AUTOMATED DETECTION OF ADVERSE DRUG EVENTS FROM OLDER INPATIENTS' ELECTRONIC MEDICAL RECORDS USING STRUCTURED DATA MINING AND NATURAL LANGUAGE PROCESSING.

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Challenges & Goals

- Adverse drug events (ADEs) is the second most frequent complication in hospitalized patients; ADEs are linked to increased mortality, morbidity, hospitalization length, readmission, and cost and most of them are preventable (pADEs).
- Older inpatients are at particular risk of ADEs. Among drugs, antithrombotics are frequently used in this population and carry a substantial risk of hemorrhages and thrombosis.
- Reduction of ADEs in the older population has therefore become an important patient safety & public health issue.

Our research hypothesis is that the automated detection of ADEs related to antithrombotic drugs use from electronic medical records could significantly improve risk management and patient safety in older inpatients with multimorbidity, frailty and polypharmacy.

Research Objectives

1. To develop and validate an electronic application for the automated detection of ADEs related to antithrombotic drugs. The application will process data derived from electronic medical records (EMRs) by means of both structured data mining (SDM) and natural language processing (NLP);
2. To develop and adapt NLP tools for the specificities of the French and German medical languages;
3. To assess the performance of the ADE automated detection tool in terms of efficacy, reliability, reproducibility and implementation ability;
4. To implement strategies to improve ADE reporting and prevention through knowledge transfer.

Methodology

WP1. Identification of antithrombotic drugs, ADEs, ADE markers, triggers, confounding factors and causes

WP2. Analysis of structured data (SDM). Computational algorithms based on logical rules will be developed for structured data to identify ADE markers, triggers, confounding factors and causes.

WP3. Analysis of free text data (NLP). We will 1. Build the lexico-semantic sources (text-based approach to detect the variables of interest) 2. Tune the NLP pipeline modules (construct the lexical entities to be recognized in a text) and 3. Design a service-oriented text-mining pipeline.

WP5. ADE detection tool assessment. The performance (sensitivity, specificity, positive and negative predictive values) of the ADE detection tool based on both SDM and NLP will be evaluated using a random sample of 600 hospital stays for ADE occurrence, type, causality, severity and preventability by means of a patient medical record review.

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References