

# Automated Adverse Event Monitoring – Promotes Safety and Quality in Healthcare

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# Authors and organizations

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# Background 1

It is estimated from a report of the National Board of Health and Welfare 2008 that, in Sweden, each year:

- 100 000 patients suffer injuries associated with hospital stay
- In 3 000 of them the injury contributes to death
- Half of the injuries are considered avoidable
- This means 630 000 unnecessary days in hospital (10 % of all)
- The cost is 600 million Euro



# Methods to detect health related injuries



Optional adverse events reporting detects only 10 - 20% of all medical adverse events

In many cases these adverse events do not lead to health related injuries

As a complement, structured retrospective chart review can be used to detect adverse events and patient injury



INSTITUTE FOR  
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Cambridge, Massachusetts, USA

The IHI Global Trigger Tool (GTT) provides:

- instructions for training reviewers to conduct retrospective reviews of patient records using 53 *triggers* to identify possible adverse events
- a list of known adverse event triggers
- instructions for selecting records
- instructions and forms for collecting data to track three measures
  - *adverse events per 1,000 patient days*
  - *adverse events per 100 admissions*
  - *percent of admissions with an adverse event*





The Swedish Board of Health and Welfare recommend structured chart review to be carried out with the GTT method

GTT has been translated and adapted to Swedish conditions

The Swedish version also includes an assessment of whether or not the injury was avoidable

# Background 2

## The Public Healthcare Services Committee, Stockholm County Council

- has taken a decision on a zero-vision regarding healthcare injuries
- included new demands in hospital agreements on structured chart review with the GTT method
- financially support hospital caregivers for an electronic support for structured chart review to be implemented



# 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





# Specific aims of the project

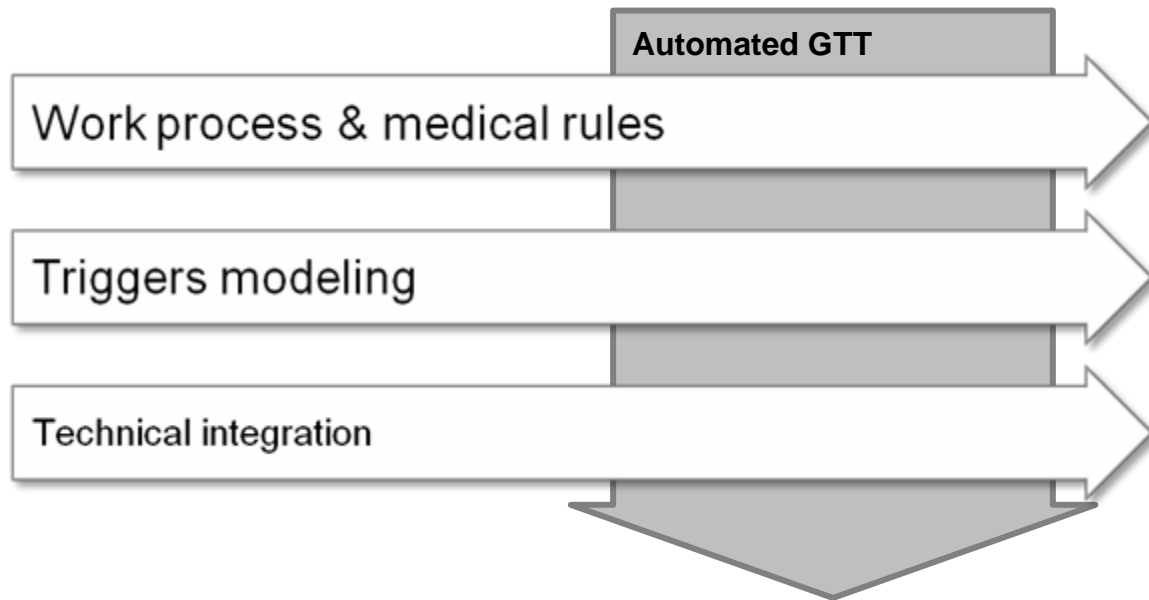
- Automating parts of the GTT method
- Automatic identification and development of 53 triggers
- Design and implementation of solutions for data integration to different electronic record systems
- Presentation on the joint analysis portal in Stockholm County Council



# Methods



# GTT-manual & structured approach



The definitions of the 53 triggers in GTT have been modeled and clarified to meet the demands of automation. For this purpose, a national reference group has been used.

### Example

C5
<i>GTT-manual's original definition</i>
C5 Dialysis Start of dialysis might be an unavoidable result of severe disease. Treatment might have caused the need for dialysis due to renal insufficiency, prolonged low blood pressure or radiological investigation using contrast medium
<i>Definition for automated trigger search</i>
Unexpected dialysis during hospital stay. Planned dialysis excluded
<i>Identified difference between definitions</i>

Preparing for medical analysis of the patient record, triggers found are documented in a reporting chart

TRIGGERSRAPPORTERING		
RESULTAT FRÅN TRIGGERSÖKNINGEN	Hittade triggers	C8,
	Patientbeskrivning	Patienten kom in initieilt för en knäoperation.
	Beskrivning av hittade omvårdnadsriterier	Bruten arm i följd av fall (Se trigger nedan). Trigger C8: Se journalanteckning från 2010-01-20 fm.
	Beskrivning av hittade kirurgiska kriterier	
	Beskrivning av hittade läkemedelsriterier	
	Beskrivning av hittade intensivvårdskriterier	
	Beskrivning av hittade perinatale kriterier	
Beskrivning av hittade akutmottagningsriterier		
TRIGGERSLISTA		
#	Triggers	Beskrivning av händelsen
Omvårdnadsriterier		
C1	Transfusion	
C2	Hemoglobinfall	
C3	Stroke på sjukhus	
C4	Svikt och stillestånd	
C5	Dialys	
C6	Positiva blododlingar	
C7	Röntgen- eller dopplerundersökning	
C8	Fall	1 Se journalanteckning från 2010-01-20 fm.

