Automated VTE Prophylaxis Surveillance and Quality Assurance Tool

Stephen Chen and Vamsi Chunduru
Computer Integrated Surgery II, Spring 2015

Introduction

We are an informatics project, dealing with the way Venous Thromboembolism (VTE) is treated. VTE is a disease process that occurs frequently during hospitalizations; blood clots often form due to immobility and the patient’s weakened state. A contributing factor is that clinical providers frequently prescribe the incorrect prophylaxis (preventative treatment) for at-risk patients. To improve this, efforts have been made to develop a “smart order set”, a way of automating prophylactic prescription. However, the compliance for such tools has been historically low due to the lack of accountability for the providers.

We address this problem by developing a VTE prophylaxis compliance tool that increases provider accountability for their patient prescriptions. This tool hosts several historical views of patient outcomes, giving providers a concrete way to view their individual and cohort progress, improving helping them improve the compliance rate of risk-appropriate VTE prophylaxis.

The Problem

What is Deep Vein Thrombosis (DVT)?
What is Pulmonary Embolism (PE)?
% of patients with DVT get PE responsible for almost
800,000 deaths worldwide

In 2005 at the Johns Hopkins Hospital, only 33% of 322 patients received appropriate VTE prophylaxis

However, rates are still not optimal

The Solution

- Develop a clinician review tool that keeps track of suggested versus prescribed prophylaxis treatment
- Rank clinician adherence to risk-appropriate prophylaxis prescription
- Provide automated continuous tracking of clinician’s treatment procedures on a monthly and annual basis
- Purpose: Improve prescribed risk-appropriate VTE prophylaxis compliance to prevent VTE onset.

Conclusion

We met our expected deliverable of creating a web tool that ranks clinical provider compliance and incorporates some advanced features. Our tool compares the compliance history of the provider with the overall compliance of the cohort. By tracking the recent compliance trends, the tool provides tangible feedback to the provider that incentivizes them to prescribe risk-appropriate prophylaxis.

Our maximum deliverable of creating achievements for a positive reinforcement system was not reached—this was partly due to further discussion with our mentors concluding that it would be not effective. Through this project we learned the necessary skill set for sophisticated web server development with Ruby on Rails. A major challenge we faced was fulfilling all of the developmental dependencies for Rails.

In the end, we consider our project a success in the primary goal of developing an effective Surveillance and Quality Assurance Tool.

Proof of Concept

The Overview screen provides an initial summary of the Provider’s performance

The Trend screen provides a visual comparison of the Provider’s overall compliance in the recent months to the cohort’s overall compliance

The Compliance screen provides in-depth feedback on each patient’s visit and the result of the prophylaxis treatment (only showing cases where the patient was either OVER- or UNDER-prophylaxed)

The Ranking screen provides an anonymous ranking of the Provider amongst their cohort

Continued Work & Further Extensions

With a Go-Live date set for June 1st, we have a couple more steps left before our final launch:
1. Automate VTE Prophylaxis data acquisition
2. Incorporate administrator view/account
3. Monitor Provider traffic for administrator feedback
4. Implement security via user login authentication

Credits

Stephen was in charge of the front-end application, developing in Bootstrap and managing the HTML. Vamsi was in charge of the back-end server, building the Rails platform that interfaced with the SQL database. The ultimate product was a result of our combined efforts.

Acknowledgements

Gorkem Suvicic (JHM TIC Manager), Dr. Paul Nagy (JHM TIC Director), Brandyn Lau (JHM VTE Expert), Michael Cohen (JHM TIC Senior Engineer), and Dr. Elliot Haut (JHU Surgeon & leading VTE researcher)

Publications