

PSIP

Patient Safety through Intelligent Procedures in medication

The prevention of medication errors that may harm the patients and generate important extra healthcare costs is a major public health issue. The PSIP project aims at developing innovative computer-based applications able to automatically detect situations at risks and to deliver healthcare professionals and patients relevant “ad hoc” information helping them to prevent medication errors.

Goals and Rationale of the Project

There are few statistics available on medication errors and adverse drug events. In Europe, it is estimated that more citizens die from adverse drug events than by car accidents, the risk being more important for ageing patients suffering from multi pathologies.

The first goal of the PSIP project is to automatically generate knowledge on adverse drug events. Most of the patients’ medical information is now available in electronic format and stored in large medical databases. The project aims at developing innovative tools able to search those databases and provide reliable numbers on adverse drug events per country, region, hospital or medical unit, describing their type, consequences and probable causes.

This knowledge on adverse drug events helps identify situations at risk in each context of care, depending on the patients’ characteristics, i.e. medical history and current symptoms, and on the care place, for instance the type of hospital / medical specialty.

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 helping them characterising the problem and adapting the treatment to avoid the upcoming adverse drug events.

Project Description

Hospital data repositories store patients’ medical history. Available information is firstly rigorously anonymized, formatted according to a specific data model, and then exported in a highly securitized temporary data warehouse. Then, these medical data may be analyzed with innovative statistical tools. These sophisticated statistical analyses allow identify adverse effects systematically associated with combinations of certain drugs and contexts such

as particular diseases or habits of prescriptions. Regular reports may then be delivered to hospitals’ units, describing the types of adverse drug events observed in their department along with their frequency of occurrence and their severity. Moreover, the statistical associations linking combinations of drugs and contexts may be described in terms of rules and incorporated into a clinical computerized decision support system. Such an application would help the clinicians identify patients at risk while they are prescribing or monitoring their treatments. Finally, this contextual information will be accessible to patients at risk of probable adverse drug events.



Project Results (as of December 2009)

The frequency of occurrence of adverse drug events varies from one medical department to another one, depending on its area of expertise (obstetrics, surgery, specialized medicine, or internal medicine). Differences between hospitals and between countries (France and Denmark) have been documented.

As of November 2009, 240 rules have been validated and implemented in a knowledge based system and the corresponding decision modules designed.

PSIP SIMULATION (BASED ON A REAL ADVERSE DRUG EVENT CASE FROM THE DANISH PATIENT SAFETY DATABASE)

Why did this patient die? A woman is diagnosed with a hip fracture needing surgery. After the surgery the patient is placed on the standard analgesics plan, including a Non Steroidal anti Inflammatory Drug (NSAID). The patient develops a bleeding gastric ulcer and undergoes emergency gastroscopic treatment. The bleeding cannot be stopped and the patient dies.

How would PSIP prevent this death: the system would identify the patient’s antecedents of gastric bleeding lesion. The applied rule would be: “prescription of NSAID (which is ulcerogenic) associated with a history of bleeding gastric ulcer and recent surgery generates a high risk of haemorrhage” (confidence 87%). Reminded of this risk the physician would prescribe another (non ulcerogenic) analgesic drug.

These decision support modules provide alerts and information when an adverse drug event is likely to occur. **Statistical results** - in the form of confidence and severity coefficients - **contribute to adapting the rules according to the local environment**. This contextualization reinforces the accuracy of the computer application aiming at supporting the therapeutic decision. A PSIP application has been designed to integrate and interface the decision support modules with existing hospital information systems and electronic prescribing tools. 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 clinicians or patients. 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.

PSIP International Workshop

The book "Detection and Prevention of Adverse Drug Events: Information Technologies and Human Factors" edited by R. Beuscart, W. Hackl and C. Nøhr and published by IOS Press, is a collection of presentations from the International PSIP Workshop held in September 2009 in Italy. This workshop gathered representatives from other patient safety European projects along with leading figures from outside Europe (U.S., Canada and Australia) specialized in identification of adverse drug events and medication errors in hospital settings. The workshop resulted in new cooperation initiatives between the different European projects on the one hand, and with a leading US project on the other hand.

Expected Impacts

Societal Impact

- Improvement of the computer-supported monitoring of patients treatment
- Improvement of patient safety through a reduction of some categories of adverse drug events
- Involvement of patients in the management and control of their treatment leading to a better therapeutic compliance
- Better clinicians – patients cooperation for the management and survey of therapeutic treatments
- Better epidemiologic knowledge on adverse drug events

Economical Impact

- Significant reduction of preventable Adverse Drug Events
- Reduction of related extra hospital costs
- Development and commercialization of new products by the healthcare industry



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Timetable: from January 2008 to April 2011

Total cost: € 9,946,770

EC funding: € 7,268,981

Instrument: IP

Project Identifier: FP7-2007-ICT-1-5.2

KEYWORDS

patient safety, data mining, human factors,
clinical decision support systems, adverse drug events