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MINISTRY OF HEALTH

# eHealth activities in Slovenia

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## Empowering Citizens for Health

Citizens' health and healthy lifestyle are health care systems' greatest value. A healthy living and working environment for all citizens in an inclusive society is the overriding goal of Slovenia.

Faced with increasing costs of treatment and unfavorable demographic changes, health care systems are focusing even more on efficiency and patient empowerment to foster cost containment without impairing health care quality.

eHealth is the solution. It spans health care, public health and healthy lifestyle. It blurs their borders and expands their frontiers. It puts the patient into the centre of care.

ICT supported care process management promises to power health care providers' efficiency and improve outpatient care for growing numbers of patients with chronic conditions. Interactive web based, mobile and TV tools are changing the role of patients, empowering them to more actively participate in the treatment process. Telemedicine enables redefinition of the care provision by removing locality barriers.

Slovenia is preparing for the challenges that lie ahead. With eHealth2010 strategy we are building a state-of-the-art infrastructure for secure information exchange, capable to support the above mentioned eHealth services.

Our eHealth strategy and Operational plan 2007-2010, based on it, have three main focuses:

- to upgrade the basic information infrastructure for the safe and transparent exchange of information between patients, health care service providers and payers:
  - establish private network of the health care sector,
  - introduce Public key infrastructure,
  - define most important health informatics standards and classifications;



- to define and introduce interoperable health care records and integrate it into daily work of medical and allied professionals with patients,
- to introduce and sustain the national health care portal and implement data exchange between patients, various healthcare providers, payers and others.

On that basis we are developing and implementing eBusiness solutions to connect health care providers, patients and stakeholders as well as solutions to increase knowledge exchange, patient empowerment, care process management, public health interventions, medical error reduction and other.

Several interrelated projects are underway in Slovenia to support processes of care and empower all users to actively take care of own lifestyle, health and health care utilisation.

The idea behind them is to create an environment for all citizens and to provide them with tools to stay healthy, recognize diseases sooner and take active part in treatment. On the other hand the projects aim to provide tools for professional users to share information, use process and decision support, access to information.

*Lepi zdravstveni*



# Process support for integrated health care

Projects in Slovenia: generic support of depression, COPD and cardiovascular disease care

## Introduction

### Support of care process

It is known that integrated care is the best proposed way to treat patients with complex, multiple or chronic diseases, that mostly require long – term care and orchestrated cooperation of several actors across all levels of health care and besides patients involving various profiles of professionals. To enable efficient integrated care we need to provide communication and exchange of data between these actors, sharing common information sources and patient data, and provide tools to support the process of care.

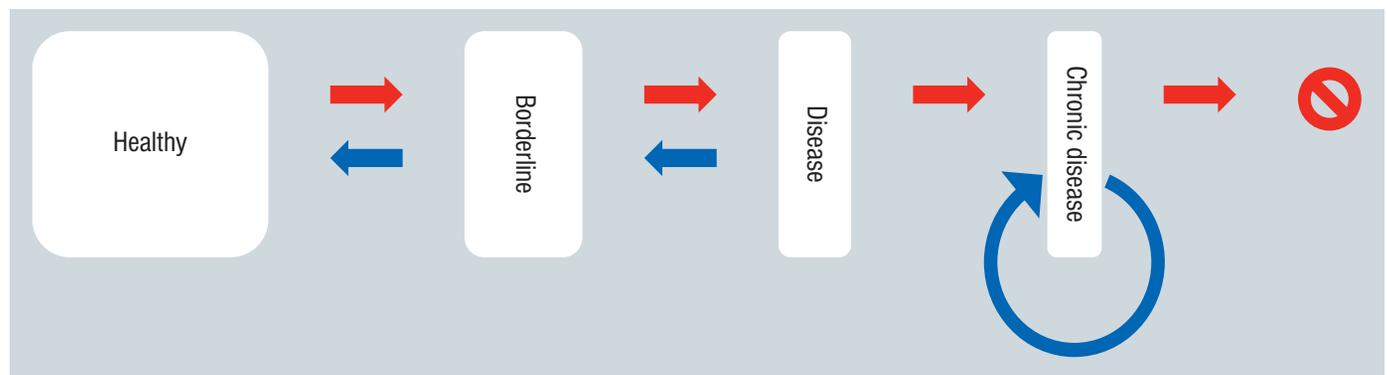
Otherwise the complexity, overlaps of care provision and repetitions of procedures can decrease efficiency.

ICT provides the environment to support process of integrated care via telemedicine, process support, electronic communication, electronic records (health care and personal), decision support systems etc.

By offering new tools ICT is also the driver of change in the health care system. Patient empowerment by web/TV/mobile technologies, automation of tasks, clinical and process reminders, risk reduction by decision support – these components all add to the potential to define and implement new models of care provision.

## Current projects

In Slovenia several research and applicative projects are underway to create common supportive ICT environment for care process. They aim to develop the necessary components of environment for support of integrated care processes. Some of them are described below in greater detail.



