focused on the following central question:

How can information and communication technologies contribute to making healthcare in Europe more efficient and effective?

The parallel group discussions led to a number of interesting results in several areas of healthcare. The results comprise both definitions of problems to be solved by ICT and initial ideas for solutions which would require further research.

1. Hospital management – process improvements

RFID-based equipment tracking in hospitals

Managing and tracking equipment and assets in hospitals and healthcare facilities is a major problem. Ranging from bed facilities, IV pumps, surgical equipment, to wheelchairs, there are assets and equipment that create challenges for the hospital management. ICT can help to make tracking equipment more effective. Solutions based on barcodes are already in use. The next step will be solutions based on Radio Frequency Identification (RFID). Active RFID tags which are tagged to equipment and send information about their whereabouts are a major step forward to improve equipment tracking. Adoption of RFID in the healthcare sector is just at the beginning, and research is needed for a smooth integration of RFID-based equipment tracking into hospital management systems.

Patient tracking

Related to equipment tracking is patient tracking. This becomes particularly critical in emergency cases. Quick patient tracking is then literally a vital requirement. Automated patient tracking was recognised as an area where ICT could significantly improve hospital management and patient safety. The research issue would be to explore the usability and effectiveness of ultrasound versus RFID. Another challenge is again to integrate wireless patient tracking systems into hospital management systems.

ICT training and support for hospital personnel

Although ICT can improve hospital management significantly, the change of established processes which is often connected to the introduction of new ICT solutions might be slowed down by the lack of motivation and training of hospital personnel to use the new technologies. Training of doctors and nurses is seen as an important accompanying measure for introducing

new technologies. However, given the heavy workload of hospital personnel, time-effective ways of training have to be developed in order to ensure that the training goals are achieved. Currently, many doctors don't know all the benefits ICT could bring to them. Training measures would help them understand and reap the benefits of ICT. There was agreement that this kind of training should already start at university.

Workflow improvements

One of the major problems of proper utilisation of ICT in hospitals is the overall workflow.

There are several different actors in hospitals who have an impact on the workflow:

- doctors, who often have their own views on how to organise the workflow in their area;
- nurses, who often have no or limited access to ICT;
- administrators, who are supposed to organise the workflow;
- patients who often behave in non-predictable ways which challenge the effectiveness of hospital procedures.

A critical issue is the management of emergencies, which can disturb all pre-planned workflows and schedules.

The discussion showed that the different hospitals and regions in Europe have a wide variety of more or less efficient workflows in place; some hospitals are utilizing ICT services much better and much more efficient than others; in this context, Sweden was mentioned as a good example of advanced ICT usage in hospitals.

There were also critical views on using ICT in hospitals, saying that new ICT solutions should not destroy well-working systems. The goal should be an end-to-end patient-oriented workflow, and ICT should be only the means to support it.

Reorganisation of processes

The benefits of ICT can only be realised, if the processes in hospitals are changed. The processes have to become more patient-centred by involving the patients more actively in the process and by always thinking of the best service to be offered to patients. The reorganisation would require that all stakeholders have to be involved in the process, doctors, nurses, administrators, patients, regulators, health insurance organisations, etc.

There was a controversial discussion whether the reorganisation of processes in hospital which should go in parallel with the introduction of new technologies, would be better initiated top-down or bottom-up.

2. Patient data – interoperability and privacy

Interoperability of patient data / electronic health records (HER)

Even within one hospital, there are often different standards and systems for storing and retrieving patient data. This problem increases between different hospitals, resident doctors, and health insurance systems. Beyond the national level, different health card systems for storing different kinds of patient data exist in European countries.

Although there is already considerable standardisation taking place, the level of interoperability of patient data is still low. The issues appear to be rather organisational, regulatory and political than technical. Given the fact that there are plenty of different information systems for patient data, there is a need for standardised conversion tools in order to convert and export/import data from different information systems.

Another challenge is the availability of patient data. They should be available anywhere whenever needed to provide medical treatment.

Concerning patient safety in the context of patient data, there is the risk of erroneous data which could, in the worst case, lead to a false diagnosis and wrong treatment. Providing safeguards against this is a major challenge which needs to be addressed.

