Estonia’s Health Information System and Digital Health Record

Kaja Kuivjögi, director, Department of Health Information and Analysis, Ministry of Social Affairs, Estonia

The author reviews Estonia’s emerging health information system, for which the conceptual starting point lies in a transition from an institution-centred approach to a human-centred approach. The heart of the system is the centrally administered Digital Health Record.

THE APPROACH

Estonia does not yet have an integrated and functioning health information system, but various components for such a system are in place – the information systems of hospitals, general practitioners, emergency care institutions and pharmacies, the information system of the Health Insurance Fund, as well as various registers and databases which have not yet been brought together and which do not systematically exchange information at this time.

The whole system forms an integrated value chain, with the human being as the central object. Everybody encounters the health sector from time to time, and each time the health care provider obtains certain information about the individual. These data are stored in various medical documents – health records, medical histories, blood records, dental records, etc. (Figure 1).

The conceptual starting point for an integrated system and a new and different approach lies in the transition from an institution-centred approach to a human-centred approach. This applies to information systems, too. The whole philosophy behind the digital health record involves all of the information about a patient – all the data, all of the activities of health care providers, irrespective of the institutions where the care has been provided. In addition to establishing a system which takes into account the fact that patients move about freely at the national level, we are also creating preconditions for the free movement of patients in the European Union’s member states.

The primary aim of an integrated health information system is to establish an efficient structure whereby scattered data can be obtained and used so as to ensure the existence of the integrated data that are necessary for patient treatment and the provision of health care. Additional benefits include health statistics and cost accounting.

PARTICIPANTS

Participants in the health information system are all health care institutions – hospitals, general practitioners, outpatient clinics, pharmacies, emergency care providers, medical care providers at institutions such as kindergartens, schools and prisons, the compilers and users of medical statistics, medical researchers, medical registers (the cancer register, the birth and death register, etc.), the Health Insurance Fund, and all patients in Estonia.

Figure 1. Life from birth to death according to the health care system
Medical information that is exchanged among these parties is part of the health information system, regardless of whether the information is administered digitally or on paper (Figure 2).

**THE DIGITAL HEALTH RECORD**

The heart of this system is the centrally administered Digital Health Record, which draws together essential medical information and passes it on to the relevant parties. The record brings together time-critical medical information (that which is needed for immediate treatment), as well as data for national and medical statistics. It also includes a reference register which allows users to search for additional information from the other scattered elements in the health information system – the information systems of hospitals, the central system of general practitioners, etc.

The structure of the digital health record project is twofold. We are dealing with a so-called centralised register, but it is also an information system which must handle information exchange for the register and establish the data exchange environment of the health information system. With regard to the Digital Health Record, it must be stressed that this is not just an IT project, but also an organisational project.

The launch of the Digital Health Record is proceeding in parallel with an updating of the register system of the health sector and of the health statistics system. A system of health sector classifications is being rolled out. Classifications and standards are important keywords for the Digital Health Record, the registers and the statistical system. They create preconditions to ensure digital exchange, comparison and quality of data.

**TARGET GROUPS**

The complexity of the health information system lies in the large number of parties that are taking part and the different aims and needs of these elements. The main target groups and their needs are listed below.

- **The attending physician** needs the patient’s medical history for treatment. This is especially important in life-threatening situations in which a patient is unable to communicate, decisions have to be taken very quickly, and every wrong move might cost the patient’s life. The attending physician also requires suitable work equipment which supports the management of patient-centred information. At present, this equipment and the system at large have been developed on the basis of the Health Insurance Fund so as to ensure payments for health care services, but this has meant that doctors have to deal with additional bureaucracy, something which hinders them in concentrating on patient treatment. A well functioning information system should allow doctors to spend more time on treatment, reduce the workload of manually drafting double reports and extracts, and enable more efficient patient information processing so as to achieve better treatment results.