Pools of health care utilizers, disease progression (in red) interventions (in blue)

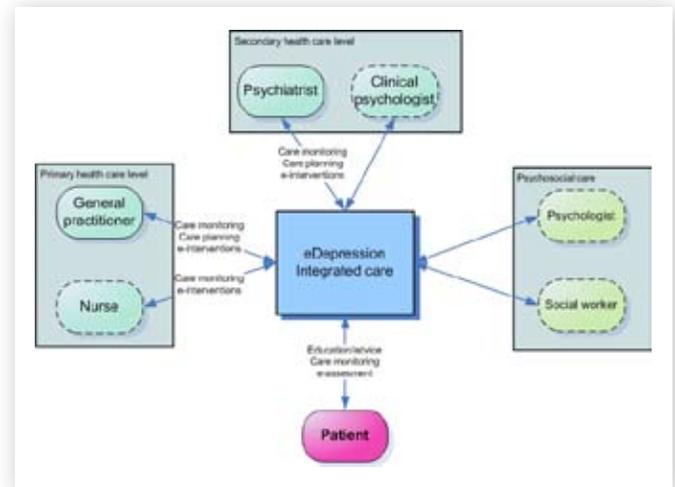
- iHUB and sizdravje.eu: health care services platform; services and PHR provider for chronic obstructive pulmonary disease (COPD) and heart disease, extending eDepression model
- eDepression (funding: Slovene Research Agency, Ministry of Health): Web based solution for care management and coordination: case of depression treatment
- Project RIGHT (funding: Framework Programme 6 - IST): Reducing diagnosis and treatment risks by leveraging knowledge and practices of Health Care Professionals

Recent research shows that information and communication technology supported care management of chronic diseases with focus on active patient involvement and patient empowerment emerges as one of the most promising ways to ensure high quality and cost-effective way of treatment. The benefits involve increased adherence to treatment, resource use optimization and automation of certain tasks

## eDepression

**Web based solution for care management and coordination: case of depression treatment (2007 – 2009, funded by Slovene Research Agency and Ministry of health RS)**

A case study developing and testing process support and active patient involvement in depression treatment is described. The idea behind the project is to develop generic model of care process support that can easily be replicated between different diseases and to test this model to streamline the process of depression treatment.



## Integrated care for depression

In general practice 12% of patients are suffering from depression, which puts depression on the second place of most common chronic diseases in primary care. Depression treatment has poor results due to poor penetration of clinical guidelines, low patient compliance and insufficient care coordination. Results of studies have shown that only 1,5 % are properly treated – they are either undiagnosed, receive improper treatment or discontinue treatment and are not followed-up. Several interventions improve outcome of treatment: education of staff, care management, active patient involvement including self-assessment, follow-up with telephone reminders and access of general practitioner to patient progress results. Several of these can effectively be joined together using an information system, employing workflow management. A recent study by Robertson et al has shown promising results of an internet based solution to provide several of these functionalities.

A model of generic process support was developed using process matrices for defining tasks, responsibilities, rules and timeflows.



MATRIKA BDI ZA INTERPRETACIJE BOLNIKOM															
vhodna vrednost/CaseT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 vsa vrednost Bt		1													
2 Bt < 10					5	5	5	5	5	5	5	5	5		
3 Bt < 0,3*B0									10	10	10	10	10		
4 Bt <= 0,5*B0							7	7	7						
5 0,2*B0 < Bt < 0,6*B0							8	8							
6 Bt < B0-1/2			2	2	2				11	11	11	11	11		
7 B0-1/2 < Bt < B0-1/3			3	3	3				12	12	12	12	12		
8 Bt > 0,8*B0						6	6								
9 Bt > B0-1/2 in B0-1/3 >= B0-2/3										14	14	14	14		
10 Bt > B0-1/2			4	4											
11 9 < Bt < 15															
12 Bt > 14															
13 Bt > 0,5*B0															
14 Bt_vpr9 (SU) = 1	10	10	10												

MATRIKA BDI ZA AKCIJE CM															
vhodna vrednost/CaseT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 vsa vrednost Bt		1													
2 Bt < 10															
3 Bt < 0,3*B0															
4 Bt <= 0,5*B0															
5 0,2*B0 < Bt < 0,6*B0															
6 Bt < B0-1/2															
7 B0-1/2 < Bt < B0-1/3															
8 Bt > 0,8*B0															
9 Bt > B0-1/2 in B0-1/3 >= B0-2/3															
10 Bt > B0-1/2															
11 9 < Bt < 15															
12 Bt > 14															
13 Bt > 0,5*B0															
14 Bt_vpr9 (SU) = 1	5,2	5,2	5,2	5,2											

