

## **Examining the measurement of quality in healthcare using artificial intelligence methods:**

### **A study of quality in long-term care**

*Andrea Iaboni<sup>1,2</sup>, Pouria Mashouri<sup>1,2</sup>, Babak Taati<sup>1,2</sup>*

*<sup>1</sup>University Health Network, <sup>2</sup>University of Toronto*

#### **Background.**

There is an increasing focus on outcomes in healthcare, and the public-reporting of these metrics in the service of transparency. However, there is some debate about the validity of the measures, that is, questions about whether they truly reflect quality of care. An example of this is the public reporting of 9 quality indicators by the Canadian Institute for Health Information (CIHI), which is used for evaluating the performance of long-term care (LTC) facilities within Ontario. Separately and independently, inspections are conducted by the Ministry of Health and Long-Term Care of Ontario (MOHLTC), and inspectors issue detailed reports identifying failures in compliance with LTC legislation or regulations.

#### **Methods.**

We employed machine learning techniques to examine if quality indicators can be used to classify each home into three categories (in good standing, needing improvement, needing significant improvement) based on inspection results. A simple linear model was purposefully chosen to allow for feature analysis.

#### **Results.**

After running a wide-range of models, we found only a weak relationship between quality indicators and compliance. The best-performing model was only able to achieve an accuracy of 40.1%. Feature analysis was then performed on the final model to identify which quality indicators were most indicative of compliance. 'Experiencing Worsened Pain', 'Restraint Use', and 'Worsened Pressure Ulcers' were strongly correlated with homes “needing significant improvement.” Counter-intuitively, 'Improved Physical Functioning' had an inverse relationship with homes “in good standing.”

#### **Conclusion.**

Overall, this study can be seen as a first step towards empirically assessing the different methods that currently exist to measure quality of care in LTC facilities in Ontario. Further work is required to understand the limited relationship between these two datasets, as well as attempting to identify those quality indicators that most meaningfully represent quality of care.