



Country Brief: Turkey

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About the *eHealth Strategies* study

The eHealth Strategies study analyses policy development and planning, implementation measures as well as progress achieved with respect to national and regional eHealth solutions in EU and EEA Member States, with emphasis on barriers and enablers beyond technology. The focus is on infrastructure elements and selected solutions emphasised in the European eHealth Action Plan of 2004.

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Executive summary

In terms of eHealth objectives for Turkey the Ministry of Health has outlined short-term goals for the Personal Health Record System, Health Data Sets, e-prescription, e-referral and e-identity projects as well as integration of National Health Information System (NHIS), the Family Medicine Information System (FMIS). For more long-term goals the plans include development and dissemination of Saglik-Net (Health-Net"), executing, developing and disseminating healthcare information standards, building a data warehouse and fostering data mining applications as well as increased use of telemedicine applications.

In order to consider Turkey's position regarding eHealth interoperability objectives the following eHealth applications have been examined: patient summaries and electronic health records, ePrescription, standards and telemedicine. In overview Turkey's situation is as follows:

In terms of electronic health records and patient summaries for Turkey there is Saglik-Net (Turkish for "Health-Net") an integrated information and communication platform which collects any kind of data produced in health institutions directly from where they were generated. In September 2005, Electronic Health Records were constructed within the Family Medicine application (FMIS). In parallel with the FMIS initialisation, the Health Coding Reference Server (HCRS), which provides a single source for the data which are coded in Electronic Health Records, also started serving FMIS.

ePrescription and eDispensation are being piloted in Bolu province. After piloting in Bolu is completed, it is planned to deploy these services to the whole country.

Related to standardisation is the National Health Data Dictionary (NHDD), a dictionary study, which is used as a reference by the information systems of healthcare organisations in Turkey and serves the purpose of creating a terminology union. NHDD has nothing to do with the electronic transmission techniques; it defines the model and content of the data to be collected. Electronic transmission is within the scope of NHIS Web Services. One of the important functions of the NHDD is listing the values that the data elements can have when they are created and making code lists by coding them. By this method, Health Coding Reference Server (HCRS), which shares code lists for all coded data that are collected from healthcare organisations, is developed.

The Ministry of Health initiated its first telemedicine project in 2007, which has been in use since 2008. There are plans to enlarge this project from 2010 to cover other regions.

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1 Introduction to the report

1.1 Motivation of the eHealth Strategies study

Following the *Communication* of the European Commission (EC) on “eHealth – making healthcare better for European citizens: An action plan for a European eHealth Area”,³ Member States of the European Union (EU) have committed themselves to develop and issue national roadmaps – national strategies and plans for the deployment of eHealth applications addressing policy actions identified in the European eHealth Action Plan.

The *2004 eHealth Action Plan* required the Commission to *regularly monitor* the state of the art in deployment of eHealth, the progress made in agreeing on and updating national eHealth Roadmaps, and to facilitate the exchange of good practices. Furthermore, in December 2006 the EU Competitiveness Council agreed to launch the *Lead Market Initiative*⁴ as a new policy approach aiming at the creation of markets with high economic and social value, in which European companies could develop a globally leading role. Following this impetus, the Roadmap for implementation of the “eHealth Task Force Lead Market Initiative” also identified better coordination and exchange of good practices in eHealth as a way to reduce market fragmentation and lack of interoperability.⁵

On the more specific aspects of electronic health record (EHR) systems, the recent *EC Recommendation on cross-border interoperability of electronic health record systems*⁶ notes under “Monitoring and Evaluation”, that “in order to ensure monitoring and evaluation of cross-border interoperability of electronic health record systems, Member States should: consider the possibilities for setting up a monitoring observatory for interoperability of electronic health record systems in the Community to monitor, benchmark and assess progress on technical and semantic interoperability for successful implementation of electronic health record systems.” The present study certainly is a contribution to monitoring the progress made in establishing national/regional EHR systems in Member States. It also provides analytical information and support to current efforts by the European Large Scale Pilot (LSP) on cross-border Patient Summary and ePrescription services, the epSOS - European patients Smart Open Services - project.⁷ With the involvement of almost all Member States, its goal is to define and implement a European wide standard for such applications at the interface between national health systems.

Earlier, in line with the requirement to “regularly monitor the state of the art in deployment of eHealth”, the EC already funded a first project to map national eHealth strategies – the eHealth ERA "Towards the establishment of a European eHealth Research Area" (FP6 Coordination Action)⁸ - and a project on "Good eHealth: Study on the exchange of good

³ European Commission 2004

⁴ European Commission 2007

⁵ European Communities 2007

⁶ European Commission 2008

⁷ European Patients Smart and Open Services (epSOS)

⁸ eHealth Priorities and Strategies in European Countries 2007

practices in eHealth⁹ mapping good practices in Europe - both of which provided valuable input to the present *eHealth Strategies* work and its reports. Member States' representatives and eHealth stakeholders, e.g. in the context of the *i2010 Subgroup on eHealth* and the annual European High Level eHealth Conferences have underlined the importance of this work and the need to maintain it updated to continue to benefit from it.

This country report on Turkey summarises the main findings and an assessment of progress made towards realising key objectives of the eHealth Action Plan. It presents lessons learned from the national eHealth programme, planning and implementation efforts and provides an outlook on future developments.

1.2 Survey methodology

After developing an overall conceptual approach and establishing a comprehensive analytical framework, national level information was collected through a long-standing Europe-wide network of national correspondents commanding an impressive experience in such work. In addition, a handbook containing definitions of key concepts was distributed among the correspondents to guarantee a certain consistency in reporting. For Turkey Prof. Dr. Asuman Dogac, Dr. Ünal Hülür, Dr. Ali Kemal Çaylan and Mustafa Yuksel provided information on policy contexts and situations, policies and initiatives and examples for specific applications. Prof. Dr. Asuman Dogac is the founder and manager of SRDC Ltd. and a full-time professor at the Middle East Technical University (METU), Computer Engineering Department. Her expertise includes semantic Web, interoperability, Internet computing, eHealth standards and profiles, eHealth infrastructures, conformance and interoperability testing, and eBusiness. She has been consulting the industry and government organisations and has been the coordinator of various projects in the FP6 IST and FP7 ICT programs, including several eHealth projects. Dr. Ünal Hülür is the Head of the Department of Administrative and Financial Affairs of the Ministry of Health and leads the eHealth projects of the Ministry. He has successfully completed certification programs of Harvard School of Public Health in the issues of reform in health sector, sustainable health finance and quality in health services. Dr. Ali Kemal Çaylan is the Coordinator of the Information Technologies Division in the Department of Administrative and Financial Affairs of the Ministry of Health. He completed Health Management program in Virginia University Richmond, USA and attended other international and local certificate programs on Health Politics, Health Finance, Health Quality Improvement and Security in Health Systems. Mustafa Yuksel is a senior researcher and software engineer in SRDC Ltd. His expertise includes eHealth standards and profiles, wide-scale eHealth infrastructures, cross-border EHR exchange, Decision Support Systems and semantic interoperability. He has been on the consultancy team of SRDC Ltd. on eHealth since 2007. He is a PhD candidate in METU Computer Engineering Department. Relevant information on policy contexts and health system situation, policies and initiatives as well as examples for specific applications was collected by the overall project lead - empirica in Bonn, Germany.