Slepek	Akcija	Izjava s akcijo	Pravila	Povezane da	Povezane datotele	Opis	Opomba
Pregled pri zdravniku	1	Vnos datuma pregleda	B		Podstran Vnos pregleda (B)		
	2	Posiljanje SMS opomnika bolniku	S	(t=>D)+ 29d AND NOT A1.1) OR (t=>D)+151d AND	datum pregleda	Datoteka_sporocila_besedilo	ob 8ih zjut
	3	Klic bolnika - pregled	CM	1.2 t=>D+ 30d AND NOT A1.1		Poročilo o aktivnosti	
	4	Vnos povežba pregleda	Z		podstran Pregled bolnika (Z)		
	5	Posiljanje sporočila in FW zdravniku	S	1.1 (t=>datum pregleda + 2d) AND NOT A1.4	Datoteka_sporocila_besedilo		ob 8ih zjut
Pregled pri psihiatru	1	Vnos povežba pregleda	P	1.5 (t=>datum pregleda + 4d) AND NOT A1.4		Poročilo o aktivnosti	
	2	Izpolnjevanje vprašalnika	B		podstran Pregled bolnika (P)		
	3	Klic bolnika - vprašalnik	CM	t= Datum opravljene akcije 3.1 + 7d		Poročilo o aktivnosti	ob 8ih zjut
	4	Klic bolnika - izstop	CM	3.2 t= Datum opravljene akcije 3.1 + 8d		Poročilo o aktivnosti	
Vprašalnik 11-20 tede	1	Izpolnjevanje vprašalnika	B		podstran Vpr; podstran Kartoteka_zadnji vprašalnik (P)		
	2	Posiljanje SMS opomnika bolniku	S	t= Datum opravljene akcije 4.1 + 20d		Poročilo o aktivnosti	ob 8ih zjut
	3	Klic bolnika - vprašalnik	CM	4.2 t= Datum opravljene akcije 4.1 + 29d		Poročilo o aktivnosti	
	4	Klic bolnika - izstop	CM	4.3 t= Datum opravljene akcije 4.3 + 7d AND t= Datum upravlja		Poročilo o aktivnosti	
Vprašalnik - klinično	1	Klic bolnika - BDI	CM	4.1 IF rezultat zadnjega vprašalnika v 'MATRIKA BD	podstran Kart	Poročilo o aktivnosti	
	2	Klic bolnika - SU1	CM	4.1 IF rezultat zadnjega vprašalnika v 'MATRIKA SU	podstran Kart	Poročilo o aktivnosti	
	3	Klic bolnika - ASEC	CM	4.1 IF rezultat zadnjega vprašalnika v 'MATRIKA AS	podstran Kart	Poročilo o aktivnosti	
	4	Klic bolnika - rednost	CM	4.1 IF rezultat zadnjega vprašalnika v 'MATRIKA Re	podstran Kart	Poročilo o aktivnosti	
	5	Klic bolnika - sprememba Th	CM	OR 2.1 IF (rezultat zadnjega vprašalnika v 'MATRIKA Sp	podstran Kart	Poročilo o aktivnosti	CM preveti spremembo

Process matrices for depression treatment

To evaluate this approach to treatment of depression an internet-based information system is being tested. It creates a link between patient, physician, care manager and psychiatrist in one place. Automated support to process of health care enables all stated actors in the healing process to execute necessary tasks. There is access to patient records, as well as possibility of closed electronic communication (email, forum). Patients' records contain data on therapy and therapy compliance and data about self evaluation regarding depression symptoms and side effects of antidepressants. Access to patients' records is available only to selected users of the system (to patients and health workers associated with certain patients treatment process). The proposed solution enables



automated monitoring of clinical parameters: side effects of antidepressants and symptoms of depression, allowing stepped approach to activate health care professionals.

In case patients do not perform actions according to plan, they receive reminder messages in form of mobile text messages or email messages. If after a certain period of time the task is still not performed, the care manager calls them.

Care manager has access to patients' self-evaluation data and performs tasks to improve patients' adherence. Collaborating physicians have access to their patients' records and collaborating psychiatrists will have to records of treated patients.

Current status of the project: the application is developed and set up, a case control study of the effects on adherence and outcome starts in May 2008.

The research will show which functionalities of the system contribute to what extent to the results.

The model of process support and patient empowerment as described is already being used in other projects (iHUB) to support treatment of other diseases: COPD and cardiovascular diseases. Work is being done to join the services described above and a personal health record under the umbrella of **sizdravje.eu**.

There are financing and organizational issues that must also be solved to ensure broad use and sustainability. System-level financing schemes are needed to insure sustainability and equal access to such solutions in future. Organizational changes (i.e. towards care management) will further increase the value of this approach.



## Home medical care for patient with chronic obstructive lung disease (COPD)

### Rationale:

**C**OPD is a lung disease of smokers and affects approximately 1% of adult population in Slovenia, although the exact prevalence in our country is not known.

COPD is defined as a disease state characterized by airflow limitation that is not fully reversible with medicines. The airflow limitation is usually both progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases. Removal from the exposure usually slows the progression of disease. COPD, once present, may have a lengthy and costly course over decades of a patient's life.

COPD is the fourth leading cause of morbidity and mortality in the US and worldwide is projected to rank third in burden of disease in 2020, yet COPD fails to receive adequate attention from the health care community and governments. A major problem is the incomplete information about the causes, prevalence, and burden of COPD, especially in developing countries, and lack of understanding of the substantial impact of the disease on quality of life and health care costs.

The COPD patient has a chronic disease – he is never well, even in a »stable« state of a disease he fights with shortness of breath, cough and recurrent infections. Exacerbations of disease, usually due to respiratory infections, worsen their condition, bring them to hospital and reduce quality of life and shorten survival.