- **Patients** receive high quality treatment thanks to the system, and they can see their medical data and communicate with health care professionals through it (make appointments, submit prescription renewal requests, submit blood pressure readings, etc.). This means that patients have to spend less time on the bureaucratic procedures which relate to treatment.

- **Handlers of official statistics** – medical institutions no longer need to draft reports manually in relation to various statistics, as data are constantly added to the information system. The state no longer has to gather the reports that are sent in and correct mistakes (the system automatically checks most of the input mistakes), and the handlers of statistics can concentrate on the content – data analysis and results interpretation.

- **Medical researchers** – at present it is all but impossible to engage in extensive medical research, as data are scattered, and their availabili-
and quality cannot be guaranteed. The development of medical science is possible largely thanks to research. The new system enables the use of impersonal data for various kinds of medical research, and this may well give a boost to the further development of medical science in Estonia.

THE STRUCTURE

The health information system can be viewed as a three-layered structure. The foundation is made up of various records (the dental record, the pregnancy record, the medical history, the health record – see Figure 1). Records can be in electronic or paper form. Information is gathered from these records into registers and is managed through the information system. This makes possible the drawing together of various data units and the systematic management and processing of same. In addition, it allows attending physicians to receive essential information. The data in registers and information systems can be used to conduct statistical and other kinds of research, as they are in unified form, easily accessed and processed. As far as the fields in which data are not gathered into registers are concerned, meanwhile, special research (surveys, etc.) can be carried out. The automated system can provide users with faster access to impersonal data and various indicators, enabling them to engage in complex analysis related to other fields, as well. The results of analyses can be applied at the individual and at the national level so as to prepare strategic political decisions and to evaluate the actual impact of national programmes and policies.

Because the Digital Health Record and the health information system do not exist outside the rest of the environment of state information systems, there are also various common grounds with systems that do not relate to the health care sector. The Digital Health Record has been elaborated on the basis of various technological prerequisites that have been set out in Estonia so as to avoid duplication of existing applications such as the ID card, the E-citizen portal and the X-Road project (the data exchange layer for information systems).

Given that the Estonian ID card handles the functions of authentication, signature and encryption, it is a very good tool for security risk management and plays a central role in the modern concept. The technological consistency of the ID card must be ensured first, however, so as to guarantee the existing functions now and in the future. Information that is submitted today should also be readable after a person has changed his or her ID card and received new certification.

Figure 3. The layered structure of the health information system

A well-functioning information system should provide doctors with more time for patient treatment and enable more efficient patient information processing to achieve better treatment results.
The Digital Health Record will also set out higher demands in relation to the X-Road project. The question is whether the X-Road project can guarantee the system’s functioning on a 24/7 basis. The information systems of hospitals, for instance, require the system to be operational 99.9% of the time, which means that it can be down for no more than 1.7 hours per year. As far as risk management is concerned, authentication through the E-citizen environment is important for the E-citizen and the X-Road programmes. Changes arising from the development of X-Road must also not pose any risks.

CURRENT ACTIVITIES

The present aim of the digital health record project is to prepare a pilot project, beginning in the autumn of 2004. It will involve one hospital, as well as the emergency medical care institutions and general practitioners of one region. The most important functions of the system are to be tested to a certain extent (passing along extracts from a medical history, transmitting lab information and patient examination results, inspection of the system of rights, etc.). After the pilot project is completed, it will be possible to implement the tested functionalities at the national level while continuing with the development of additional functionalities in the pilot location. The main functionalities should be in place at the national level by 2007.

Various activities are being carried out this year in parallel with the preparation of a public bid for tenders – improvements in the legal arena, elaboration of standards and classifications, specification and definition of various ethical issues and ethical limits, preparation of a PR programme, preparation of interfaces between the information systems of hospitals and those of general practitioners, development of the Code Centre of the State Agency of Medicines and the Prescription Centre of the Health Insurance Fund, as well as establishment of co-operation with professional associations, various umbrella organisations, interest and target groups, patient representatives and the public at large.