Privacy and ownership

For achieving a high level of acceptance, privacy-protection of patient data needs to be ensured. This includes that patients know which data are stored about them and that access levels for doctors, nurses and other actors are transparent and clearly defined. It is crucial that patients themselves have access to their own data and can control the use of their data.

A critical issue in this context is the ownership of patient data. Should it be centralised or decentralised? How should data acquisition be organized?

Further requirements for digital patient data are accessibility and the integration of patient data into a national and European-wide system.

3. Health information systems

General practitioners and other actors in the healthcare sector are confronted with data overload but quite often with information paucity when it comes to critical information required on short notice for a surgery or medical treatment. Future health information systems need to be dynamic in the management of information and should provide fast and reliable information retrieval. Interfaces to health information systems need to be context-sensitive in order to provide the right information at the right place and the right time.

4. Telemedicine and remote health monitoring

Virtual doctors

Telemedicine will help to change medical care in a way that increases both the quality and the cost-effectiveness of medical treatment. One of the aspects discussed was the concept of the virtual doctor. A part of the medical consultation, which currently requires making an appointment and having a face-to-face meeting, could be done via the Web. Patients could get qualified medical advice when they need it without having to wait hours in the waiting room of a medical practice.

In emergency cases, doctors will be able to access the patient history and other critical patient data via a mobile device whenever and wherever need.

Through a dynamic knowledge database and a context-sensitive information system it would have to be made sure that only the information needed is provided to the emergency doctor, in order not to waste important time through searching the right information in a bulk of data. In order to achieve this on national and European level, interoperability would have to be ensured via common standards that are compatible with the new needs generated by this new way of treating patients.

There were mixed views on self-diagnosis. On the one hand, it would be good if patients could use structured automatic systems for better self-diagnosis; on the other hand the expertise of doctors is still needed for a proper diagnosis in order to detect serious diseases.

Patient orientation of medical care

ICT allows to treat more patients at home than before, e.g. by shortening the time of hospitalisation after a surgery. This has a number of advantages: expensive long hospitalisation of patients is avoided, the recovery of patients and the subjective well-being of patients are much better in their familiar environment.

Especially the care for the growing number of elderly people with chronic diseases can be made much more effective by providing ICT-supported care at home.

Medical care at home will be facilitated by remote health monitoring, which allows doctors to check body functions of their patient remotely from their desk, and also to check if the patient has taken the prescribed drugs.

Remote health monitoring will also improve prevention of diseases, as checkups of vital body functions can be done more frequently than today.

Remote health monitoring may even enable patient self-help groups to mutually support each other, e.g. by reminding each to ingest prescribed drugs.

However, remote health care can also have potential drawbacks, which should be taken into account, e.g. the missing direct contact between patient and medical personnel. Thus, remote health monitoring should be used rather as a complementary measure to increase the quality of healthcare and help medical personnel focus on patient needs than as a replacement of direct social interaction between medical personnel and patient. In this context, mental conditions and needs of patients treated remotely should be considered as well.

Remote health monitoring gives more responsibility and self-determination to the patients and will reduce the cost of the healthcare system. The challenge is to integrate remote health monitoring into a wider nation-wide health information systems and to make health-monitoring systems interoperable on European level.

There was a wide agreement among the audience that the aim of using ICT in healthcare is to improve the entire healthcare system and the way it is organized, and not just provide some isolated solutions to specific problems. From the discussion it became clear that ICT should be used to increase both the quality of healthcare in terms of better service and at the same time improve the efficiency of healthcare in Europe in a way that enables the reduction of cost for prevention and treatment.

5. Technological drivers and barriers

Usability

The discussion showed quite clearly that usability is less a technological issue than a societal and economical one. Most required technologies are available; however they need to be integrated and interfaced in a way that systems and services can be used efficiently. The goal should be that ordinary people must be able to cope with the systems. In addition, there are also acceptance problems which better usability can help to overcome.

Key technologies

Most of the key technologies already exist. Speech recognition and artificial voice are two areas where better solutions are needed.

Privacy and security

Privacy and security have been identified as crucial for the successful implementation of ICT solutions in healthcare. Interestingly, during the discussion safety and robustness were not regarded as an equally important issue in healthcare.