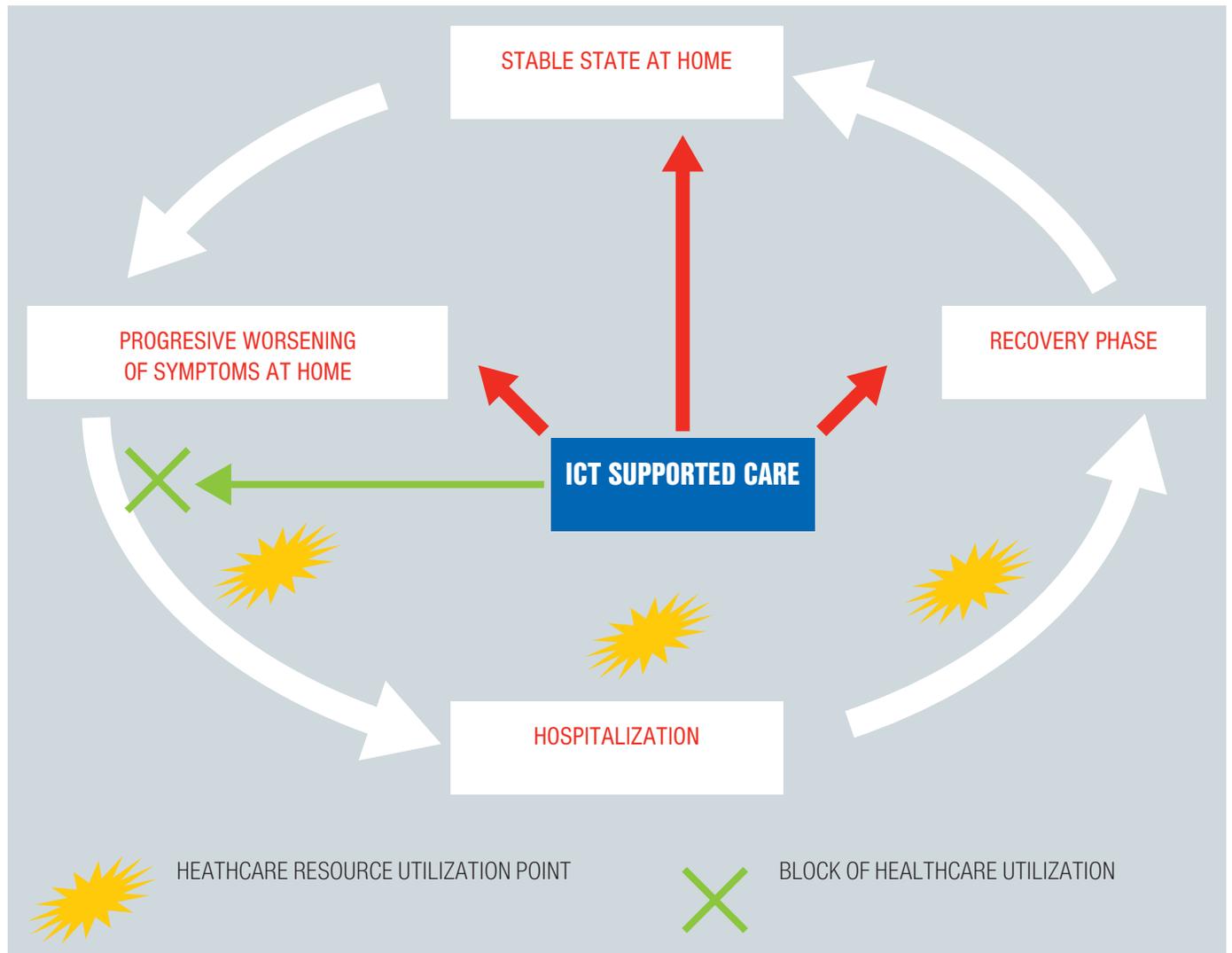
Transmural care of a patient – at home, in hospital, at GP's office is a key to provide better care for them and allow patients to be an active participant in medical care for his health. ICT supported care brings all the three major components of longitudinal care: **medical care, nursing care and rehabilitation** to their home. Patients, willing to actively

participate in all three components of home-based programme, are able to live a better life, avoid hospitalisations and lessen utilisation of health care resources at primary and hospital level.

### Project description

The chronic pulmonary patient »walks a way« between one and another exacerbation (worsening) of their disease for 30 to 40 years. That means the constant pressure of fear not to get worse. He comes in con-





tact with health services at his GP's office, at outpatient specialists' office and during hospitalization. But the crucial moment is when the patient is at home – how to know, what to do to maintain a good level of health, how to avoid worsening of the disease and how to come in contact with health services at the right moment.

