Information on Medication History - Basis for Improved Prescribing

Martina Zorko, Marjan Sušelj

Health Insurance Institute of Slovenia, Ljubljana, Slovenia

Abstract

The spectrum of applied pharmaceuticals, often interactive, persistently expands. In modern therapeutics, patients receive more and more drugs, cases of simultaneous administering of more than 10 different drugs are not seldom. The majority of drugs are prescribed by personal physicians, the rest by the secondary level service specialists, doctors on duty, doctors at the release from the hospital etc. Furthermore, patients keep in stock drugs prescribed in the past. In the Slovene practice of medication prescribing, a major setback is poor information linking between the doctor and the pharmacist, as well as between doctors at different levels of service. Thus, doctors have often raised the issue of timely and accurate informing on the administered drug. This issue became even more pressing upon the implementation of the scheme of substitutable drugs in 2003, allowing the pharmacist to substitute the prescribed drug for an equivalent less expensive one.

The paper outlines a project headed by the Health Insurance Institute of Slovenia (Institute) to facilitate the recording of issued drugs on the card. The information on drugs received by a patient in the past will in this way become readily accessible to the prescribing doctor as well as to the administering pharmacist. This objective requires a range of tasks to be completed: business/operational design of the system, introduction of a uniform drug information scheme at the national level, adjusting the functions of the health insurance card system, upgrading the software environment at the health care service providers, training doctors and pharmacists in applying the new information, and ensuring data security in conformity with regulations.

Keywords:
Medication; e-prescription; Health insurance card

1. Background

The health insurance card (HIC) system, introduced by the Institute in 2000, furnished the Slovenian health care system with an electronic insured person's document and established data interconnections between all insurance providers and health care service providers. The HIC system, which effectively combines the smart card technology and network services, consists of: insured person's cards, health professional cards, health care service providers' data processing environment, and an on-line network of self-service terminals.

As the owner and manager of the HIC system, the Institute has continually since the system’s introduction in 2000 made efforts to enhance the functionality in order to extend the benefits and options for the card holders. Major such enhancements include:

- ordering of convention insurance certificates through self-service terminals, in 2001;
• recording of issued medical-technical aids on the card, in 2003;
• integration of a new voluntary insurance provider into the HIC system, in 2003;
• recording the commitment to posthumously donate organs and tissues for transplants, pilot implementation in one region in 2004, national scale implementation this year.

The infrastructure in place and experiences provide infrastructure for the extension of information technology to encompass professional medical work, which is the target of the next development steps.

2. Support to the Medication Management – Record of Drug History

The first step in medication IT management concerns the recording of issued drugs and providing this history to relevant processes. This enhancement is addressed by a project, managed and implemented by the Institute. In view of its national scope, the project is steered by the project board, which seats the representatives of the Ministry of Health and of competent institutions. The project also collaborates with a "counselling group", consisting of representatives of the professional chambers, the Office for Drugs and the Public Health Institute. With such a setup, the project aims at reaching the consensus in all competent bodies and in the medical and pharmacist profession. The project was launched in January 2004. According to the current time schedule, its pilot introduction will start in June 2005, and the national scale introduction early in 2006 [1].

In international perspective, a number of research studies have been undertaken and a host of data gathered concerning un-safe application of drugs, such as:

• Slovenia faces a safety and cost problem of stocks of left-over drugs at home, for it has been established (by a survey in March and April 2004) that of all the elementary drug packages, the users never use as much as 17.7%. [2]
• Experts estimate that, in the developed countries, the problems associated with dispensary prescribed drugs (un-safe or improper use - incorrect selection, administering not in compliance with instructions, incorrect metering, side effects, untreated indications, redundant treatment etc.) are the cause of 7.1 % of all hospital admissions, of which 4.3 % could be avoided. [3]
• It is estimated for the USA that ADR is the fourth most frequent cause of death, immediately following CVD, cancer and CVA. [4]

The objective of the project of recording issued drugs on the card is to set up professional, organisational and technological bases for the extension of the card dataset to include the record of issued drugs. The project aims to advance the level of safe use of drugs, to provide additional information to the prescribing doctors and to the issuing pharmacists, and to improve the information links between the different levels of the health care and between the doctors and the pharmacists (an even more important factor now, under the regime of substitutable drugs). The Institute further envisages the prescribing to be more rational and in this way to contribute to the containment of expenditure on medication, which is a rising trend in Slovenia, similar to other countries. In Slovenia, the expenditure on prescribed drugs from the compulsory health insurance funds is estimated to 61 billion Slovene tolars in 2004, which presents a rise of 1.8% in real terms compared to 2003.

