

# HIS Implementation Guide

## Introduction

The main goal of the Integrated Health Information System (EU-IHIS) Project is to implement and integrate hospital information systems (HIS) in 19 beneficiary hospitals and link these systems with the unique, standardized Electronic Health Record (EHR) system, which would lead to increased efficiency and improved quality of patient centred health care. The EU-IHIS Project is being carried out under the leadership of the Ministry of Health of the Republic of Serbia and financed by the Delegation of the European Union to the Republic of Serbia. World Health Organization (WHO) for Europe is in charge of the project implementation through the WHO Country office in Serbia with administrative support of the UN Office for Project Services (UNOPS).

HIS implementation in hospitals covered by the project is designed to provide a rounded set of elements that allow the improvement of work process of the vast majority of health professionals, and to enable users to obtain a functional entirety that will improve the quality of hospital business. The implemented solution will improve the internal communication and availability of information, allow the avoidance of multiple entry or transcription, data entry at the source with appropriate coding and better track of items invoiced to the health insurance. The restrictions of project scope were also considered, as well as the need to avoid dealing with the particular subsystems that are used in some hospitals (mostly diagnostic and non-medical ones). Certainly, the possibility to subsequently cover these specifics, beyond the EU-IHIS project, is left open.

Information systems planned to be implemented by the EU-IHIS project in hospitals are two accredited software, with source code owned by the Ministry of Health as result of previous projects. Manufacturers of these software are ComTrade (HIS1) and Bit Projekt (HIS2), companies that provide upgrade, support and maintenance services.

It is assumed that both hardware and LAN network existing in the beneficiary hospitals, that were provided either through the IPA 2008 HIS Project or through other means, are adequate for the deployment of one of the HIS software. By implementing the hospital information system, the equipment and network infrastructure provided to hospitals through the IPA 2008 HIS Project will be put into full operation.

## ***Hospital Information System***

Why Healthcare - Hospital Information System?

- Data is entered at the source.
- All data are centralized in one place.
- Allows quick finding of information on the patient, the doctor, the diagnosis.
- Allows easy browsing of patient history.
- Allows easy monitoring of medicines and materials expenditure.
- Reduces the volume of documentations kept on paper and retains only what is required by the law.
- Raises the level of patient care.

- Shortens the time required to collect the information needed for important decision making.
- Increases efficiency and effectiveness in work.

Why HIS1 and HIS2? They are:

- Standardized and certificated by the Ministry of Health of the Republic of Serbia,
- Used in more than 20 hospitals,
- Upgradable according to the needs and requirements of users.

The main goal of HIS is to provide the best possible support to the treatment of patient and concomitant administration by electronic data processing. HIS will encompass following functionalities that will enable automation of the treatment process that follows the patient flow through the health care institution:

- Scheduling and initiating specialist-consultative examination including the verification and recording of patient's insurance status, with possibility to choose a doctor and available date, define types of medical examinations, doctors' working hours and scheduling in outpatient rooms.
- Admission of patients to inpatient treatment, referral to departments, and discharge from the inpatient department, possibility to print anamnesis, matriculation list and hospitalization report.
- Keeping electronic medical records with a formed structure of printable documents, in accordance with the law (specialist consultative examinations, admission and discharge list, medical history, decursus morborum, surgical operation report, discharge summary, treatment invoice). Possibility to define document templates.
- Insight into the history of diagnoses and chronic diseases of patients and access to a complete history of patient's treatment, ICD-10 classification used for coding of diagnoses.
- Prescription of therapy with use of the drug classification system, with dosing and form of drug administration.
- Recording of therapy administered to the patient in the inpatient and outpatient department with a complete overview of the history of proscribed and provided therapy, with the ability to export data on drug consumption in predefined format.
- Monitoring of expenditures in departments and the ability to produce reports on expenditures in a predefined format, as support to the work of departmental pharmacies.
- Importing of all the NHIF code lists into the system. Mapping of internal code lists of medical services, drugs, medical supplies and the diagnosis on the NHIF code lists.
- Distributed data entry for electronic invoicing to the NHIF at all points where health care services, supplies and drugs are provided to the patient. The possibility of generating a centralized electronic invoice (in XML format) with integrated validation system, as well as the ability to export collected data in standard XML format, for possible imports into the special software for invoicing.
- Statistical reporting with large number of general and statutory reports, which provide an insight into the entered data for a given period of time, by various criteria.
- Ensured data security through assigning a set of roles for each user with specified rights on data access and actions in the system.