**Figure 1. The FOUR »states of health« for COPD patients are:**

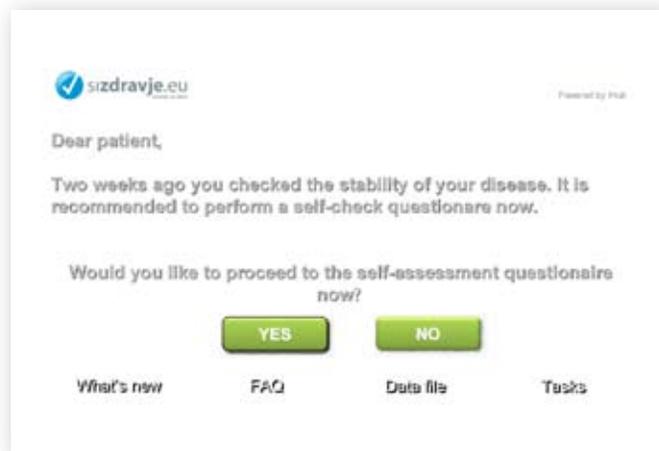
- Stable state at home
- Progressive worsening of symptoms at home
- Hospitalization
- Recovery phase

Use of home - based ICT supported care at crucial levels of patient's states of health would prevent the need to use health care resources, lessen exacerbation frequency, speed up recovery and lessen the cost of management of the patient.

## ACTORS INVOLVED IN ICT – BASED PATIENT CARE

The project will run in collaboration with ICT specialists and specialists in medical management of patient, nursing care and rehabilitation. University Clinic for Pulmonary Diseases and Allergy Golnik, Slovenia, with 7000 admissions per year and 11000 out-patient visits, among which are about 25% COPD patients will provide scientific support and develop concept of integrated care of chronic pulmonary patient with COPD. iHUB consortium will provide the database accessibility and integration into web-based telemedicine framework and provide technical and multimedia platform for supporting medical information and final elaboration of the project. Team of medical doctors, nurses, physiotherapists and patients themselves will contribute in creation and review of materials, accessible on such ICT platform. Medical instruments for home use, that measure vital parameters (heart rate, oxygen saturation of blood and lung volumes) will be integrated in the system and allow bidirectional communication with the patient and better follow-up of patients' health status.

A simple questionnaire about major symptoms and signs of the disease is crucial for a patient to allow a self-check of stability of the disease. Personalised access and scoring system of answers to these questions with a feed-back to a patient about the result will help to monitor level of patient's health at home. Addition of home devices that measure vital parameters of lung function and oxygen saturation of the blood for some severe unstable patient would result in even better control of the disease.



**Figure 2. A simple interface accessible via usual television set, computer or smart phone leads a patient through a stable state assessment at home.**

### References regarding telemedicine for project team:

- IMCA II – is a 7FP EU research project, in which is UH Golnik a project partner
- DRUGCHECK is a 7FP EU research project, in which is UH Golnik a project partner
- MOTOROLAHEALTH – a telemedicine solution for pulmonary patient as a part of IMCA II project
- SPIROTEL – a manufacturer for telemedicine products for pulmonology; has a development contract with UH Golnik



## Good Practice of Implementation of Teleradiology and Telemedicine

In the recent years Slovenia has successfully implemented the first steps of information technology in the health care system following the document e-Zdravje2010 (or e-Health2010) by introducing the basic computer technology and computer exchange of information, defining some standards, establishing basic data bases and implementing the health insurance card system. In May 2005 the first PACS system has been implemented in Izola General Hospital. In the winter 2005-2006 the second and third PACS systems in Slovenia were installed: in the Jesenice General Hospital and in the Ljubljana Oncology Institute. The second objective that year was Teleradiology connection between these three hospitals. While PACS system could remain standalone, the Teleradiology connections demanded the upgrade of the basic information infrastructure in healthcare for safe and transparent exchange of information between hospitals, the establishment of safety and technological standards for safe communication, management and storing medical data, setting up minimum standards and range of technologies that should ensure interoperability and safe communication also when public communication networks are used (Internet).

Due to lack of dedicated healthcare communication network we used public communication networks. The Minister of Health established The Teleradiology committee, which in close cooperation with the Board of Slovenian Radiologists prepared the First Slovenian Teleradiology Standard, which was the foundation for the realisation of the Teleradiology network and defined technological standards for safe communication.

First three hospitals (Izola General Hospital, Jesenice General Hospital and Hospital for Pulmonary Diseases Golnik) were connected in the Teleradiology Network in December 2006.