⁹ European Commission; Information Society and Media Directorate-General 2009

The key tool to collect this information from the correspondents was an online survey template containing six main sections:

- A. National eHealth Strategy
- B. eHealth Implementations
- C. Legal and Regulatory Facilitators
- D. Administrative and Process Support
- E. Financing and Reimbursement Issues
- F. Evaluation

Under each section, specific questions were formulated and combined with free text fields and drop-down menus. The drop-down menus were designed to capture dates and stages of development (planning/implementation/routine operation). In addition, drop-down menus were designed to limit the number of possible answering options, for example with regard to specific telemedicine services or issues included in a strategy document. The overall purpose was to assure as much consistency as reasonably possible when comparing developments in different countries, in spite of the well-known disparity of European national and regional health system structures and services.

Under Section B on eHealth implementation, questions regarding the following applications were formulated: existence and deployment of patient and healthcare provider identifiers, eCards, patient summary, ePrescription, standards as well as telemonitoring and telecare.

The data and information gathering followed a multi-stage approach. In order to create a *baseline* for the progress assessment, the empirica team filled in those parts of the respective questions dealing with the state of affairs about 3 to 4 years ago, thereby drawing on data from earlier eHealth ERA reports, case studies, etc. to the extent meaningfully possible. In the next step, national correspondents respectively partners from the study team filled in the template on recent developments in the healthcare sector of the corresponding country. These results were checked, further improved and validated by independent experts whenever possible.

Progress of eHealth in Turkey is described in chapter 3 of this report in the respective thematic subsections. The graphical illustrations presented there deliberately focus on key items on the progress timeline and cannot reflect all activities undertaken.

This report was subjected to both an internal and an external quality review process. Nevertheless, the document may not fully reflect the real situation and the analysis may not be exhaustive due to focusing on European policy priorities as well as due to limited study resources, and the consequent need for preferentially describing certain activities over others. Also, the views of those who helped to collect, interpret and validate contents may have had an impact.

1.3 Outline

At the outset and as an introduction, the report provides in chapter 2 general background information on the *Turkish* healthcare system. It is concerned with the overall system

setting, such as decision making bodies, healthcare service providers and health indicator data.

Chapter 3 presents the current situation of selected key eHealth developments based on detailed analyses of available documents and other information by national correspondents and data gathered by them through a well-structured online questionnaire. It touches on issues and challenges around eHealth policy activities, administrative and organisational structure, the deployment of selected eHealth applications, technical aspects of their implementation, legal and regulatory facilitators, financing and reimbursement issues, and finally evaluation results, plans, and activities

The report finishes with a short outlook.

2 Healthcare system setting

2.1 Country introduction¹⁰

Healthcare is provided by a mixture of public and private organisations, including the Ministry of Health (MoH), universities, the Ministry of Defence and private health professionals.

Primary healthcare is provided through general practitioners, health centres, health posts, Maternal and Child Health (MCH) and Family Planning (FP) centres as well as tuberculosis dispensaries. Several reforms have been applied in order to standardise health benefits across the different health insurance schemes. In 2007, legal measures mandated that all citizens of Turkey would have free access to primary care, even if they are not covered under the social security system. By the end of 2010, family medicine will be in practice in the whole country.

The health status of Turkey's population has improved in general. Population growth has decreased and Urbanisation increased, with now almost 75% of the population living in urban areas. The increase in urban dwellers is coupled with access to healthcare being better in the urban and western areas of the country.

Since 1999, Turkey has been a candidate for membership in the European Union (EU); this is a major objective of the Government, with changes occurring in economic, political and social policy. The Government's health reform agenda, the "Health Transformation Programme" (HTP), supports this vision as does the Law on Changing Social Security and General Health Insurance Law.

The box below summarises the key facts about the Turkish healthcare system:

¹⁰ World Health Organization 2009

Key facts about the Turkish healthcare system:¹¹

Population: 72,561,312

Life expectancy at birth: 74 years

Healthcare expenditure as % of GDP: 5.0% (WHO 2007)

2.2 Healthcare governance

Decision making bodies, responsibilities, sharing of power

The MoH is the main government body responsible for health sector policy making, implementation of national health strategies through programmes and direct provision of health services. MoH is the major provider of primary and secondary healthcare, maternal health services, children's and family planning services. It is essentially the only provider of preventive health services through an extensive network of health facilities (health centres and health posts) providing primary, secondary, and specialised in-patient and out-patient services. As of 2010, MoH has 890 hospitals and approximately 6,000 health centres – about twice as many as a decade ago.

The MoH currently comprises seven general directorates: (i) Primary Healthcare; (ii) Curative Services; (iii) Mother and Child and Family Planning; (iv) Pharmacy; (v) Health Education; (vi) Personnel and (vii) Borders and Maritime Health. The organisation is essentially structured along vertical lines of responsibility reflected in the topic-based, functional divisions within each directorate, also at the provincial level and, to a certain extent, in health centres and posts.

At the provincial level, provincial health directorates (for 81 provinces) are responsible for administering health services provided by the MoH. The provincial health directorates are accountable to provincial governors for administrative matters and to the MoH for technical matters. Directors of MoH hospitals report to the Director General of Curative Services, while Directors of Health Centers report to the Director General of Primary Healthcare.

Aside from the hierarchical structure there are also various management systems in place under the direction of the Ministry of Health to ensure the smooth running of the healthcare system as a whole. One of these systems is Human Resources Management System (HRMS), which provides a monitoring service for staff information and activities under the Ministry of Health. HRMS is a very comprehensive system. 325,000 employees and 150,000 retired/left personnel's information is hosted on it. This system is used by the General Directorate of Personnel and the central organisation in particular and 81 Provincial Directorates of Health, hospitals and Public Health Centres. The system has more than 15,000 active users.

Another supportive system is Investment Tracing System (ITS) which organises the allocation of the financial resources of the Ministry of Health according to the needs. It distributes the resources between the ministry units, using and monitoring them. It

¹¹ Data from World Health Organization 2000; Health Consumer Powerhouse 2008; World Health Organization 2009

contains these sub-modules: Investment Information System, Building Information System and Direct Supply Procedures.

Also in use is Private Health Organizations Management System (HOMS) which makes it possible to monitor the hardware of private health organisations, licensing, all staff working at private hospitals and all process steps of private health organisations.

Healthcare service providers

For primary healthcare, citizens are able to choose their GP and access to primary care is free. When a GP is officially off work, e.g. for a holiday or other reasons, all of his patients are assigned to a proxy GP so that neither his patients nor himself face a medically or financially disadvantaged situation. Apart from that, citizens are free to change their GPs at any time, as long as the geographic constraints are satisfied.

Public healthcare service providers constitute the majority in terms of secondary and tertiary healthcare. As of June 2010, there are 1033 public secondary and tertiary healthcare providers and 579 private and university hospitals in Turkey.

