Guiding Principles for the Duke Connected Care Predictive Modeling Pilot

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Introduction

Predictive modeling in healthcare is a complex undertaking. It benefits from cross-disciplinary perspectives that reflect the multi-faceted nature of risk and potential interventions. However, it can be challenging to foster these multiple viewpoints to recognize common goals and shared purposes.

Methods

In the first stages of developing a clinically-useful machine learning-based predictive model for hospital admissions, Duke Connected Care, an accountable care organization (ACO) managing a Managed Shared Savings population, assembled a diverse stakeholder group to develop a set of guiding principles that were finalized on December 21, 2016. The stakeholders represent a cross-section of expertise, including clinical care, case management, health administration, data science, information technology, translational science, and informatics. We based this activity on the approach used by the FDA Sentinel Initiative and the National Patient-Centered Clinical Research Network (PCORnet). Our intention was to form a strategic roadmap for the pilot; allow underlying assumptions, intent, and values to be recognized; create a basis for priorities to be balanced and decisions evaluated; and enable every team member to understand the underlying context.

Table 1. Stakeholder Group Guiding Principles for the MSSP Predictive Modeling Pilot.

1.	**Practicality is key.** Elaborate and overly complex risk prediction models may not provide strong value in actual use.
2.	Above all, our predictive models must generate **information that is actionable** and closely tied to intervention.
3.	The advisory role of **clinicians and care managers** is integral in designing and improving the predictive workflow, especially within the context of the clinical care setting.
4.	Careful incorporation of predictive models **into clinical workflows** is crucial for adoption and use.
5.	**Clear and transparent documentation** is a priority, especially to capture decision points along the way.
6.	**The "why" is important** in making decisions about actionability and to understand the basis of risk. "Black-box" risk prediction, where the underlying design is not transparent, is less helpful. Understanding what drives the level of risk – particularly increasing risk – is critical to care managers and providers understanding what they might be able to do to mitigate that risk.
7.	Any given model **may involve trade-offs** (for example, more timely/less accurate vs. less timely/more accurate). Therefore, we will be open to simultaneous development of multiple models to provide multiple options where different models may be optimized for timing of deployment within clinical workflows.
8.	We will seek to **learn from the work that already exists** in predictive modeling, including published and proprietary models, but be open-minded to the new possibilities in this pilot. We will also consider leveraging and/or modifying existing tools where they exist and where permissible, especially where efficiencies can be gained.
9.	The **lessons learned through model development** may be as important as the models themselves, including new paradigms of engagement and collaboration.
10.	**Data privacy and security** are critically important.
11.	We need to understand measures of **value, quality, and cost** that will allow us to monitor performance and gauge success of this predictive modeling process. Tracking and observing **performance of risk prediction over time** is important. It is also important to monitor the **performance of interventions** associated with the risk predictions.

Conclusion

The development of guiding principles has been a valuable foundation for our work in predictive modeling for the Medicare Shared Savings Program (MSSP) population served by Duke Connected Care. Although these specific principles reflect the uniqueness of the pilot and collaboration of the stakeholders, we anticipate that others can benefit from the value of developing guiding principles as a generalizable activity and phase of development.