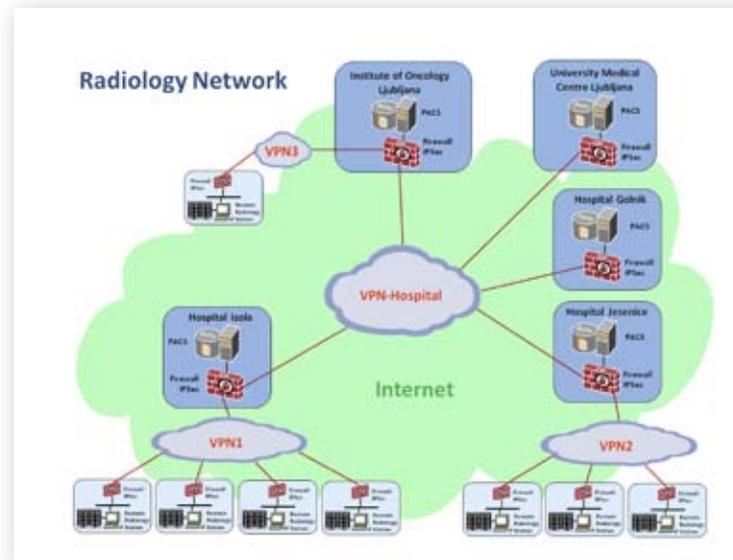


Image 1: Slovenian Teleradiology Network

The next two health care providers to be connected to the network are University Medical Centre Ljubljana and Ljubljana Oncology Institute. Actually there are 5 hospitals with PACS systems in Slovenia (Izola, Jesenice, Golnik, Oncological Institute and Ptuj) and two Outpatient Clinics (Ljubljana, Postojna) and all are of the same provider (Agfa Gevaert) all of them will be included in the Teleradiology network in 2008.

The network, serving for the communication between hospitals, was also planned for the Teleradiology Service (radiologist-at-home). The first installation was made in Izola General Hospital, where the radiologist was connected to the hospital via VPN connection in February 2007. The radiologist was provided with diagnostic workstation which includ-

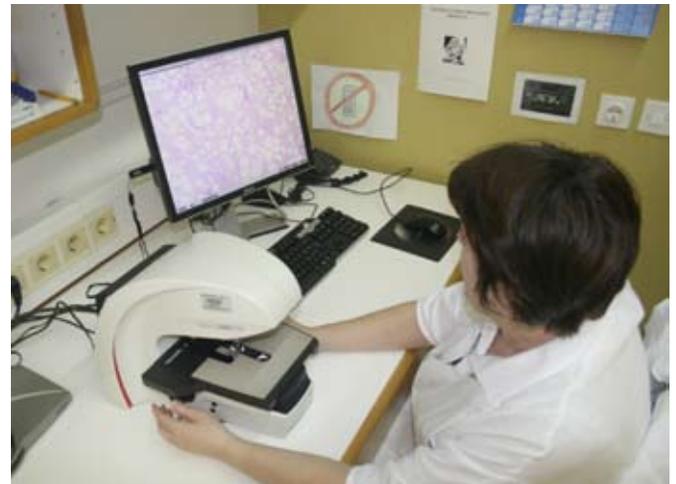
ed two medical 1MP greyscale monitors. The VPN connection allowed the access to the hospital HIS and RIS systems. Video Controlling System was installed in Izola General Hospital that allowed the radiologist-at-home to visually control the diagnostic room. The radiologist could report CT and MRI studies from his home and had also the possibility to control the CT and MRI scanner with a special software solution. The same software solution allowed the radiologist to control also the multi-modality workstation and to make all the necessary reconstructions of studies directly from his home. Because the hardware software solutions allowed the on-line reporting in case of emergency, the Medical Council of Izola General Hospital decided to provide the home workstations to all hospital radiologists for the on-call service. The response time of the radiologist in case of emergency reduced from 30 minutes to 5 minutes. The same solution is implemented in Jesenice General Hospital for the on-call radiological service. Currently there are 7 radiologist-at-home in Slovenian Teleradiology network (4 in GH Izola, 3 in GH Jesenice and additional neuroradiologist in Ljubljana).

The implementation of Teleradiology Network is only the first step in digitalization of Slovenian HealthCare and in implementation of available Telemedicine Solution.

In the april 2008 we also implemented The first International Telemedicine Solution in Slovenia.

The Project "Patient without borders" in the INTERREG IIIA Italia-Slovenia 2000-2006, implemented Telepathology Connection between University Hospital Udine – Italy and Izola General Hospital – Slovenia. With the use of Digital Microscope and Videoconference system we are able to exchange images and second opinions on the both sides.

There is another project running in Izola General Hospital – the digitalisation of the video source imaging diagnostic systems (eg. Bronchoscope, gastroscope, colonoscope). With use of available technology for on-line capturing and encoding video source, we are able to document



all endoscopic studies. The studies are saved on a central video server and available for later evaluation and second opinion. We are able to send these studies to other sites using the existing Teleradiology network.



# Renovation of the health insurance card system by providing the on-line access

## 1. Introduction

The health insurance card system was successfully introduced in Slovenia during the period 1998 – 2000. The solutions were the result of the national project headed by the Health Insurance Institute of Slovenia and performed in cooperation with stakeholders from the fields of politics and the profession and users and domestic and foreign suppliers of equipment and services.

The system base upon the results of preliminary steps for ensuring organised national health care databases, wide implementation of information technologies at healthcare providers and information technology related education of healthcare workers and management.

The system ensures quality administrative and medical data to all healthcare providers. In addition to health insurance data recorded on the card of each resident, 82% of the population also have data on received medicines recorded on the cards while 13% also have data on obtained medical technical devices. Over 1,000 persons also have decisions on the post-mortem donation of organs and tissues for transplants recorded on their cards.

## 2. Upgrade of the system

The contextual and technological upgrade of the system is currently underway, dictated by business and technical reasons.