Developments are currently occurring in terms of accessibility of healthcare for citizens. An important national project in Turkey is the Centralized Hospital Appointment System (CHAS) that is currently being piloted in Erzurum, Kayseri and Yalova provinces. CHAS enables the citizens to make appointments in any public secondary and tertiary healthcare provider together with Mouth and Teeth Health Centres by calling the CHAS Call Centre phone number "182". The citizens are assisted by online operators during phone calls. All the healthcare professionals from public secondary and tertiary healthcare providers share their calendars of at least 15 days with the MoH through CHAS Web Services to enable operators to make appointments according to these calendars. One of the ambitious targets of MoH is the piloting of CHAS in all 81 provinces by the end of 2010.

Currently, only the responsible operators working in the Call Centre can make appointments. By the end of year 2010, GPs will be provided with a Web interface to the CHAS in order to make online referral of their patients immediately to secondary or tertiary healthcare providers. Hence, when leaving his GP, the patient will already know whom to visit and when to visit in case of a referral.

Figure 1: Important features of primary healthcare organisation in Turkey

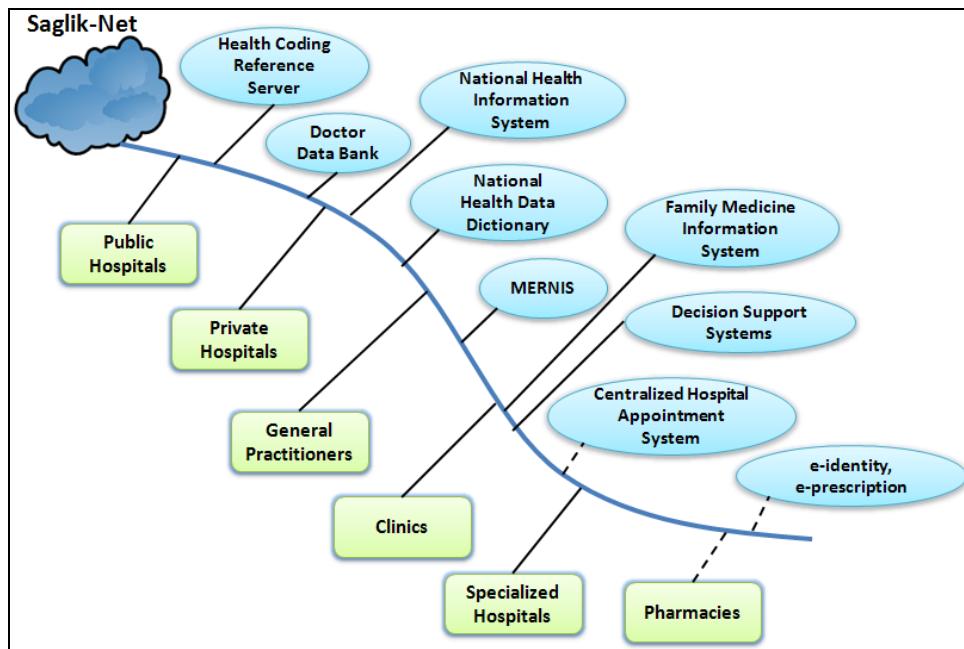
Political/administrative unit responsible for primary healthcare	The MoH currently comprises seven general directorates: (i) Primary Healthcare; (ii) Curative Services; (iii) Mother and Child and Family Planning; (iv) Pharmacy; (v) Health Education; (vi) Personnel and (vii) Borders and Maritime Health. Responsibility is allocated according to field and then at provincial level.
Consumer Choice	Free choice of GP within geographical constraints. Free access to primary care.
Financing	The majority comes from general government revenue. Secondary and tertiary healthcare depends on the choice of consumers; can be public or private.
Public or private providers	Ministry of Health is the main provider of primary healthcare.
Gatekeeping function of the GP	GPs make direct written referrals to specialists in secondary and tertiary care providers. Citizens are also able to make an appointment with any public secondary and tertiary provider via CHAS call centre in the piloting sites of CHAS. Soon, CHAS will be available in the whole country and GPs will have their dedicated CHAS interfaces for making online referrals.
Integrating health: initiatives for coordination	Public hospitals (large majority) are financially supported by the local authorities of patient's residence. Deficits of those hospitals are covered by patient's local authorities. Local coordination between primary care and hospital care is managed by Province/County Health Directorates and Public Health Centres. In addition, there is information sharing between the National Health Information System (NHIS) and the Family Medicine Information System (FMIS) for informing GPs about the updates of their patients in secondary/tertiary care providers.

2.3 Recent reforms and priorities of health system/public health

A priority for Turkey has been the creation and establishment of the major health information systems of the Ministry of Health, Turkey, namely, the Saglik-Net (Turkish for “Health-Net”), the National Health Information System (NHIS), the Family Medicine Information System (FMIS), the Centralized Hospital Appointment System (CHAS) and the Core Resources Management System (CRMS).

The Saglik-Net is an integrated, secure, fast and expandable information and communication platform which collects data produced in health institutions directly from where they were generated, in accordance with standards, and aims to increase the efficiency in health services by generating appropriate information for all stakeholders from these collected data. NHIS, FMIS, CHAS, ePrescription and Telemedicine projects are all part of the Saglik-Net, which can be termed as the “umbrella” eHealth project of the MoH.

Figure 2 Saglik-Net 2010



In the last decade, Turkey has made considerable reforms in the way healthcare is delivered to citizens and healthcare information is collected from the healthcare providers. In comparison to many other countries, Turkey was late in migrating to the family medicine system. Since the introduction of the Health Transformation Programme in 2002, Turkey has progressed quickly with its Family Medicine Programme and the supporting Family Medicine Information System (FMIS) by the help of incremental pilot deployments. The legislation on the Family Medicine Pilot Application was passed in November 2004. This legislation was followed by regulations on the pilot application, its financing and the contracts in the summer of 2005. After the law and the regulations were put in place, the first pilot application started in September 2005 in Duzce province. Since then, the family medicine programme and the pilot applications have been expanding very rapidly in Turkey. The dissemination of the family medicine will be completed by the end of 2010.

The success of the incremental FMIS pilots influenced the development of the National Health Information System which is a national Web Service based infrastructure for collecting Electronic Health Records (EHRs) from all secondary and tertiary healthcare providers in the country. In 2007, the NHIS contract was signed. As a result of fast development, deployment and testing activities, NHIS became operational in summer 2008. Since January 2009, public and private healthcare providers have been sending their EHRs to NHIS daily. As of June 2010, the average number of EHR instances that are sent by the Hospital Information Systems (HIS) and successfully recorded in the NHIS has reached 1.5 million a day. Regarding incentives/penalties, the Ministry of Health published a regulation that declares the mandate to all public/private secondary and tertiary care providers to send EHRs to the NHIS. The healthcare organisations that are successfully connected to NHIS are publicly listed in the MoH Web portal to create an incentive.

One of the major objectives of collecting healthcare data through FMIS and NHIS is running Decision Support Systems (DSSs) on the collected data to enable aggregated

and effective information easily for especially decision makers. FMIS already has a well-functioning DSS that can give the picture of primary care for the overall country.

