



Kosovo Health Information System: Case Study

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1.0 Introduction

The Kosovo Health Information System (HIS) pilot project is the kick-off for the Health Support Programme in Kosovo. This programme, financed by the home government as well as the government of the Grand-Duchy of Luxembourg, has the overall objective to improve the general health of the population of Kosovo. The Luxembourg Agency for Development Cooperation (Lux-Development) and the Ministry of Health (MoH) of Kosovo are responsible for the implementation and project-coordination. The HIS strategy and implementation plan were finalised by the MoH in June 2010, expecting to achieve its roll-out and inclusion in the private sector by 2014.

1.1 Summary

One of the programme's main goals is to implement the Health Information System nationally, the HIS pilot project being the first phase. Its objectives were to meet the functionality, security, and performance of the system and to evaluate its impact, progress, and implications. This is considered a crucial part of Phase I and was to be achieved through demonstrations, software reviews, and testing.

1.2 Objectives

The four main objectives of the HIS Strategy are:

1. Establishing the HIS infrastructure
2. Developing the processes and methods for data manipulation
3. Developing the method of evidence-based decision-making
4. Integrating the private sector and preparing the hospitals' information systems

2.0 Solution

There were several factors to consider in choosing the solution for this project. The HIS is a complex system with different layers and so has many requirements including the definition of new government structures, the redesigning of the underlying clinical and financial processes, customization of the already existing HIS software modules, and the significant investments the HIS requires.

The following factors had been considered:

- The form in which the project would be delivered
- The source to finance the investments
- The source to finance the operating costs
- The governance and responsibility over the HIS

As for the HIS, there are four key functional domains which correspond to the scope of the HL7 Functional Model of an electronic health record including patient care, registers security, and enterprise planning. They are all detailed below.

2.1 Patient Care

2.1.1 Admission, Discharge, and Transfer

The ADT subdomain monitors the patient's movement within the institutions and allows for the personnel to schedule further visits or check the patient's "lifecycle" which oversees the continuity of care. This allows for easy reviewing of appointments, therapies, and procedures and staying in touch with the patient.

2.1.2 Patient Relationship Management

The PRM registers and deregisters patients in a certain institution and makes sure that each patient is assigned to one responsible physician. It is interconnected with the ADT and allows for contact with the patient. It can also track complaints and the number of times the patient has switched the responsible physician.

2.1.3 Inpatient, Outpatient, and Emergency Care

This subdomain supports the processes connected with nursing and physician's healthcare, providing diagnostics, treatment, result interpretation, prevention, and the follow-ups to any of these based on the acquired information. This is the most complex subdomain as it involves actual medical care rather than simply managing everything around it.

2.1.4 Order Management

The Order Management subdomain allows healthcare professionals to easily place patient orders for procedures, tests, medications, IV fluids, consults, referrals, or medical equipment. These are then sent to other departments or institutions for fulfilment. The subdomain also performs various checks on, for example, a patient's allergies and compares it to the drug they were prescribed, thus preventing any accidents caused by human error.

2.1.5 Electronic Health Record

The EHR provides an up-to-date single source which allows healthcare professionals to view health data about a patient accumulated throughout the patient's lifetime. The information available could include, for example, blood type, allergies, former procedures and treatments, lab results, etc., allowing the institutions to view all data necessary to make decisions about further steps.

2.2 Registers

Registers of:

- Healthcare Professionals
- Healthcare Institutions
- Patients
- Pharmaceuticals

Catalogues of:

- Procedures and Laboratory Tests
- Diagnoses

2.3 Security

The HIS being a system which works with sensitive data, the question of security and privacy needs to be carefully addressed. Therefore, there are two subdomains for this issue:

- Consent Management
 - reliable controlling of access to clinical data, such as records in EHR
- Identity and Access Management
 - identification and authentication of HIS users and their rights to use HIS in a defined way

2.4 Enterprise Resource Planning

This domain is responsible for the administration and organization of patients, staff, resources, institutions, and data and includes:

- Billing Support
 - administrative functions of healthcare providers that includes billing support, and pricing
- Capacity Management and Staff Planning and Scheduling
 - tools to organize staff, schedule appointments, plan capacities and resources in order to process orders
- Health Statistics and Public Health Reporting System
 - analytics of healthcare indicators including health services, health status and reporting to national and international institutions

3.0 Outcomes and Impacts

3.1 Results

The results of the programme, though behind schedule, have been positive.