The key business reasons are: insurance holders' expectations regarding access to their personal data, the discontinuation of validation of health insurance cards at self-service terminals, the assurance of additional solutions for the safeguarding of data (electronic signing, traceability of data accesses) and insurance companies' expectations of a decrease in risks associated with the exploitation of healthcare services without arranged insurance (3-month validity of data on the cards).

The key technical reasons are: discontinuation of the product which the current health insurance card is based on, the urgency of the technological upgrading of remaining components of the system and the exploitation of opportunities presented by contemporary telecommunications technologies.

The upgrade follows the following objectives:

- Assurance of infrastructures and tools required for the safe and reliable direct access to and exchange of data among healthcare providers and health insurance holders.
- Renewal of the security scheme and the establishment of solutions for electronic signing.
- Assurance of the active role of insured persons with regard to their access to personal data.
- Gradual introduction of a new card which will no longer act as a data storage medium, but as an access key.

## 3. New solutions

The renewal of the system establishes the following solutions:

- A new professional card for healthcare workers which will contain a digital certificate for secure access to personal medical data and for the electronic signing of healthcare documents (electronic prescriptions, orders, medical referrals, etc.).
- A new health insurance card with digital certificates for secure access by the user to his/her personal data and acting as a key whereby the holder permits the healthcare worker to access his/her personal medical data.
- Establishment of an on-line system for direct, instant, secure and reliable exchanges of data via the network. The exchange of data between healthcare providers and health insurance providers (Health Insurance Institute of Slovenia and all three voluntary

health insurance companies) will be set-up in the first phase. The system provides an open infrastructure for the development of solutions to also enable the exchange of data within the healthcare organisations.



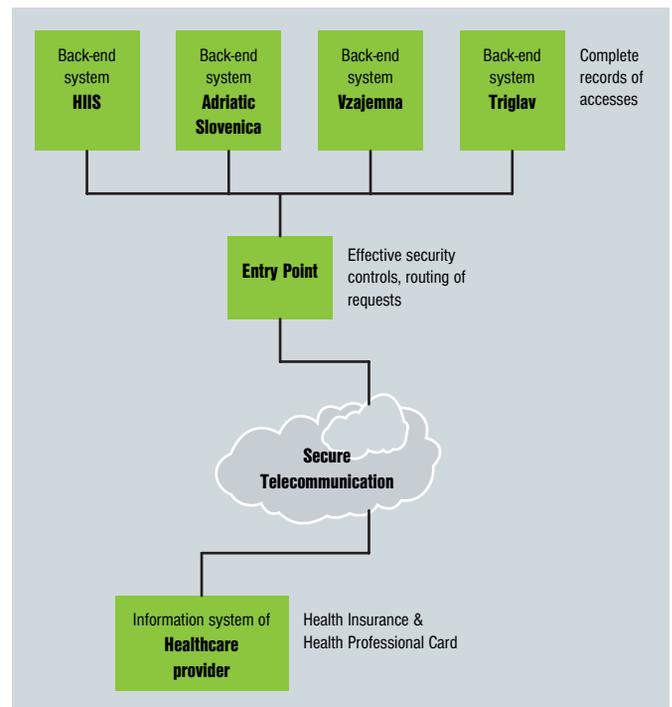
**Figure 1: New health insurance card as a patients access key to his/hers personal data**

Technical solutions will be prepared so as to enable a gradual transition from the use of data on cards to direct access to data via the network.

In addition to a wider selection of data sets currently available on the health insurance card, the on-line system will already upon its introduction enable the exchange of additional insurance and medical data.

A series of subsequent projects for expanding the use of the on-line system and new cards is envisaged in the future, namely:

- Gradual conceptualisation of solutions for secure access for insurance holders to their personal health insurance and medical data.
- Establishment of uniform solutions from the field of public health whereby the registration of contagious diseases and a solution regarding vaccinations are planned as initial solutions.
- Assurance of analytical data on healthcare for physicians.
- Introduction of electronic documents with the electronic prescription as the first priority.
- Subsequent steps in ensuring national medical records – especially in the direction of so-called patient summaries.



**Figure 2: Scheme of the on-line health insurance system**



#### 4. Advantages for all

The system brings important advantages for all users of the healthcare system.

For citizens, the system brings the discontinuation of health insurance card validation at self service terminals. The wider sets of data will improve the quality of healthcare services and decrease the possibility of administrative and professional error. Future solutions of the on-line system will enable the simplifications of the procedures for acquiring various certificates and approvals in connection to the utilisation of healthcare services. With the establishment of access for insurance holders to their personal health insurance and medical data, an increased awareness of insurance holders of their own health and better acquaintance with procedures regarding their treatment is envisaged.

For healthcare providers, the system will simplify procedures for determining the status of health insurance holders and the scope of their rights and the issuance of documents and charging of healthcare services. The new data sets will enable easier communications among healthcare workers. The established public key infrastructure and new health professional cards, as well as the technological upgrade of information equipment and inclusion of providers into the Internet network will enable the development of new information solutions which will contribute to more effective and qualitative services by healthcare providers and bring benefits with regard to communications with the business environment.

For the Health Insurance Institute of Slovenia and voluntary health insurance companies, the system eliminates risks associated with the unauthorised use of healthcare services in the event of non-arranged insurance, enabling a more rapid implementation of changes and ensuring a platform for the implementation of the new functions of electronic communications.