In Turkey, all employed people and their families are members of one of the public insurance organisations. An important reform in this area has been uniting all of the public insurance organisations under the umbrella of National Security Organization and merging various public insurance schemes provided by these organisations (e.g. one scheme for officers, one for the working class) under the National Insurance System. Previously, public insurance did not cover expenses in private hospitals. Now, the patients with public insurance can freely select public or private hospitals. The reimbursement rates vary according to private service provider and the operation but limits are set by the Ministry of Health.

Currently ongoing reforms in the health and social care systems

First of all, the major item in the agenda of Ministry of Health is the law on eHealth. This law will clearly define the scope of Electronic Healthcare Records in Turkey and set the responsibilities of involved parties such as healthcare professionals. Turkey's eHealth law is ready and it is expected that it will pass soon. Once this law is in action, plans for the 2nd phase of NHIS are on the agenda. Yet, Saglik-Net is a collection of systems which mainly collect data. After the essential legal structure is constructed, it will be made possible for authorised healthcare professionals to reach their patients' healthcare data whenever they wish, and wherever they are. Furthermore, this law will enable the necessary online consent mechanisms for realisation of a Personal Health Record (PHR) system enabling active involvement of patients in the management of their own healthcare. In fact, MoH already started piloting of a national PHR system together with SRDC Ltd.

Currently, the NHIS (National Health Information System) and FMIS (Family Medicine Information System) are not yet connected, i.e. a citizen has two different accounts in NHIS and FMIS that are not linked yet. One of the high priority objectives of the MoH is the integration of FMIS and NHIS. For this purpose, there are several planned steps. First of all, starting from July 2010, the GPs will be able to access the data of their patients that are stored within NHIS. Every morning a GP will see, in his FMIS client, the list and records of patients who had visits to a secondary or tertiary healthcare provider the previous day. Then, by the end of 2010, FMIS side will start using the HL7 CDA based schemas of the NHIS for common Minimum Health Data Sets, e.g. Vaccine, Puerpera Observation, etc. This will be a major advantage for vendors who are developing both Hospital Information Systems and FMIS clients. Finally, the complete integration of FMIS and NHIS databases is on the agenda for 2011.

Last but not least, widening the coverage of ongoing Centralized Hospital Appointment System (CHAS), ePrescription and Telemedicine applications is again on the agenda of MoH.

2.4 ICT use of general practitioners

This section will give a brief overview of important ICT related infrastructure and services data.

The FMIS (Family Medicine Information System) software is a key player in the ICT use of a general practitioner. FMIS is a system via which General Practitioners register their patients, observe their status and can refer them to hospitals. FMIS is a national infrastructure providing a combination of EHR, patient tracking, referral and clinical decision support systems. It is based on the principle that each individual has a family physician (general practitioner - GP) to take care of his/her health; that is, the primary care services. The client applications that are used by the GPs can work both in online and offline modes. They can either record patient observations locally and synchronise with the MoH FMIS Web Services immediately, or synchronise the local data later. The second approach is especially useful when the GPs visit their patients in the rural areas together with their laptops.

The FMIS Performance Evaluation System is also used to evaluate the performance of the General Practitioners with particular regard to immunisations, infant and pregnancy observations, referrals to hospitals and the care of immobile patients. GPs have a baseline salary and based on the calculation of their performance scores automatically by the FMIS, their salaries change each month. When they complete all the expected observations, their salaries are increased. In the opposite case, they can even go below their baseline salaries. Each GP is responsible for 3400-3500 citizens and through the FMIS Decision Support System (DSS) GPs are able to dynamically monitor their own performances. For each month, they are expected to synchronise all patient data till the 7th day of the following month, when the salaries of all GPs are automatically calculated by the FMIS according to their performance scores.

Another use of FMIS is that it is possible to collect very detailed statistics through the FMIS Decision Support System. As of June 2010, out of 81 provinces of Turkey, family medicine is being applied in 43 of them. By the end of 2010, it will be in practice in all provinces; the deployment and the education of healthcare staff is proceeding in parallel in multiple provinces. As of June 2010, the FMIS usage statistics are as follows:

- The number of registered patients: 26,941,729
- The number of registered general practitioners: 9,168
- The number of stored healthcare records: 137,202,811

The Ministry of Health distributes a FMIS client application to GPs for free. On the other hand, some GPs opt for using FMIS client applications by 3rd party vendors, for example, in Manisa and Samsun provinces.

3 eHealth Strategies survey results

The following sections present the results of the eHealth Strategies country survey. In a first section, the eHealth policy actions undertaken in Turkey are presented. This is followed by a presentation of administrative and organisational measures taken. Section 3.3 presents results on key eHealth applications. Section 3.4 focuses on the technical side of eHealth, namely the role of patient and healthcare provider identifiers and the role

of eCards. Legal and regulatory facilitators as well as financing and reimbursement issues are presented in the following chapters, 3.5 and 3.6. The report concludes with evaluation activities (3.7) in the country and an outlook (4.).

3.1 eHealth policy action

The eHealth strategies of EU and EEA countries are not always labelled as such. Some countries may indeed publish a policy document which refers to the ICT strategy in the healthcare sector. Other countries such as France and Germany have enshrined the central eHealth activities in legislation governing the healthcare sector. In Germany, the relevant law is the law on the modernisation of healthcare; in France the introduction of an electronic medical record is included in a law concerning social security.

Sometimes, also documents from domains such as eGovernment or Information Society strategies may contain provisions which concern eHealth. In cases where the healthcare system is decentralised, i.e. where power is delegated to the regional level, there may even be strategy documents regarding eHealth from regional authorities.

3.1.1 Current strategy/roadmap

The objectives of the Ministry of Health for 2010-2011 are as follows:

- The completion of the integration to the NHIS by all responsible healthcare organisations.
- Increasing data sharing between NHIS and FMIS by increasing the integration between them.
- Starting testing Personal Health Record System as a pilot in order to make the patients active in the management of their own healthcare.
- Activation of Centralized Hospital Appointment System which is being piloted in 3 provinces to all over Turkey.
- Preparing Administrative and Financial Data sets as in Health Data Sets, collecting this information from the field.
- Continuing the e-prescription, e-referral and e-identity projects which are currently being piloted.
- Automatic generation of all regional and national statistical health data based on NHIS and FMIS.

In the long run, the eHealth strategies of the Ministry for 2010-2014 are as follows¹²:

1. Further development and dissemination of Saglik-Net until the end of 2014 for the management and planning of healthcare information through a single framework.
2. Executing, developing and disseminating healthcare information standards until the end of 2014 for increasing the access of healthcare providers and consumers to eHealth applications.

¹² Turkish Ministry of Health 2010

3. Defining and executing the security and privacy of both personal and organisational healthcare records until the end of 2010, within the scope of information security and protection of personal privacy.
4. Building the data warehouse and fostering data mining applications on the collected data for the decision makers and healthcare planners until the end of 2011, within the scope of Decision Support Systems.
5. Dissemination of Telemedicine applications in at least 15% of the public hospitals until the end of 2014 for providing remote healthcare services in the domain of imaging (radiology, pathology, ECG, etc.) and for tracking patients with chronic diseases.