Expected benefits of the HIS implementation in hospitals are:

- Better quality of patient care,
- improvement of the efficiency of hospital management ,
- Improvement in information quality,
- Reduction in operating costs.

## Challenges and Success Factors

In order to implement successfully the new HIS, it is necessary to conduct change management process that will help hospitals in preparing its organization for the usage of new tools and working environment.

The factors that influence mostly the successfulness of HIS implementation are in the direct or indirect relation with the change management, pointing out to the necessity of setting up the effective communication channels and the vision for change, among both hospital management and staff.

Two factors are involved in HIS implementation through change management process: social and technical factors. The relationship between the technical and social factors is determined by four components: structure, people, technology and processes. Although each of the four components can result in success or failure of the HIS implementation, social factors are more crucial than the technical ones, as people play the vital role in the success or failure of any change process.

The implementation of HIS is very complex, intense in terms of dedicated work required and challenging. Thus, it is important that risks are identified, understood, and managed.

Also, it is important that the change management plan include:

- Good practices, deriving from the previous projects of HIS implementation in healthcare institutions;
- Preparatory activities related to challenges associated with the acceptance of the system by end users.

Based on the socio-technical approach, key factors to be addressed during the HIS implementation, are:

- **Leadership:** Strong leadership in support of the HIS implementation is crucial in order for implementation to be successful and must ensure strong support for the change. Dedication from the top-level management is one of the most important success factors.

Certain obstacles have to be expected to arise during the implementation process. It is necessary for the health management to deal with the overcoming of these obstacles with care and efficiency. It is of outmost importance to endure in these efforts and to provide motivation for all participants in the implementation process. Messages coming from the top are crucial for the success of the implementation.

It is necessary to harmonize the additional time needed for training and initial usage of the system with regular obligations of staff, while clearly emphasizing that these activities, related to HIS, represent the integral part of their duties.

The concerns of the care providers who use the systems must be respected and considered throughout the transitional period, before moving to the production environment. For example, in case that there are restrictions related to the infrastructure and additional expectations from users, hospital team together with the implementation team should make a conscious effort to find opportunities to use existing functionality in the system to run or complete the specific business process.

Management should promote the use of the system in timely manner, in order to avoid problems related to the lack of information on HIS implementation and overcome the resistance of end-users. The level of reluctance by staff is expected to rise proportionally with the level of traditionalism in work, expressed through rejection to use the PCs or be personally involved in data recording. In that sense, the special attention should be paid to this staff, by promotion of their participation in training and system use.

- **Usability:** It is defined as the “degree to which a person believes that using a particular system would enhance his or her job performance”.

One of the major risk factors is the resistance to change. Major concerns include the users’ openness to change, users’ attitudes towards the new system, and users’ expectations.

Adequate involvement of user is paramount in order to foster ownership of the system by the future users, and to allow the implementation of systems that will actually match work processes, current and future.

- **Changes in work flow:** HIS implementation has always an impact on the hospital workflows and the scale of this impact depends on its complexity.

Therefore, complex work processes placed before the introduction of HIS should be redesigned and adjusted in order for medical staff to do their jobs effectively through the use of the system. Some jobs will be performed faster, whereas some will consume more time, especially while there is the obligation to keep both paper and electronic records.

Health workers and management will be able to get more updated and detail data related to patients and work processes. Only data that is being entered into the HIS will later on be available. HIS will also modify the working relationships between the hospital staff since it has the positive effect on the ways in which they work together, provide health care, and carry out their daily work practices. It is important to recognize the influence of the work process organization on the success of the HIS introduction and needs for its adjustments.

- **Equipment availability and reliability:** Technology facilitates the successful HIS implementation. Healthcare institutions must have the appropriate technology and infrastructure to start with the implementation process.