By the end of the contract time, the HIS had been implemented in 61 health facilities within the Pristina municipality and the Prizren region (30 % of all public-sector health facilities) and 4 clinics of the University Clinical Centre of Kosovo (UCCK) with approximately 4,000 end users overall. Throughout the contract 350,000 patients were registered, receiving 650,000 episodes of care and producing 1.1 million HIS transactions. The zero-client ration for doctors was 1 to 2 for doctors and 1 to 3 for nurses.

3.2 Evaluation

Data used for the evaluation was based on evidence collected through monitoring reports, HIS program documents, external independent evaluators, and a social research statistical package supported analysis where necessary.

3.2.1 Relevance

Consistency with EU and MoH strategies: *Excellent*

The relevance of the project to the country's needs, global priorities, donor and partner policies and its consistency with beneficiary requirements was found to be highly satisfactory with HIS piloting and implementation.

3.2.2 Quality

Quality of the IT HW and SW applications: *Very Good*

Data quality: *Excellent*

Measuring the extent to which HIS hardware and software applications allowed for the use of data which is complete, consistent, valid, accurate, and timely, the study that they were accessible with some minor usability issues. It was possible to extract disaggregated data and address its minor inconsistencies with feedback from the economic operator and KSV/O17 HIS technical advisors.

3.2.3 Effectiveness

HIS Standard Operating Procedures: *Satisfactory*

Training: *Excellent*

Achieving MOH HIS NOC contract objectives: *Very Good*

Though three SoPs were developed (call centre HW, data centre SW, and network WAN connectivity), the Ministry of Health has not implemented them yet. On the other hand, over 85% of the end-users expressed high satisfaction with the HIS training and were able to apply the skills to their work environment and help assist other colleagues with using the HIS.

Within the 13 NOC contract objectives supervised by the MoH to facilitate the smooth implementation of the HIS, 7 were fully achieved, 2 only partially, and 4 were not achieved including implementing service level agreements, IT procedures, assessing BMC compliance and establishing an NOC.

3.2.4 Efficiency

Cost efficiency: *Excellent*

Project management: *Poor*

The project management effectivity was evaluated as poor due to delays in implementing MoH contract pre-conditions as well as MSWG recommendations. Focus groups, for example, were implemented as late as March 2017.

In paradox, the HIS maintenance costs were judged as cost-efficient compared to global estimates at US \$ 0.59 per capita with the global annual estimates ranging from US \$ 0.53 to US \$ 2.99 per capita.

3.2.5 Sustainability

HIS information demand: *Very Good*

Established NOC: *Satisfactory*

It has been evaluated according to the study that the sustainability of HIS is highly probable when fully implemented and upkept. End-users can make informed decisions about patient care based on the system and data can be extracted for use in management decisions.

3.3 Drawbacks

At the moment, the project is stagnating.

While the admission-discharge-transfer (ADT) health sector domain of the HIS has been put into operation and users have expressed a larger degree of satisfaction with it, the unavailability of support service has drawn many away from it. Many facilities have stopped using the software including the UCCK and the Ministry of Health has not yet made the decision to implement the system nationally.

Furthermore, monitoring and measuring of the performance of this system is no longer possible as the monitoring network no longer has access to the monitoring nodes.

4.0 Future Steps and Visions

Though this project has had drawbacks and delays, it still has huge potential and people who wish to proceed with its implementation. The results have shown that end-users were widely satisfied with the benefits it brought and it was only the lack of technical support which caused the drop in its usage. Therefore, there are still several ideas and paths the project could follow to, under the right circumstances, provide the health sector improvements which Kosovo desires.

4.1 Evaluation Recommendations

The evaluation provided some ten recommendations which would further enhance HIS implementation.

1. Activate all HIS modules
2. Ensuring uniform and uninterrupted internet connection
3. Refine minor language errors and ICD codes
4. Allow changes to be made to a differential diagnosis
5. Develop printable standard discharge forms
6. Encourage input from patients in the design of the patient portal
7. Develop a national core set of indicators with the Kosovo National Institute of Public Health
8. Develop framework for the use of HIS information
9. Strengthen the HIS Steering Committee
10. Implement a HIS awareness campaign to strengthen community ownership

4.2 Other Ideas