3.2 Administrative and organisational structure

In Turkey, the Ministry of Health has full responsibility for defining and executing eHealth policies. The management of the policies is done centrally at the Ministry while local responsibilities for monitoring the activities are assigned to Provincial and County Health Directorates. For example, when a new legislation is made and approved by the Ministry, it is sent to the Provincial Health Directorates which then distribute it to interested public/private healthcare service providers. Communication with the Healthcare Information System vendors is usually through the Department of Administrative and Financial Affairs of the MoH and the healthcare providers who are free to select their vendors.

The MoH and its sub-directorates organise periodic and non-periodic meetings with the healthcare providers, consumers and vendors before, during and after definition of eHealth policies for collecting feedback directly from the involved parties.

3.3 Deployment of eHealth applications

3.3.1 Patient summary and electronic health record (EHR)

In this study, the epSOS project's definition¹³ of a patient summary was used as a general guideline. There a patient summary is defined as a minimum set of a patient's data which would provide a health professional with essential information needed in case of unexpected or unscheduled care (e.g. emergency, accident), but also in case of planned care (e.g. after a relocation, cross-organisational care path).

Lacking a standard definition, a patient's electronic health record (EHR) is here understood as an integrated or also interlinked (virtual) record of ALL his/her health-related data independent of when, where and by whom the data were recorded. In other words, it is an account of his diverse encounters with the health system as recorded in patient or medical records (EPR or EMR) maintained by various providers like GP, specialists, hospitals, laboratories, pharmacies etc. Such records may contain a patient summary as a subset. As of yet, fully-fledged EHR systems rarely exist, e.g. in regional

¹³ European Patients Smart Open Services

health systems like Andalucia in Spain or Kronoberg in Sweden, or in HMOs (health maintenance organisations) like Kaiser Permanente in the USA.

It should be noted that in most policy documents reference is made simply to an "EHR" without any explanation of what is meant by it, thereby in reality even a single, basic electronic clinical record of a few recent health data may qualify. As a consequence, this section can only report on national activities connected to this wide variety of health-related records without being able to clearly pinpoint what (final) development stage is actually aimed for or has been reached so far.

The Saglik-Net (Turkish for "Health-Net") is an integrated, secure, fast and expandable information and communication platform which collects any kind of data produced in health institutions directly from where they were generated, in accordance with standards, and aims to increase the yield and efficiency in health services by generating appropriate information for all stakeholders from these collected data¹⁴.

In September 2005, Electronic Health Records were constructed within the Family Medicine application, and data collection from the pilot provinces in which the Family Medicine is beginning to be applied. FMIS (Family Medicine Information System) application follows an individual from the time of his conception and maintains the information on his health, which is continuously synchronised with the health records in the centralised servers of the MoH, Turkey via FMIS Web Services. It is possible to retrieve data from the MoH FMIS central servers. For example, when a citizen moves to a new city or a district, his GP will change. The new GP is able to retrieve all previous records of his new patient available from the MoH servers into his FMIS client application through the Web Services.

In parallel with the FMIS initialization, the Health Coding Reference Server (HCRS), which provides a single source for the data which are coded in Electronic Health Records, started serving FMIS for the first time. In 2007, the National Health Information System (NHIS) contract was signed. 1.0 Version of National Health Data Dictionary (NHDD), which defines the model and the content of the data which are to be collected from healthcare organisations, was published.

NHDD version 1.1 was published in 2008. HCRS 2.0 that shares the coded data which are defined in NHDD 1.1 was implemented. The implementation of the HL7 CDA R2 and HL7 Web Services Profile based NHIS Web Services for collecting EHR from healthcare providers all over Turkey preceded in 2008. Starting from November 2008, the healthcare organisations which completed their integration to the NHIS services started sending real healthcare data. By January 2009, it was observed that a high level of participation of National Health Institutions was provided, and that private and university health institutions' participation had increased day by day. The functional and interoperability testing of both Hospital Information Systems by around 60 vendors and the NHIS Web Services together with the NHIS Integration Workshops organised with the support of TestBATN^{15, 16, 17} testing framework played an important role in fast integration to the NHIS.

¹⁴ Sağlık-NET

¹⁵ SRDC Yazılım Araştırma & Geliştirme ve Danışmanlık [SRDC Software Research & Development and Consulting] 2008

In preparation for this increase and after functional testing, the performance of NHIS was tested under heavy load. Performance testing started in September 2008 and ended in December 2008. During this period, millions of EHR documents have been exchanged with the NHIS Web Services. These tests revealed that the system had some performance issues, such as memory, logging and response time problems. As a result, several enhancements, most of which are software related, have been realised on the services.

In 2009 and 2010, studies have been continued by both the Ministry of Health and the healthcare organisations. Ministry of Health progressed with improvement work in the NHIS and made it satisfactory enough to carry the load of the complete country. By June 2010, all public hospitals and more than 70% of private and university hospitals had completed their integration to the NHIS, and became able to send the patients' daily Electronic Health Records. Out of the 72 million citizens of Turkey, electronic healthcare records of 43 million citizens have already been created in NHIS. The average number of EHR instances that are sent by the Hospital Information Systems (HIS) and successfully recorded in NHIS has reached 1.5 million a day.

Aside from the ability to function under heavy load the most important advancement of the National Health Information System (NHIS) Project is the standards based Web Services that are used to collect information from the field. The purpose of these Web Services is to collect data from healthcare organisations, where it is produced, and store them in the servers of the Ministry of Health. Data flow is one-way; the users are not able to get data (such as retrieving the examinations of a patient). There are no technical problems, but there are privacy issues; hence, firstly the e-health law should be passed.

Apart from NHIS Web Services, the biggest Web Service group is the FMIS Web Services. The objective of these services is assisting general practitioners in fulfilling their tasks defined with the laws. Data flow is two-way in these services; in addition to sending data to the Ministry of Health about his patients, the GP can also retrieve data about his patients when needed. For example, before a pregnancy follow-up, the GP can view the patient's past pregnancy follow-ups.

Currently, only General Practitioners can access the EHRs of their patients. In the near future, after the legal framework is completed, the proper patient consent mechanisms will be developed so that these EHRs will also become accessible to the authorised healthcare professionals in the secondary and the tertiary healthcare. For this purpose currently the implementation of a Personal Health Record system on top of NHIS is progressing which will not only allow patients to define their consent but also allow them to access their own healthcare information.

3.3.2 ePrescription

In the framework of this study and following work in epSOS¹⁸, ePrescription is understood as the process of the electronic transfer of a prescription by a healthcare provider to a

¹⁶ Namli T Aluc G Sinaci A Kose I Akpinar N Gurel M Arslan Y Ozer H Yurt N Kirici S Sabur E Ozcam A Dogac A 2008

¹⁷ Namli T and Dogac A 2010

¹⁸ European Patients Smart Open Services

pharmacy for retrieval of the drug by the patient. In this strict sense, only few European countries can claim to have implemented a fully operational ePrescription service.

ePrescription and eDispensation are being piloted in Bolu province together with the National Electronic Identity Card of Turkey. After piloting in Bolu is completed, it is planned to deploy these services to the whole country. There is a need for more progress with the integration to the National Insurance Organization before this can happen.