Staff who spend most of their time on data entry or on using the data from the information system must have available PC, that will be used mainly or exclusively by them. This refers primarily to the admission and out-patient rooms. In other locations, like premises of doctors and nurses, multiple users could share one PC, but each person should have individual account.

- **Staff Training and Technical Support:** Initial HIS implementation is not sufficient for the hospital to achieve the necessary goals. Such system cannot work properly unless the proper training is provided to the people who will use it.

On-site technical support and trainings are necessary for the IT staff and end users to feel comfortable in using the system successfully.

Training of users should be focused on practical issues and use the one-to-one approach, on-site and in real situations, rather than the more theory-based traditional “class-room” style, since this seems to be better accepted by the users and more efficient. A key factor that usually leads to user acceptance is the practical usage of the system (learning by doing), “releasing” the system in a controlled environment, thereby engaging the users early in the implementation process leading to their “real” involvement.

The training of doctors, nurses and other staff in a controlled environment shall be carried out in a system that is set up in accordance with the current clinical settings, in order to avoid tapping in the dark and sense of burden that staff involved in data-entry might feel, without recognizing the benefits for the organization and with bad quality of data entered in the system.

The involvement of hospital IT staff is necessary from the very beginning, since they will represent the first line of support to users during HIS usage, besides their involvement in the system installation, import of the existing data and initial training of users.

Users should be acquainted from the very beginning with the practices necessary for the safe use of the system, protection of patient's privacy, use of personal account and guarding of appropriate credentials. The signing of appropriate statement, as part of the procedure for obtaining HIS users accounts, should be considered although it represents the part of the norms associated with the rules of profession.

#### **What are the key elements of good implementation?**

- All should support the change, both management and staff of the hospital.
- Flexible approach to the HIS implementation.
- Implementation should be done gradually, step by step.
- End user and IT staff are trained to work within the system.
- To comply with the plan and implementation timeline.

#### **What management related aspects are essential during implementation?**

- Organizational stability and motivational role of hospital top management.
- Strong support of managers to the change that hospital information system brings.
- Not to falter on the obstacles, but to overcome them.

#### **On what else should the attention be drawn to during the implementation process?**

- Some users may experience difficulty when working on the computer, especially elderly.
- For some users, the introduction of information systems generates fear and anxiety and in the beginning it will be regarded as additional burden of obligations and assignments.
- Information system brings novelties that should be supported by change of the work process.
- Every change, especially large, causes the dissatisfaction and resistance of users. Reluctance, opposition and sometimes unfair criticism are expected and one should be prepared for them.

## Expectations from Health Care Institutions within the Project

It is necessary for hospital to meet numerous preconditions and conduct various activities:

- Management's commitment to participate in the project;
- Initial written agreement with the health institutions, which describes the tasks and responsibilities of both partners including the work plan and expected results.
- Compliance with technical requirements:
  - Functional local area network (LAN) and the necessary communications equipment;
  - Availability of servers and workstations;
  - If necessary, licenses for databases that are provided through the IPA 2008 HIS Project and World Bank projects, available in the Unit for Project Implementation of the Ministry of Health of the Republic of Serbia;
  - If possible, previous installation of the above mentioned licensed software.
  - Administration, needed customization and maintenance of the network infrastructure and equipment, including components of protection and safety (server protection, anti-virus and firewall servers), network configuration and management, and access to working stations.
- Premises allocated to the team engaged by the project - a room that can accommodate at least three people and three computers.
- Allocation of room adequate for training of health workers;
- Formation of a team that will cooperate with the EU-IHIS project team, composed of IT and medical staff, and submission of the list of team participants at the very beginning of the implementation process;
- Active involvement of the IT sector, experts and hospital associates in system customization, preparation and input of existing data and training;
- Provision of all the necessary code-lists and databases of relevant institutions, which include code lists from the NHIF: database of insurees, database of the rejected health insurance cards, diagnosis lists, medicines lists, services lists, consumables, devices;
- Provision of the data needed for the initial HIS configuration in electronic form, , which, among other data, include:
  - The scheme of organizational structure;
  - Codes of hospital days for outpatient departments;
  - NHIF codes for departments;
  - All data about end users (name and surname, "LBO" number for doctors only, title, role in the system, list of organizational unit in which the user works);
  - Prices of medicines and materials;
  - Logo of the institution.
- Provision of the other data needed for initial HIS configuration, which, among other things, include:

