



Summer, 2010

@Health

Monthly Focus

PSIP

Patient Safety through Intelligent Procedures in medication

European Commission
Information Society and Media



Adverse Drug Events harm patients and generate unproductive extra healthcare costs. It is a major public health issue. The PSIP project aims at developing innovative computer-based applications able to automatically detect situations at risk and to deliver healthcare professionals and patients relevant “ad hoc” information helping them to prevent Adverse Drug Events.

What is an Adverse Drug Event?

The Institute of Medicine (IOM) definition of an Adverse Drug Event is: “an injury due to medication management rather than the underlying condition of the patient”.

FIRST CHALLENGE: IDENTIFICATION OF ADVERSE DRUG EVENTS

There are few statistics available about medication errors and Adverse Drug Events (ADEs). **In Europe, it is estimated that more citizens die from Adverse Drug Events than from car accidents**, the risk being more important for aging patients suffering from multiple pathologies.

The first goal of the PSIP project is to automatically generate knowledge about Adverse Drug Events. Most of patient’s medical information is now available in electronic format and stored in large medical databases.

Achievements: The project has developed innovative tools to search these databases and provide reliable numbers about Adverse Drug Events per country, hospital or medical unit, describing their type, consequences and probable causes.

This knowledge about Adverse Drug Events identifies situations at risk in each context of care, depending on the patients’ characteristics, i.e. medical history and current symptoms, and on the place of care, for instance the type of hospital / medical specialty.

Which data are used to detect Adverse Drug Events?

Diagnoses (coded using ICD-10), Drugs (coded using WHO-ATC), Laboratory tests (coded using IUPAC) and demographics (age, gender...) of the patients are extracted from the hospital databases using the PSIP data model.

What is the PSIP data model?

The PSIP data model allows searching of different databases from different hospitals. It can be applied to hospitals from all European countries.



Which methods are used to automatically detect Adverse Drug Events?

Innovative statistical techniques of structured medical data combined with sophisticated analyses of textual documents such as medical letters have allowed the identification of significant associations between combinations of drugs and patients conditions on the one hand and indicators of Adverse Drug Events such as abnormal lab values on the other hand.

Partners

Centre Hospitalier Régional Universitaire de Lille, France; Centre Hospitalier Universitaire de Rouen, France; Centre Hospitalier de Denain, France; Capital Region of Denmark Hospitals, Denmark; Oracle France; SAS, France; IBM Danmark A/S, Denmark; Medasys SA, France; Vidal SA, France; Kite solutions, S.N.C., Italy; Ideea Advertising SRL, Romania; Aristotle University of Thessaloniki, Greece; Aalborg University, Denmark; Private Universität für Gesundheitswissenschaften, Medizinische Informatik und Technik GmbH, Austria.

Result

ADE scorecards provide an overview of the frequency of different Adverse Drug Events in a hospital (or a medical unit). They also give the characteristics of 65 different Adverse Drug Events using 245 association rules.

Example:

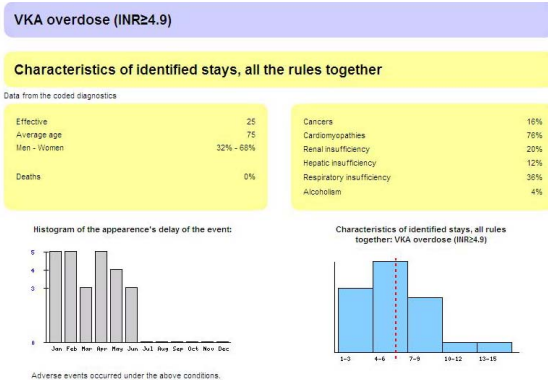


Table 1: Anticoagulation by Vitamin K Antagonist (VKA) is monitored by the lab value INR. There is a high risk of haemorrhage when $INR > 5$. The table gives the ADE scorecard identifying 25 cases at risk of haemorrhage in a population of 7,400 hospitalised patients over a six months period in a general hospital.

The different Adverse Drug Events can also be analyzed for each patient to identify the circumstances of occurrence.

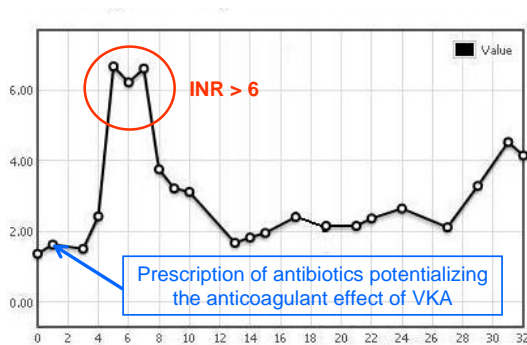


Figure 1: Visualisation of the evolution of INR in one of the 25 patients. This patient is undergoing an anticoagulant treatment at day 0. Following the prescription of antibiotics on day 2, INR raises to abnormal values ($INR=6$) indicating a high risk of haemorrhage.

Timetable: from 01/2008 – to 04/2011
Total cost: 9,95 million €
EC funding: 7,27 million €
Instrument: IP
Project Identifier: FP7 ICT-2007.5.3

Important Links:

Project website: <http://www.psip-project.eu>

ICT for Health website: http://ec.europa.eu/information_society/ehealth

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SECOND CHALLENGE: PREVENTION OF ADVERSE DRUG EVENTS

The second goal of the PSIP project is to deliver to the healthcare professionals and to the patients who find themselves in these risky situations, the contextual knowledge that can help them characterise the problem and adapt the treatment to avoid potential Adverse Drug Events.

Result

To reach this second goal, a computerized decision support system has been designed, aimed at optimizing the medication use process. To this end, association rules are implemented in a knowledge-based system to provide alerts and information to clinicians handling the patient's therapeutic plan. A PSIP application has been designed to integrate and interface the decision support modules with existing hospital information systems, electronic prescribing tools and specialized web portals.

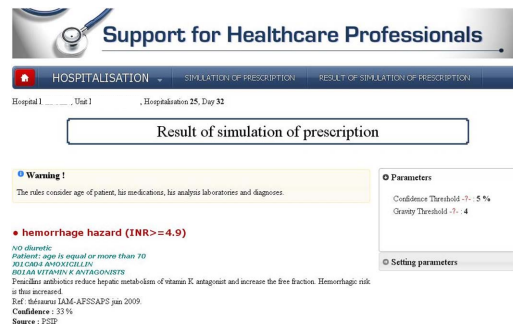


Figure 2: Example of alert "Association of antibiotics and VKA increases the risk of haemorrhage."

User-centred approach

The design and development of this application follows a user-centred approach so that the product fits the needs and characteristics of the users, be they health professionals or patients.

Human factors issues to ensure efficiency and acceptance

Careful consideration of human factors issues ensures the efficiency and acceptance of the final product, and its ability to be well integrated in the users' work and thought processes.

CONCLUSION

To evaluate the clinical impact of PSIP, clinical trials are in progress in actual hospital settings, expecting a reduction of Adverse Drug Events in the medical units using the PSIP applications.