

**Project Title:** Monitoring Intensification of Treatment for Hyperglycemia and Hyperlipidemia

**Principal Investigator:** Turchin, Alexander, M.D.

**Organization:** Brigham and Women's Hospital

**Mechanism:** RFA: HS07-002: Ambulatory and Safety Quality Program: Enabling Quality Measurement through Health IT (EQM)

**Grant Number:** R18 HS 017030

**Project Period:** 09/07 – 09/09

**AHRQ Funding Amount:** \$533,431

**Summary Status as of:** December 2008

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**Strategic Goal:** Develop and disseminate health IT evidence and evidence-based tools to improve health care decisionmaking through the use of integrated data and knowledge management.

**Business Goal:** Knowledge Creation

**Summary:** This project was initiated in September 2007 and has completed the first half of the grant period. Low frequency of treatment intensification has been linked to increased prevalence of elevated blood pressure and glycosylated hemoglobin (HbA1c). Dr. Turchin and his team are developing a physician performance process measure using both structured and unstructured data targeted at the frequency of treatment intensification in managing hyperglycemia and hyperlipidemia. Two informatics tools or algorithms have been developed to determine whether medication for the treatment of hyperglycemia and hyperlipidemia was increased based on data found in the electronic health record (EHR). The first algorithm is designed to extract structured data from the EHR, and the second is a natural language processing (NLP) tool developed to assess whether accurate measures of treatment intensification can be obtained through computational analysis of the text from physician notes. It is expected that these tools will be made available using the public domain. The project will test the sensitivity and specificity of the informatics tools using manual review of the electronic patient records by two independent reviewers who did not participate in the tool development. To determine if the measures of treatment intensification obtained through the use of the informatics tools are clinically valid, the project will use a variety of statistical analyses to demonstrate a relationship between HbA1c and low-density lipoprotein (LDL) cholesterol levels and two measures of treatment intensification: frequency of treatment intensification and time to treatment intensification. Statistical analyses will also be used to 1) identify specific patient and visit characteristics that affect the probability of anti-hyperglycemic and anti-hyperlipidemic treatment intensification at a given visit and 2) to test that case mix-adjusted measure of intensification of treating hyperglycemia and hyperlipidemia is more strongly associated with clinical outcomes than currently used process measures of diabetes care.

This project is applying the informatics tools to retrospective data generated from an internally developed EHR, Longitudinal Medical Record (LMR), and is collected in Partners Healthcare System's proprietary Research Patient Data Registry (RPDR). The data collected are based on patient visits to primary care practices or endocrinology practices affiliated with Massachusetts General Hospital and Brigham and Women's Hospital.

## Specific Aims

- Test the hypothesis that an accurate measure of treatment intensification in the management of hyperglycemia and hyperlipidemia can be obtained through computational analysis of the text of physician notes in the EHR. **(Ongoing)**
- Test the hypothesis that the measure of treatment intensification developed in the first aim is related to glucose and lipid control. **(Upcoming)**
- Identify specific patient and visit characteristics that affect the probability of anti-hyperglycemic and anti-hyperlipidemic treatment intensification at a given visit. **(Upcoming)**
- Test the hypothesis that case mix-adjusted measure of intensification of treating hyperglycemia and hyperlipidemia is more strongly associated with clinical outcomes than currently used process measures of diabetes care. **(Upcoming)**

**2008 Activities:** Data acquisition was completed early in 2008 along with the recruitment and training of a computer programmer. Following the completion of these activities, Dr. Turchin and his team compared structured data found in the medication section of the EHR and unstructured data found in the text of physician notes as the sources of information on medication intensification. Based on the comparison results, the project includes both structured and unstructured data sources in its analysis of medication intensification. A tool to analyze the structured data has been developed. Design of the overall framework of the general informatics tool to identify documentation of any (anti-hyperglycemic or anti-hyperlipidemic) medication intensification in the text notes is completed, and development of the tools is underway. An evaluation of the accuracy of the NLP tool in determining whether medication non-adherence was documented in physician notes was performed, and the findings were presented in a full paper at the 2008 American Medical Informatics Association (AMIA) Annual Symposium.

**Preliminary Impact and Findings:** The project's findings illustrate that medication intensification data from structured and narrative sources are complementary and in both cases independently associated with changes in relevant clinical outcomes. A manuscript that describes the comparison of structured versus unstructured data sources has been submitted to a peer-reviewed journal. Documentation data of patient medication adherence obtained using the informatics tool was developed, and the findings showed that patients who are documented to be non-adherent to their medications are more likely to have significantly elevated blood pressure (> 150/95). This finding confirms clinical relevance of the information computationally extracted from the text of the notes.

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## Selected Outputs

A manuscript describing the evaluation of the tool for identification of documentation of medication non-adherence from narrative provider notes in the EHR was published in the AMIA 2008 Symposium Proceedings, pp. 732-6.

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**Grantee's Most Recent Self-Reported Quarterly Status:** The project is making some progress but has experienced delays. It is currently delayed across three of its four aims because of a 2-month delay in the start date. The project did not officially begin until December 2007 because additional non-AHRQ funds necessary to supplement the project were not received on time. A plan has been developed to achieve the other aims by the project end date. For example, fellows and students have been recruited to help with the development of the NLP tools. As a result of the aforementioned delays, adjustments have been made to the budget to distribute the appropriate level of support over the lifetime of the grant. As such, the project is temporarily under spent by 5 to 20 percent. However, based on upcoming activities to achieve the aims described in the project, full use of the budget is planned.

**Milestones:** Progress is on track in some respects but not others.

**Budget:** Somewhat under spent, approximately 5 to 20 percent.