The renewal of the system is one of the key and most expensive tasks in realising the Slovenian eHealth strategy by 2010 for it will bring with

it an important infrastructure and solutions for all three strategic development areas: electronic medical records, communications among healthcare organisations and accessibility to data and electronic services for citizens.

The renewed card with digital certificates and an on-line system opens up possibilities also for the healthcare sector's cooperation with other sectors in the country. The new electronic identity card which will also include the functionalities of the health insurance card will be among the first such solutions.

#### 5. Time plan for pilot and national introduction

The system will be introduced gradually. The introduction to a group of healthcare providers in the pilot area (Nova Gorica region) is planned for October 2008. Based on experience gained, the system will be upgraded with necessary modifications, if any, whereupon in 2009 a national implementation from region to region will follow. While introducing the new system, the HIIS will gradually eliminate the self-service terminals network, as there will be no need for refreshing the data on the health insurance cards.

## eBirth service

### Introduction

**H**uman resources are without doubt the most important factor of economic development. To be able to plan social, economic and political development every country needs demographic data - number, structure and characteristics of its population.

In Slovenia registers of internal administrative affairs are source of information for population statistics. At the same time data from these registers are also used for activities of public services, including health care system, and for performing administrative procedures.

In Slovenia basic personal data are managed in the Central Register of Population. It represents the official source of population data for all institutions that use data on the basis of valid legislation. Main source on newborns data are maternity hospitals and maternity wards, where 99% births occur.



Picture 1: Mother with newborn

Registration of birth was implemented on paper forms until recently. In 2005, the Ministry of Internal in agreement with the direction of development of e-management prepared circumstances for the introduction of electronic registration of births into the Register of civil status. The Ministry of Health responded to the given request with a project that on the side of healthcare enables support to registration of newborns in the registers mentioned above.

Accomplishments of the project are the result of cooperation within three fields of competence: Ministry of the Interior, responsible for the management of registers from the field of work of civil status, citizenship, population registration and public documents, Ministry for Public Administration, responsible for e-government and for support of communication infrastructure of public administration, and Ministry of Health as founder of hospitals responsible for birth registration.



Picture 2: Cooperative institutions



### Solution description

Hospitals have already been collecting in their information systems all the data needed for birth registration and for assignment of National Patient Identifier Number (NPIN).

Project goal was for this reason reduction of paper operation and implementation of electronic registration of births with assignment of NPIN immediately after birth.

Groundwork for system performs electronic communication between hospital information systems and register of civil status (RCS) and central register of citizens (CRP).

For this purpose hospitals have to supplement their software to be able to support preparing requests for NPIN and acceptance of assigned identifier into hospital information system.

They also have to fulfill technical and security demands to set communication links with HKOM - state administration network.

eBirth application is installed in the network and with its assistance data interchange between hospitals and Ministry of the Interior is enabled.

Authorized users from hospitals access registers with SIGEN-CA digital personal web certificates and security schema at eCRP.



Picture 3 and 4: nurse and midwife preparing and sending data

Data interchange has three steps:

1. Hospital sends provisional data on birth registration with eBirth application to RCS and CRP, where NPIN is assigned to the newborn.
2. CRP sends message about NPIN assigned and at the same time sends also partly completed forms for personal name registration and permanent residence registration to the hospital. Parents check the forms, change and complete data if necessary. The hospital sends fulfilled and signed forms to registry office where the procedure is officially completed.
3. CRP sends official data of newborn and parents to hospitals

NPIN is assigned in CRP in few seconds. This way hospitals have instantly available official identification number of newborns, that can be written into health records.



## Achievements

Electronic birth registration implementation brings achievements in several fields:

### for administrative services:

- data for birth registration is received by registrar faster, in electronic form, with NPIN that shortens the administrative procedure of birth registration;
- data in administrative registers is up-to-date;

### for parents:

- shorter and easier procedures at social welfare centers;
- shorter procedure for birth certificate acquisition;
- shorter procedure for health insurance card (HIC) acquisition;

### for healthcare:

- due to electronic operation there is no need to send paper forms by post; it reduces the volume of manual work and potential number of errors at data input;
- supplemented health care documentation on hospitalization of newborns and checked and fulfilled data of mother;
- possibility of automatization of procedures;
- improved data quality and integrity for health statistics and analytics and planning;
- possibility of rationalization of issuing of HIC to newborn; it enables correctness of monitoring healthcare services;

## System implementation

eBirth system was implemented in two steps. In the first - pilot phase - three hospitals have been invited and they accomplished their tasks at the end of 2007:

- |                       |                   |
|-----------------------|-------------------|
| • UMC Maribor         | 25 September 2007 |
| • Hospital Novo mesto | 4 October 2007    |
| • Hospital Postojna.  | 16 October 2007   |

Second phase will bring all the rest hospitals into the system (11 hospitals). Two of them, Hospital for gynecology and obstetrics Kranj and Hospital Brežice have already succeeded to implement all necessary actions.



Picture 7: UMC Maribor; maternity ward











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