The project ultimate goal is to provide integral support to the process of medication - embracing the prescribing, issuing and accounting of drugs; the recording of drugs on the card is the first step in this direction. In the second step, the HIC system will be enhanced

Section 2: Computerized Patient Record
with the e-prescription functionality and with an expert system to assist doctors in prescribing.

To summarise, the benefits for the different user groups include:

**Insured persons:**
- safer supply of medication (timely detection of potential incompatibilities with medication already administered).

**Doctors, pharmacists:**
- improved information links within the health care system;
- introduction of uniform drug information;
- first step towards information supported drug prescribing and issuing;
- in the regime of substitutable drugs, feedback information to the doctor on which drug has actually been issued in the pharmacy.

**Insurance providers:**
- rationalisation of medication expenditure at the national level;
- first step in the direction of e-prescription.

Since this is a pioneer work in the field of medication, the following risks and dilemmas need to be addressed and resolved in the scope of the project: the professional public is voicing a request to include the "opting-out" solution, to empower a patient to prohibit the inspection of drug record on the card to pharmacists and/or doctors. Here, consensus and support from the overall medical profession is required. Another challenge is to coordinate the project with similar projects unfolding at the Institute in relation to the drugs, i.e. the recording of allergies and hypersensitivity reactions to drugs on the HIC. Namely, the information on hypersensitivity reactions to drugs is essential for safe and quality prescription of medication, to avoid adverse reactions in the stage of prescription. The record of this information on the card will provide a systemic, user friendly and integral arrangement of this aspect. According to the draft concept, the card record of each established hypersensitivity reaction is to contain the data on the types of drugs involved, type of reaction, probability, and the indication of the author and the date of recording. Since the information on medication and allergies is sensitive medical information, the project shall observe high standards of the personal data protection regulations.

### 1.1 Design Solutions

![Figure 1-Schematic of the present situation, and the enhancements by steps](Image)

*Figure 1-Schematic of the present situation, and the enhancements by steps*
In the current arrangement, the doctor prescribes a drug on a paper prescription form, which then serves as a basis for the issuing of the drug in the pharmacy, after checking the HIC record of health insurance validity. The pharmacy reports the issued drug data to the Institute by email. (Fig. 1: solid arrow.)

The first step of enhancement, i.e. the recording of issued drugs on the card, will amend the procedures in the following ways (Fig. 1: dotted arrows):

- In the pharmacy, the issued drugs will be recorded in the card.
- The doctor will observe the record of issued drugs on the card at the time of prescribing new drugs.
- The data will be transmitted to the card (if data on issued drugs was not recorded on the HIC in the pharmacy – due to technical problems or if the patient did not have his/her HIC present) at the time of updating the card through the self-service terminal. Patients update their HIC themselves.

In the second step, i.e. e-prescription step, the system will be further enhanced with an expert system to assist the doctor at prescribing. Instead of the paper form, the doctor will apply electronic recording of the prescription on the HIC and will apply digital signature. In the pharmacy, the e-prescription record will be read from the HIC applying the public key infrastructure. (Fig. 1: dashed arrow.)

1.1.1 Which Data will be recorded on the Card?

For each issued drug, the following data are to be recorded on the card:

- drug operation code;
- issued quantity of the drug;
- date of issue;
- code of the prescribing doctor;
- code of the issuing pharmacy.

The card space allocated to the drug recording is 757b. With the above defined data set, this will allow the recording of 46 drugs. Upon filling up the file, a special algorithm will erase the old records and replace them with the new ones.

1.1.2 Uniform Drug Information - Prerequisite for the Drug Recording on the Card

At present, health care service providers and the pharmacies apply a variety of drug data collections. Accordingly, a prerequisite for the recording and reading of data to/from the card is the implementation of a uniform drug information. To this end, the Institute, in collaboration with the Public Health Institute, is setting up a modern technology based drug data collection with continuous updating from existing data sources, to be distributed to the users by the Institute.