# Technical aspects of the method

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

Definitions were incorporated in an electronic decision support system that automatically search in existing electronic records for triggers in structured data and unstructured text through text mining.



# Manual aspects of the method

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

Measures are taken to avoid repeated injuries

Regular follow-up of health care injuries over time is undertaken



# Results

In a pilot project with five triggers, the accuracy of the automated tool was well in accord with the manual reviewing

14 triggers in GTT have so far been completely automated  
34 triggers have been partially automated and  
5 triggers have not yet been automated

The last group of triggers (5) is dependent of data not yet included in the Karolinska's data warehouse.

For 48 (14 + 34) automated triggers the new tool overall will detect records with triggers as efficiently as, or better than, the manual method

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

The time to find triggers can be almost eliminated with an automated tool

Saved resources can be allocated to analysis of results and to patient safety improvements

IT tool compatible with existing electronic records was an important prerequisite



# Further development

Hopefully, the automated tool will also

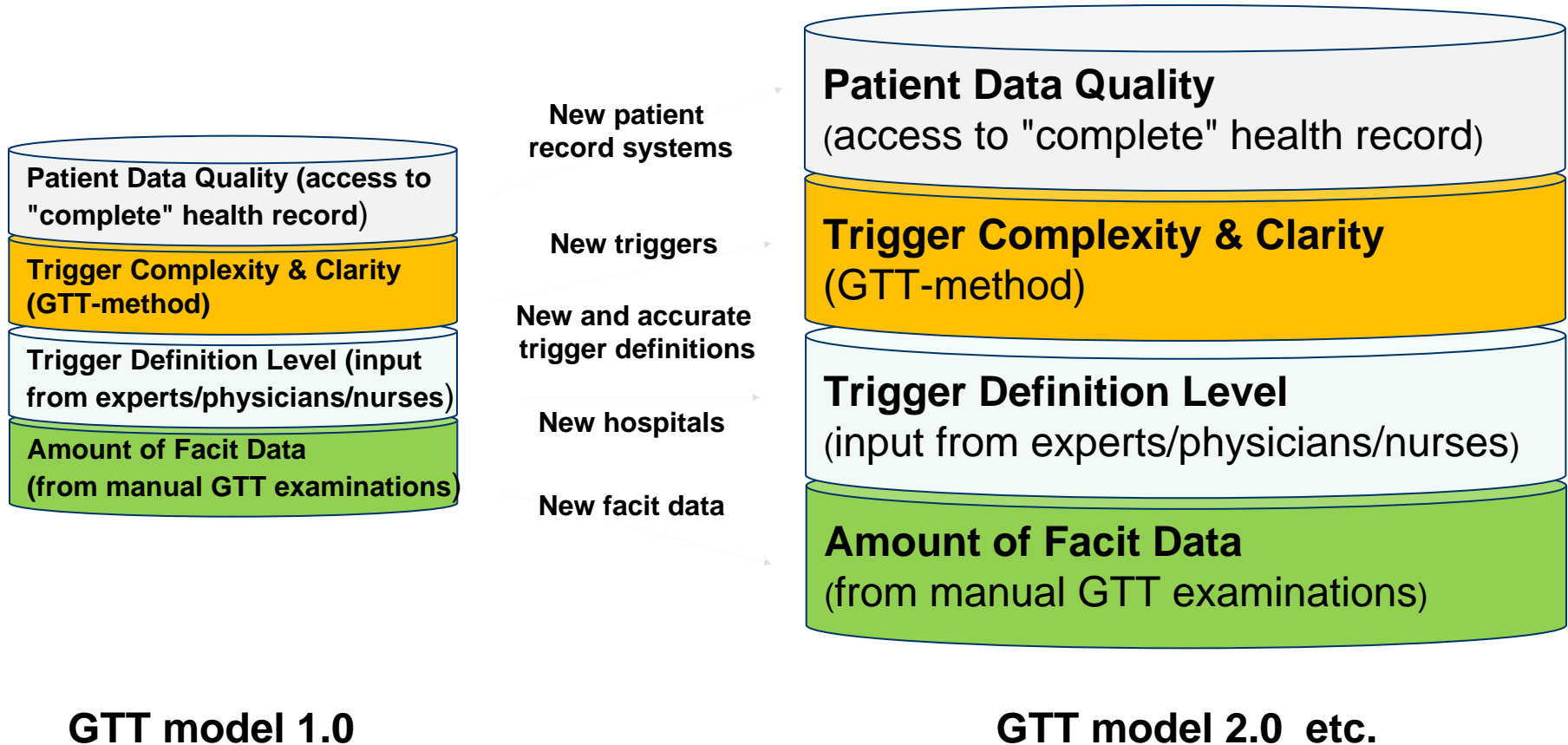
- increase accuracy in injury detection
- identify important combination of triggers
- identify triggers most predictive of avoidable injury

By broadening the use to other hospitals and record systems, the tool will gradually provide more and more accuracy

By input and support from national expertise in the reference group the automation system can be expected to be approved and used nationwide



# Parameters that affect the quality and potential for development of an automated GTT model



# Collaboration and contacts

This work was carried out as a collaboration between:  
Karolinska University Hospital,  
Stockholm County Council (SCC) -  
Public Healthcare Services Committee Administration,  
SAS Institute and  
Bearing Point Consulting AB

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