3.3.3 Telemedicine

The use of telemedicine applications is recognised as beneficial to enable access to care from a distance and to reduce the number of GP visits or even inpatient admissions. Commission services define telemedicine as “the delivery of healthcare services through the use of Information and Communication Technologies (ICT) in a situation where the actors are not at the same location”¹⁹. In its recent communication on telemedicine for the benefit of patients, healthcare systems and society, the Commission re-emphasises the value of this technology for health system efficiency and the improvement of healthcare delivery²⁰.

The Ministry of Health initiated its first telemedicine project in 2007, which has been in use since 2008. It proposes the following features; overcoming the lack of experts in imaging area, obtaining the second opinion of experts in complex cases, increasing the quality of patient care and providing best diagnosis and cure for the patients. The project has been applied to the domains of Radiology and Pathology.

The project includes 14 public hospitals scattered around Turkey. Nine of them, that reside in rural areas, are termed as sending hospitals (require consultation) and 5 of them, that reside in the capital city Ankara, are termed as receiving hospitals (provide reporting services). The servers at the Ministry of Health act as a gateway. The healthcare professionals in the rural areas are able to request consultation from receiving hospitals via electronically sending radiology or pathology images.

Since 2008, the scope of the telemedicine project stayed rather stable. However, starting from 2010 telemedicine is again among the top priorities of the MoH. Soon, the scope of the project will be enlarged to cover other regions.

3.4 Technical aspects of implementation

A key prerequisite for the establishment of an eHealth infrastructure is the ability to uniquely identify citizens/patients and healthcare professionals. This part of the survey deals with identifiers and how they are stored. This section does not deal with the tokens through which identification can or will take place. One such possibility would be via an eCard. This topic is dealt with in the following section. The current section focuses solely on whether or not unique identifiers are in place in Turkey and for which purpose.

¹⁹ Europe's Information Society

²⁰ European Commission 2008

3.4.1 Unique identification of patients

In Turkey, every citizen has a unique identity number called citizenship number and these are used as patient identifiers; which prevents the challenge of patient identifier mapping in cases where each healthcare provider uses a different identifying scheme. The citizen identity numbers are maintained in a system called MERNIS (The Central Civil Registration System)²¹ and the patient identifiers in the EHRs sent to NHIS and FMIS are validated through this system. In addition to the citizenship numbers, the healthcare providers are free to maintain their local patient identifiers if they wish to do so.

3.4.2 Unique identification of healthcare professionals

In Turkey, a medical doctoral work permit is given by the Ministry of Health. Until recently, the information about the doctors that are given a doctoral work permit throughout the history of the republic was kept in books. Since 2006, with the Doctor Data Bank (DDB) Project, all healthcare professional information (such as demographics, diploma and expertise information) is being recorded by mapping them to Turkish Citizenship numbers and this database was opened for use via the Web. As of June 2010, there are 187,181 registered healthcare professionals in the DDB. This includes all the healthcare professionals who obtained a license since 1923.

DDB is also very important for the National Health Information System. In the messages that are sent to the NHIS Web Services (Transmission Schemas), Turkish Citizenship numbers of the doctors who performed the operation are requested within some data elements. Finding a physician's identity number in a message in the DDB is not enough; all information about the physician must be absolutely available. Otherwise, an error message is sent to the person/software who sent the message. The physicians who are not registered in the DDB or have incomplete information must consult the Provincial Health Directorates.

3.4.3 The role of eCards

As mentioned in the ePrescription section, eCards are being piloted within the scope of National Electronic Identity Card project of Turkey. This project is led by the Scientific and Technical Research Council of the Turkish Republic (TUBITAK) and it is based on the unique national citizenship numbers. The piloting studies are in progress in Bolu province, thousands of eCards have already been distributed to citizens. For testing and evaluation purposes, ePrescription is selected as the pilot application of the National Electronic Identity Card which is in fact a generic eIdentity solution for all eServices. This project is one of the top priority eGovernment projects of Turkey. Once piloting in Bolu leads to success, it will be deployed to the whole country.

3.4.4 Standards

Standards are not only crucial to enable interoperable exchange of meaningful information in the healthcare system; they also ensure secure access to patient records by healthcare providers and citizens. This study aims to identify, among other usage,

²¹ General Directorate of Civil Registration and Nationality 2008

standards related to the domain of health informatics, such as the SNOMED Clinical Terms or the LOINC terminology.

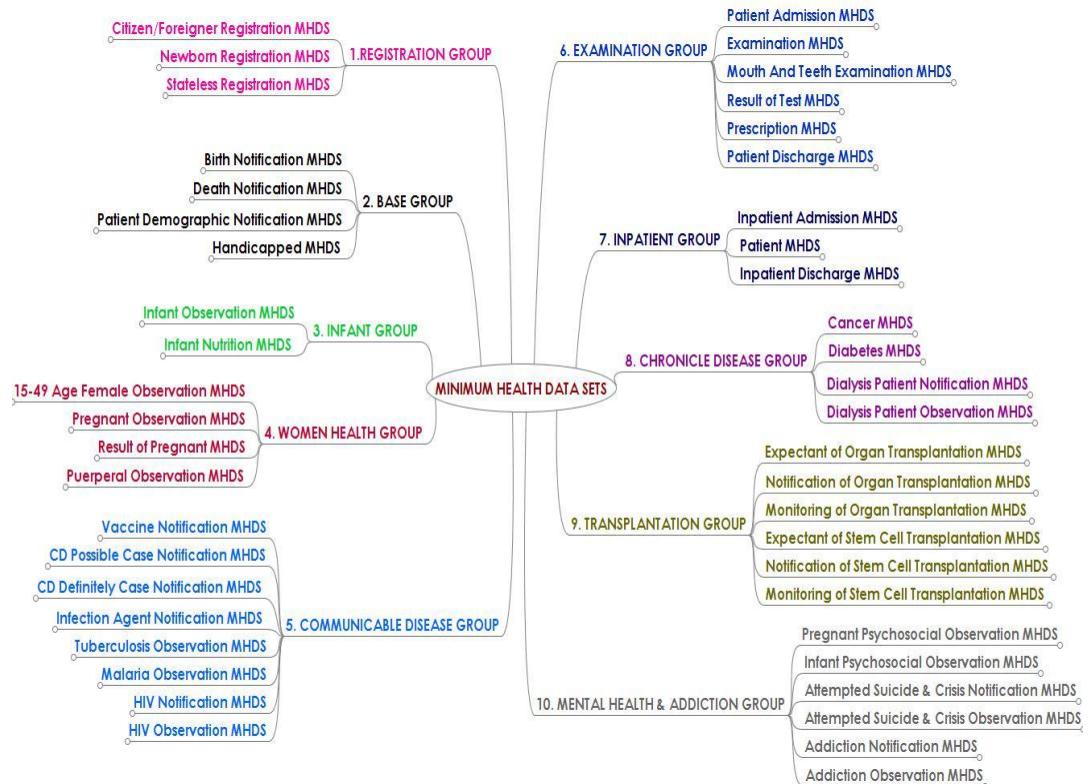
National Health Data Dictionary (NHDD) is a dictionary study, which is used as a reference by the information systems of healthcare organisations in Turkey and serves the purpose of creating a terminology union. It was created by Health Data Standards Development Commission of the Ministry of Health. Version 1.0 was published in September 2007, and the last version, which is 1.1, was published in January 2008²².

