EDSA’s Data Science Initiative team is working to provide Utilization Management and Care Management with new tools to predict who, among L.A. Care’s hospitalized members, is at highest risk of returning to the hospital soon after discharge.

Being readmitted 30 days or less after discharge may indicate an underlying problem with the quality of the care a member receives. It may indicate a missed opportunity to control costs, especially when opportunities existed to address the members’ needs early through outpatient care. It also exposes frail members to hospital acquired infections for longer periods of time, and it frustrates any member who prefers to be home rather than – again – at the hospital. Accordingly, accrediting organizations commonly use readmission rates as a measure of the quality of the services that health care actors like L.A. Care render. L.A. Care in turn monitors the readmission rates of the PPGs and hospitals within its network.

The Care Management professionals within L.A. Care’s Utilization Management (UM) and Care Management (CM) have the means to reduce readmission rates. They routinely reach out to members to provide them with information, resources and support to help them stay out of the hospital. They currently identify the members who need this assistance through professional referrals, self-referrals, and the Health Risk Assessment (HRA) survey which is administered to a subset of the membership. UM and CM have asked EDSA’s Data Science Initiative (DSI) for a new tool to calculate the risk of readmission for every hospitalized member.

DSI’s most recent readmission risk prediction tool outperforms the [LACE index](https://www.besler.com/lace-risk-score/), a widely used formula developed in Canada approximately ten years ago (see table 1):

| **Table 1: Performance of two models on cases that are distinct from those that helped to form the models.** | | | | |
| --- | --- | --- | --- | --- |
| **Model** | **Kappa** | **AUPRC** | **Precision** | **Recall** |
| L.A. Care Model 1 | 0.3803 | 0.6643 | 0.7135 | 0.6355 |
| LACE | 0.2979 | 0.6311 | 0.6845 | 0.5526 |

This first attempt took advantage of DSI’s newly acquired Cloudera Data Science Workbench. DSI used a gradient boosting algorithm to train a model on three quarters of all 2017 L.A. Care member admissions, a method that was especially successful in a recent study by [Maali et al. (2018)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5755362/) in Australia. Developing a model using L.A. Care’s own, unique population was key to the success of DSI’s first model. DSI limited the input to what LACE requires, i.e. Length of Stay (i.e. how long a member initially stayed in the hospital), Acuity (whether the member was admitted from an emergency department), the same 14 comorbidities (including previous myocardial infarction, chronic pulmonary disease, and metastatic solid tumor), and a 6-month count of prior ER visits. On this even playing field, DSI outperformed the LACE on both precision (0.71 vs. 0.68) and recall (0.64 vs. 0.55).

DSI is working on improving the quality of its predictions by expanding the input they use to train future models. To do this, they are sourcing a list of several hundred variables that are associated with readmission in peer reviewed work and they have become stakeholders in L.A. Care’s Health Information Exchange (HIE) projects to bring admission data into our systems more quickly and to expand our data universe to include EMRs. Additionally, they are developing a new workflow that interleaves modeling efforts with Causal Mapping Workshops with their subject matter experts, and they are working closely with UM to monitor systematic drivers of readmission.

LA Care is in an advantageous position to describe a member and his or her care beyond the walls of the hospital. Models such as DSI’s readmission model are an illustration of how these data can be turned into tools to improve member care.