- Existing sets of services and materials for all departments;
  - Tests, test groups and corresponding services provided in the laboratory;
  - Templates of texts, most commonly used in the clinical documents that are typically generated, like findings and similar reports, in case that hospital already has defined templates;
  - Hospital address, telephone number, VAT and NHIF institution codes.
- Provision of the selected and purified data that need to be imported from other systems, in mutually agreed format. . Since hospitals are using various, often quite specific, systems, it is necessary for institution to make a selection of key data and conduct their preparation;
  - Assurance of the participation of HIS users in training and trial use of the system;
  - Clearly stated commitment to sustainable use of HIS after the end of the project.
  - Promotion and assignment of the internal trainers - advanced users who will support the work of colleagues in the hospital;
  - Reporting on the HIS implementation progress and eventual related problems, as requested by the Ministry of Health or the Project.

## Implementation Plan

HIS implementation will be carried out by the team prepared for the hospital staff (end-user) training and configuration of HIS according to the hospital needs.

Project team will submit, in timely manner, the list of necessary data, code lists and information that hospital has to provide to the Project at the very beginning of the HIS implementation.

The total duration of the planned HIS implementation process takes usually three to four months.

The HIS implementation will be conducted through following phases, in accordance with the best practices:

1. HIS installation and initial training (up to 1 month),
2. Practical HIS training – Test environment (up to 1 month),
3. Support for HIS production environment (up to 2 - 3 months), depending on the size of the institution,
4. Subsequent training for the additional HIS functionalities related to EHR (up to 15 days), conducted upon HIS implementation.

All phases are susceptible to change, in accordance with the number of end users and actual situation in particular hospital.

### ***HIS Installation and Initial training***

In accordance with the envisaged Project activities, the first phase will encompass the initial installation and configuration of HIS in the hospital, as well as actual training of groups of end-users.

### **Installation and configuration**

The installation and configuration of the HIS system includes:



- Hardware platform setup (only necessary in hospital where the hardware platform setup for HIS installation is not completed);
- Short gap analysis;
- System parameterization and configuration;
- Assignment of roles and access rights to system users;
- Import of the hospital organizational scheme;
- Import of all necessary code lists.

## Initial Training

Training of end users will be accomplished in phased introduction to the new system, focused on building their skills and confidence to use the system effectively in their role.

The goal of training is more than just entering the right data in the right field on the right screen. The goal is to enable users to think logically about how to best use the system in order to maximize the benefits of the system for patients and for the hospital.

During this training period:

- HIS users should be prepared for further training, through understanding of the crucial importance of their participation in achieving the objectives of the HIS.
- Effective HIS training should be organized based on the role of staff in the workflow (management, accounting, doctor, nurses...), not on the features and functions of the system.

Target of the initial training are hospitals' IT staff and end users.

**IT staff training** is focused on the IT personnel who will support and maintain the HIS system. It will cover the administration of users and system, code lists maintenance, detailed overview of the system functionality, organization/planning of work load and support to the users in case of problems in work and critical cases (first level support).

**Workshop for end users** are focused on classroom training, where trainees will get familiar with the general aspects of the HIS usage, as well as with the specificities related to work process and the manner of using the system by all members of the group. This training is oriented to the practical use of the system, since it is organized in classroom equipped with computers connected to the HIS server. Classroom training could be organized for groups of up to 20 attendees, although the optimal number of attendees is 15. It would be best if the training is organized for users of similar profile and coming from the same department.

## Practical HIS Training – Test Environment

The training program in this phase is provided in the departments based on the one-to-one approach, in real working conditions. All doctors and nurses will be included in the training, but special attention will be paid to those in charge of the department management, since the success of this activity mostly depends on them. The training is tailored to the fact that the estimated number of nurses is in average two times greater than the number of doctors. Also, doctors working in the inpatient department usually also work in outpatient department, so they need training for additional software functions used in both types of settings.