NHDD consists of data elements, Minimum Health Data Sets (MHDS), Transmission Schemas. MHDSs consist of data elements, and Transmission Schemas consist of MHDSs. There are 261 data elements, 46 MHDSs and 41 Transmission Schemas in total. Data elements are the smallest structural elements in the dictionary. Data elements define the meaning of a datum which is to be acquired from healthcare organisations, its format, the possible values that it can have, in which MHDSs it can appear, and the relations with other data elements.

Minimum Health Data Sets are the building structures of information based management approach of the Ministry of Health. MHDSs define the data groups which have the minimum content that is to be collected from the field. The purpose of MHDSs is to serve the electronic transmission of the data from all healthcare organisations to the Ministry of Health in a common and standard way. The important point here is that, NHDD has nothing to do with the electronic transmission techniques; it defines the model and content of the data to be collected. Electronic transmission is within the scope of NHIS Web Services.

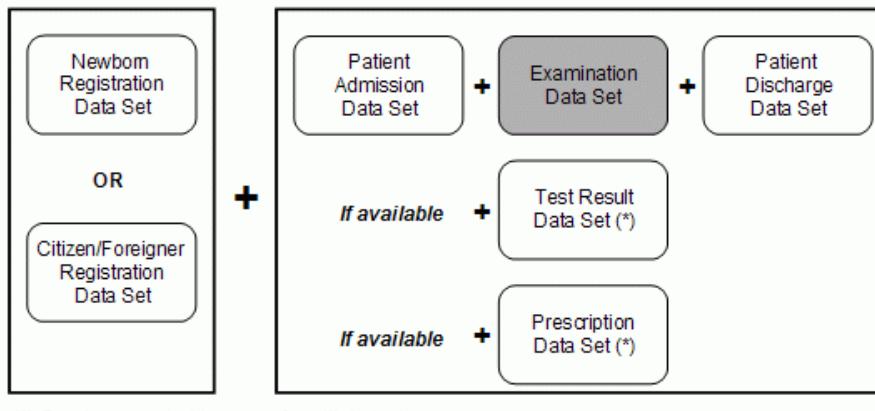
Figure 4 Minimum Health Data Sets in the NHDD

²² Sağlık Bakanlığı Bilgi İşlem Daire Başkanlığı [Ministry of Health- Department of Information Processing] 2008



Transmission Schemas go one level up and constitute the packages which healthcare organisations are responsible for sending. The aim here is to benefit from the reusability of MHDSs in various package combinations. For example, an Examination MHDS includes only examination related data elements, such as diagnosis, complaints, findings, and it doesn't contain any information about the identity of the patient. As a result, while sending an Examination package, a Citizen/Foreigner Registration or Newborn Registration MHDS should be attached to the Examination MHDS. The complete Examination Schema is shown graphically in Figure .

Figure 5 Examination Transmission Schema



NHIS Web Services are prepared according to Transmission Schemas. There is a dedicated Web Service for each Transmission Schema. Therefore Transmission Schemas are also known as Notification Packages. Each Transmission Schema is mapped to HL7 Clinical Document Architecture (CDA) Release 2. NHIS Web Services are totally conformant to HL7 version 3 Web Services Profile, and CDA based Transmission Schemas form the payload of these Web Service messages.

The data elements in the MHDSs can be optional and/or repeatable, so can MHDSs in the Transmission Schemas. In addition to this, some data elements can be conditional according to the existence and values of other data elements. For instance, if patient admission method is selected as “referral”, referral diagnosis has to be entered as well.

One of the important functions of the NHDD is listing the values that the data elements can have when they are created and making code lists by coding them. By this way, Health Coding Reference Server (HCRS), which shares code lists for all coded data that are collected from healthcare organisations, is developed.

Health Coding Reference Server is created in order to serve all code systems in Turkish health system that are in use and will be used, from a single point. HCRS shares the code systems it includes as XML documents through a Web Service and at the same time through a Web page.

In addition to including international code systems, most of the code systems in HCRS are the local code systems that are defined in the NHDD. As examples to international code systems, ICD-10 diagnosis classification system and ATC coding system for drugs and drug classes can be given. Some local code systems are Healthcare communication, institutions, vaccines, pregnancy status, occupation status, blood group, diagnosis method and prescription type. In total, there are 178 code systems in HCRS.

In addition to these EHR related standards, DICOM is being used in imaging departments of almost all the public and private hospitals.

Recently, MoH has started a World Bank supported project in Turkey for the review of all the prominent International eHealth standards with the aim of disseminating this knowledge to the stakeholders through workshops. The ultimate aim is to reach a consensus on further eHealth standards to be used in Turkey. SRDC Ltd. is the contractor of this project.

3.5 Legal and regulatory facilitators

Legal and regulatory issues are among the most challenging aspects of eHealth: privacy and confidentiality, liability and data-protection all need to be addressed in order to make eHealth applications possible. Rarely does a country have a coherent set of laws specifically designed to address eHealth. Instead, the eHealth phenomenon has to be addressed within the existing laws on professional liability, data protection etc.

Turkey has declared to enact "Law on Protection of Personal Data" in the Information Society and Media chapter of "Turkey's Programme for Alignment with the Acquis (2007-2013)"²³. Moreover, the draft Law is currently in Parliament and is waiting to be enacted²⁴. Alignment with the 95/46/EC Directive is frankly stated as one of the grounds in the preamble of the draft Law (see 5th page of the document).

Additionally, Pre-Accession Economic Programme of the Year 2009²⁵, which has been submitted to the European Commission since 2001 responding to the request of the Economic and Financial Affairs Council (ECOFIN Council) dated 26/27 November 2000, include the following statements on the protection of personal data: Legislative alignment with the EU acquis related to cybercrime is continuing. In this regard, the Draft Law on Protection of Personal Data is at the Justice Commission of the Assembly as of November 2009. In the field of cybercrime, works regarding signing the Convention on Cybercrime No. 185 of the European Council and ratification of Conventions No. 108 and 181 will be initiated.

Besides, the Ministry of Health has revised some regulations on "Patient Rights Regulations" and "Family Medical Practice Regulation" in relation to information security policies and privacy.

3.5.1 Patient rights

Since the introduction of Health Transformation Programme in 2002, Turkey is progressing fast with its Family Medicine Programme and the supporting Family Medicine Information System (FMIS) by the help of incremental pilot deployments. The legislation on Family Medicine Pilot Application was passed in November 2004. This legislation was followed by regulations on the pilot application, its financing and the contracts in the summer of 2005. After the law and the regulations are put in place, the first pilot application started in September 2005 in Duzce province. Since then, family medicine programme and the pilot applications are expanding very rapidly in Turkey.

