1. **Title:**

Automated adverse event monitoring – promotes safety and quality in healthcare

2. **Keywords:**

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Tools

4. **Authors and organizations**

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5. **Abstract text**

Background

Each year, an estimated 100 000 patients in Sweden suffer injuries associated with hospital stay. In 3 000 of them the injury directly contributes to death. Half of the injuries are considered avoidable. This corresponds to 630 000 unnecessary days in hospital or 10 percent of all care days to an extra cost of more than 600 million Euro each year. This estimation from a report by the National Board of Health and Welfare 2008 increased the awareness of patient safety and of the importance of prevention of adverse events. In the Public Healthcare Services Committee, Stockholm County Council a decision has therefore been taken on a zero-vision regarding healthcare injuries.

Only around 10-20 percent of all medical errors – most of them not resulting in injuries – are reported through voluntary incident reporting. As a complement to the incident reporting, structured retrospective chart review is a useful method to detect adverse events and patient injury. The Public Healthcare Services Committee Administration, Stockholm County Council therefore financially support hospital caregivers for an electronic support for structured chart review to be implemented.

The National Board of Health and Welfare recommend structured record review to be carried out with the Global Trigger Tool (GTT) method, which is an effective method for measuring the overall level of harm in a healthcare organization. The method was developed by the Institute of Healthcare Improvement (IHI) in the U.S.A. and has been translated and adapted to Swedish conditions. The Swedish version also includes an assessment of whether or not the injury was avoidable. GTT consists of 53 indicators ("triggers") that, if they occur in the patient record, could indicate a possible injury.

Purpose

The overall purpose of developing an automated tool for structured chart review is to support and simplify the work of minimizing healthcare injuries in order to increase patient safety and to decrease costs.

Method

For the automation of the structured visual examination of the GTT procedure, SAS Institutes' SAS ® Analytic Intelligence has been chosen as the technical solution, as the software is already included in the Joint Monitoring Platform for the Stockholm County (GUPS). The technical solution includes the module SAS ® Enterprise Miner with plug-in SAS ® Text Miner. Text mining is a process for discovering meaningful patterns and relationships from unstructured text information. The definitions of the 53 triggers in GTT have been modeled and clarified to meet the demands of automation. They were incorporated in an electronic decision support system that automatically search in existing electronic medical records for triggers in both structured data and unstructured text through text mining. After the automated procedure records with triggers are assessed by a physician. If an injury is found, the physician categorizes the injury according to the GTT classification and to whether or not it was avoidable.

The tool will be developed on the record systems of Karolinska University Hospital, but will be adapted to other existing electronical record systems. A national reference group is being used for expertise advice, and support.

Results

In a pilot project with five triggers, the accuracy of the automated tool was well in accord with the manual reviewing. To date, one group of triggers in GTT has been completely automated, a second group has been partially automated and a third group is yet not automated. The third group of triggers is dependent of records not yet included in the Karolinska's data warehouse. The automated method, so far tested, seem to detect fewer "false-positive" triggers than the manual method.

Discussion

Manual reviewing of records is time consuming, approximately 20 minutes per record to find triggers. This time can be almost eliminated with an automated tool. This will make it possible to allocate saved resources to analysis of the results and to patient safety improvements. We hope that the automated tool also will increase accuracy in injury detection, as compared to manual reviewing, and be able to identify important combination of triggers and triggers most predictive of avoidable injury. By broadening the use in a number of hospitals, the tool will gradually provide more accuracy as more, and more varied, record data will allow further adjustment of the model for trigger search.