1.1.3 Data Security

Information on received drugs is sensitive personal information, requiring the highest level of security. Card data security is ensured through the scheme of controlled access to different data segments by types of health professional card holders. In this scheme, access to the card drug record is granted to:

- doctors (read-only access); and
- pharmacists (read/write access).
1.1.4 Implementation in the User Environment

The implementation of the project will require upgrading of software in all the card system components and in all the environments of card application.

All the health insurance cards in circulation (close to two million cards) are already provided with the file structure to accommodate drug recording. The size of this file is to remain as original, while the internal file structure has been determined in the course of the project.

To allow the application of the new card file, upgrading of software libraries for all card reader types (desktop, keyboard integrated, portable) is required, as well as upgrading of all the card reader application platforms (DOS, Win 16, Win 32, Clipper, etc.). New library versions will be distributed by the Institute to all the users – 6000 work posts.

To support the recording of drugs through the self-service terminals, terminal software upgrading is required, including their card reader software libraries, for all the 296 terminals in the network.

The communication channel for the reporting and accounting data transfer between the pharmacies and the Institute is also in the process of reconstruction. The reconstruction will involve technology and the contents of communication (extended data set). The accounting reports from the pharmacies are the basis for the maintenance of the issued drug database at the Institute.

To allow reading of data at the doctors' offices and their writing in the pharmacies, software upgrades will be required in these environments, to integrate new software libraries, to allow the processing of issued drug card records and to allow the working with the drug data collection. Another important aspect is the training of doctors, medical nurses and pharmacists in the operation of the upgraded software. Since this is, in many cases, a premiere application involving the doctor’s hands-on work with the computer, the training and informing will have to be extensive, carefully planned and professionally executed. A similarly important activity targets the acceptance among the users.

3. Support to the Medication Management – e-Prescription

This is a second major step, based on and continuing the drug recording step. The e-prescription is an electronic document containing all the data of the present paper prescription form (or several such forms) stored on the patient's health insurance card. Alternative technical variant considered is to record the e-prescription on a server, with the patient card and the doctor's and pharmacist's health professional card serving as keys to access the e-prescription. The difference is only in the location of the storage of data, while for the user, the alternatives are virtually equivalent. The final decision will be made in the course of the project, according to the established conditions in the field as regards the technology and equipment.

The implementation of the e-prescription application depends on the introduction of the public key infrastructure. The introduction of the public key infrastructure is a vital upgrading need for the HIC system, to allow the recording of data requiring specific digital signature protection, among which the e-prescription is one example. In 2005, the Institute continues the preparatory activities, setting up of organisation and technology for phased introduction of the public key infrastructure in the HIC system. This will require the substitution of current health professional cards.

Along with the PKI activities, the project is to address different other aspects as well:

- further standardisation of the drug database;
• synthesis of all data (card, local database at the health care service provider, drug database) and expert SW tools into an integral expert system;
• development of universal interfaces for the integration in the local IT environments at the pharmacies and doctors' offices;
• informing and training of health care workers;
• upgrading IT equipment at the health care service providers - computers on the doctors' desks!

The e-prescription phase is a major step, introducing new technologies and functions into all the aspects of the national health care and health insurance system. We estimate it can be completed in 2 -4 years.

4. Conclusion

The recording of issued drugs on the card and the introduction of a uniform national drug database are to set information foundations for further development in the broad health care environment. Up-to-date and modern technology supported drug data will allow the development of tools to assist doctors in their decisions in the drug prescribing process. Positive effects, though, depend on the continual updating of professional guidelines for treatment and drug prescription, and on information support for these processes, which requires joint efforts by all the competent institutions at the national level. The new functionality will indirectly also promote equipping the health care environment with computer hardware and, in turn, propagation of other modern professional tools in the doctor's office.

The second step will extend the functionality in the direction of prescribing, including the application of the digital signature function. The digital signature functionality will open the way to a variety of other applications in the Slovene health care, dealing with sensitive health related data and subject to the provisions of the electronic commerce regulations in force.

5. References

[2] Research study: evaluation of the home stocks of drugs in the safety and cost perspective; Faculty of Pharmacy, University of Ljubljana, September 2004

6. Address for correspondence

Martina Zorko
Health Insurance Institute of Slovenia
Miklošičeva 24, SI-1507 Ljubljana, Slovenia
martina.zorko@zzzs.si, www.zzzs.si