This phase allows end users to immerse more deeply into the work of the system and provide feedback for optimization of its work:

- As users gain experience, they will have much to share on improvements, especially regarding usability and issues they encounter.
- As user's knowledge base grows, they can further be trained to incorporate systems advanced functionalities and to take a look at how workflows and processes can be improved.

The introduction of the system, in a test environment, is first envisaged in the admissions desks and outpatient rooms, followed by the inpatient departments.

The training phase ends with training of other specific experts using the system, such as pathologists, hospital administration staff (invoicing) and management. The training program is adapted to the selected group of these specific users.

Additional training on new capabilities/options resulting from the work process changes and system configuration will also be covered in this phase.

## **Support for HIS in Production Environment**

This phase encompasses the transfer to the production use of HIS and on-request support provided to end-users, based on the requests for assistance or clarification.

Once the entire staff is trained and 'green light' is received from the hospital management, the hospital is ready for the transfer to work in the real environment, namely the production phase.

When the system enters into the production phase, the entire team, which includes members of the particular hospital, has to be focused on customers and be available to assist in their work and overcome any problem, to respond to any additional requests for the system configuration that would provide a more comfortable and efficient operation of the system.

The involvement of local IT experts is necessary during this phase, besides persons who are specialized in HIS implementation and maintenance. Also, the most advanced users should be identified and encouraged to take a role in providing the support to other HIS users in their immediate surroundings and inspire them to use the system.

Experiences have shown that the users' greatest reluctance to the new system generally occurs in the early beginning of the production phase.

It is very important that all the necessary preconditions are met, so that the success of HIS implementation and transfer to work in the production environment, along with the participation in training and use of the system, will not depend on the "general climate" and the willingness of individuals to work in the system.

## **Additional HIS functionalities related to EHR**

Once the phase of EHR development/upgrade is finished, that is, institutions are able to share the important health data on patients through the EHR, the additional training for use of the relevant functionalities will be organized.

Additional functionalities will be provided in order to integrate the defined data set from hospitals into the EHR.

In this phase, the extensive training will be organized for smaller number of end users, namely coming from the IT sector, with the aim to provide precise and prompt transfer of defined dataset in both ways between HIS and EHR. Health workers will be acquainted with the purposes, content and mode of access to the EHR.

## Acceptance Criteria

Criteria for the formal acceptance of the system, that should indicate that the implementation of HIS in the healthcare institution within the EU-IHIS project is finalized and should also be signed by the representative of the hospital management, are following:

- HIS Installation and all necessary configurations are finished:
  - Organizational chart is imported
  - End users' role and access rights are assigned
  - 80% of user accounts created
  - All necessary sets of services and materials are imported
  - All necessary and prerequisite code lists and data are imported:
    - Database of insurees
    - Database of rejected health insurance cards
    - Code list of healthcare institutions
    - Code list of healthcare workers
    - Code list of diseases/ diagnosis
    - Code list of medical services
    - Code list of medical devices
- IT staff allocated to the project is trained for HIS administration and support in end users' daily work (signed attendance list with training topics);
- 80% of end users of the health information system are trained (signed attendance lists with training topics);
- Admission desk is fully operational
- HIS is used regularly in at least 60% of the inpatient department, along with the appropriate outpatient rooms
- Generation of invoices to the NHIF is enabled in the departments where HIS is implemented
- Following reports can be generated in the departments where HIS is implemented:
  - Specialist's medical report
  - Case history
  - Surgery list
  - Report on hospitalisation (discharge letter)
  - Protocols (outpatient department, inpatient department, surgery, protocol of deaths)

## Further Reading

- Spetz J, Burgess J, Phibbs CS. What Determines Successful Implementation Of Inpatient Information Technology Systems? Journal of Healthcare Information Management, 2009, <http://www.ajmc.com/publications/issue/2012/2012-3-vol18-n3/What-Determines-Successful-Implementation-of-Inpatient-Information-Technology-Systems>
- Integrating Hospital Information Systems, <http://www.healthit.gov/providers-professionals/faqs/integrating-hospital-information-systems#.UNeFRSiksGM.email>