Currently, only General Practitioners can access the EHRs of their patients. In the second phase of the implementation, after the legal framework is completed, the proper patient consent mechanisms will be developed so that these EHRs will also become accessible to the authorised healthcare professionals in the secondary and the tertiary healthcare. For this purpose currently the implementation of a Personal Health Record system on top

²³ Information Society and Media 2007

²⁴ <http://www2.tbmm.gov.tr/d23/1/1-0576.pdf> (in Turkish)

²⁵ Seker 2009

of NHIS is progressing which will not only allow patients to define their consents but also allow them to access their own healthcare information.

In the case that e-health law is passed, plans for the 2nd phase of NHIS is on the agenda. Saglik-Net is a collection of systems which mainly collect data. After the essential legal structure is constructed, it will be made possible for authorised healthcare professionals to reach their patients' healthcare data whenever they wish, and wherever they are.

Yet, the patients do not have any control over who sees their records at present because the necessary consent and auditing mechanism are not in place yet. These will be provided within the scope of the planned Personal Health Record (PHR) system. Similarly, the patients cannot modify their records. This will not be enabled for the medical records created by healthcare professionals even when the PHR system is in place. Patients will only be able to modify the records that are created by themselves.

3.6 Financing and reimbursement issues

According to World Health Statistics 2010, total expenditure on health as a percentage of GDP is 5%. The figures of 2007 show that general government expenditure on health as a percentage of total expenditure on health is 69%, while the remaining 31% belongs to private sector. Thus, it can be concluded that the state is the major healthcare provider in Turkey.

As mentioned in the Recent Reforms section, in Turkey, all employed people and their families are members of one of the public insurance organisations. Recently, all these public organisations have been united under the umbrella of National Security Organization and various public insurance schemes provided by these organisations (e.g. one scheme for officers, one for the working class) have been merged under the National Insurance System. Previously, public insurance did not cover expenses in private hospitals. Now, the patients with public insurance can freely select public or private hospitals. Most of the expenses in public hospitals are covered by the National Security Organization. The reimbursement rates in private hospitals vary according to private service provider and the type of the service delivered to the patient but limits are set by the Ministry of Health. There are also several private insurance organisations that make agreements with private healthcare providers; they are preferred by both companies and individual consumers. Furthermore, for very poor people who are unemployed and cannot afford healthcare expenses, the Ministry of Health distributes "green cards" that allow these people to benefit from healthcare services in public hospitals freely. Starting from 2011, the Green Card Insurance System will be part of the united National Insurance System as well.

3.7 Evaluation results/plans/activities

From a public policy perspective, evaluation is a key activity in the policy-cycle. It provides insights into the success or failure of a policy or project and leads to new policy goals and new methods of implementation. The need for evaluation of eHealth policies and projects has been stressed time and again by the EC, not least in order to further the spread of eHealth in the process of healthcare delivery.

There are a number of factors that affected the successful implementation of NHIS. The MoH, being the national authority to decide on the eHealth standards in Turkey, was able to enforce the standards that have led to their fast adoption. The second factor is building a national common data dictionary consisting of eHealth data elements and minimum health data sets, which has helped to clearly identify the meaning of data elements; give their explanation in the local language and more importantly make it possible to share and re-use these components.

After its operation in the field for almost two years, there are some suggestions from healthcare users and software developers to enhance the NHIS. Such requests from users are collected and at the end of 2010, they will be reflected to the actual system. An example is the update of some Minimum Health Data Sets to collect more data.

The Decision Support System (DSS) of NHIS is not fully operational currently. The MoH will carry out a requirements study with the organisational units to update the rules and reports within the DSS. Within 2010, the results of this study will be reflected to the NHIS DSS so that it will be accessible by decision makers at all levels as in the case of FMIS DSS. Furthermore, it will be possible to automate creation of all Basic Health Statistics Reports.

The requirements and the feedback from the users of FMIS provide valuable enhancement directions. The ongoing and future plans for further development and dissemination of the FMIS are as follows: The top priority of the Ministry of Health with the FMIS is the application of FMIS in the whole country by the end of 2010. As of the beginning of June 2010, FMIS is in use in 43 provinces out of 81 provinces in Turkey. The deployment and education activities are already in place in the rest of the provinces. For example, in Ankara, the capital and second biggest province of Turkey with a population of 4.5 million, FMIS has started in July 2010. In order to get feedback and improve the system further, the MoH carries out user surveys with the GPs and the citizens in the piloting provinces. This way, MoH measures the satisfaction level of the actual users and encourages their inclusion in the management of the overall system. The surveys will continue in both existing and new participating provinces.

4 Outlook

The National Health Information System (NHIS) of Turkey has been in place and used, officially, since January 2009, as it is a living system, there is need for some enhancements and updates.

First of all, although 100% of public hospitals are integrated with the NHIS, still 30% of private and university hospitals are not totally integrated. These organisations will finalise their integration soon.

Another major goal is the integration of the NHIS with the Family Medicine Information System (FMIS). This is explained in detail in the FMIS plans, which are presented in the previous sections.

Currently, NHIS is a data collection system. Once the e-health law passes, EHR sharing among the healthcare professionals at the national level is planned in the 2nd phase of the NHIS. For this purpose a Personal Health Record System is being developed which will allow citizens to define their consent as well as accessing their own records. Needless to say patient records will also become accessible to the authorised healthcare professionals in the secondary and the tertiary healthcare according to patient consent.

5 List of abbreviations

CDA	Clinical Document Architecture
CHAS	Centralized Hospital Appointment System
CRMS	Core Resources Management System
DDB	Doctor Data Bank
DRG	Diagnosis Related Group
DSS	Decision Support System
EC	European Commission
ECG	Electrocardiography
ECOFIN	Economic and Financial Affairs Council
EEA	European Economic Area
EHR	Electronic Health Record
EMR	Electronic Medical Record
EPR	Electronic Patient Record
epSOS	European patients Smart Open Services
ERA	European Research Area
EU	European Union
FMIS	Family Medicine Information System
FP	Family Planning
GDP	Gross Domestic Product
GP	General Practitioner
HCP	Healthcare Provider
HCRS	Health Coding Reference Server
HIS	Hospital Information Systems
HL7	Health Level Seven International (authority on standards for interoperability)
HOMS	Health Organizations Management System
HPC	Health Professional Card
HRMS	Human Resources Management System
HTP	Health Transformation Programme
ICT	Information and Communication Technology
ID	Identification (e.g. number, card or code)

IHTSDO	International Health Terminology Standards Development Organisation
IT	Information Technology
ITS	Investment Tracing System
LSP	Large Scale Pilot
MCH	Maternal and Child Health
MERNIS	The Central Civil Registration System
MHDS	Minimum Health Data Sets
NHDD	National Health Data Dictionary
NHIS	National Health Information System
OECD	Organisation for Economic Co-operation and Development
PHR	Personal Health Record
PHS	Personal Health System
R&D	Research and Development
TUBITAK	Scientific and Technical Research Council of the Turkish Republic
WHO	World Health Organization

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