Predicting Survival Time for Bowel Resection in Individual Crohn Disease Patients

AI algorithm helps tailor medical treatments after pCD diagnosis

OUR AIM was to apply machine learning (artificial intelligence) to predict the probability of first bowel resection over future time on novel pediatric Crohn's disease patients.

BACKGROUND - Over time, most Crohn's disease patients will require surgery. Approximately 1 in 5 will need major surgery in the first five years after diagnosis. While surgery is a common therapeutic option, to date there is no tool that predicts when the first bowel resection after diagnosis will most likely occur. To our knowledge, there are models that stratified the patients by risk of getting surgery, but there is not a model to predict when surgery will likely be required.

METHODOLOGY

A prospectively-followed cohort of pediatric Crohn's disease (pCD) patients (n= 934) was collected through CIDsCaNN. We applied machine learning to build a Superlearner that considers different hyperparameters that differ by the type of base ISD learner. It uses internal cross validation to choose the best model with the best hyperparameter settings and appropriate number of features. Then it runs that best learner over the entire dataset to produce our final predictive model. We performed external cross validation to evaluate the predictive model.
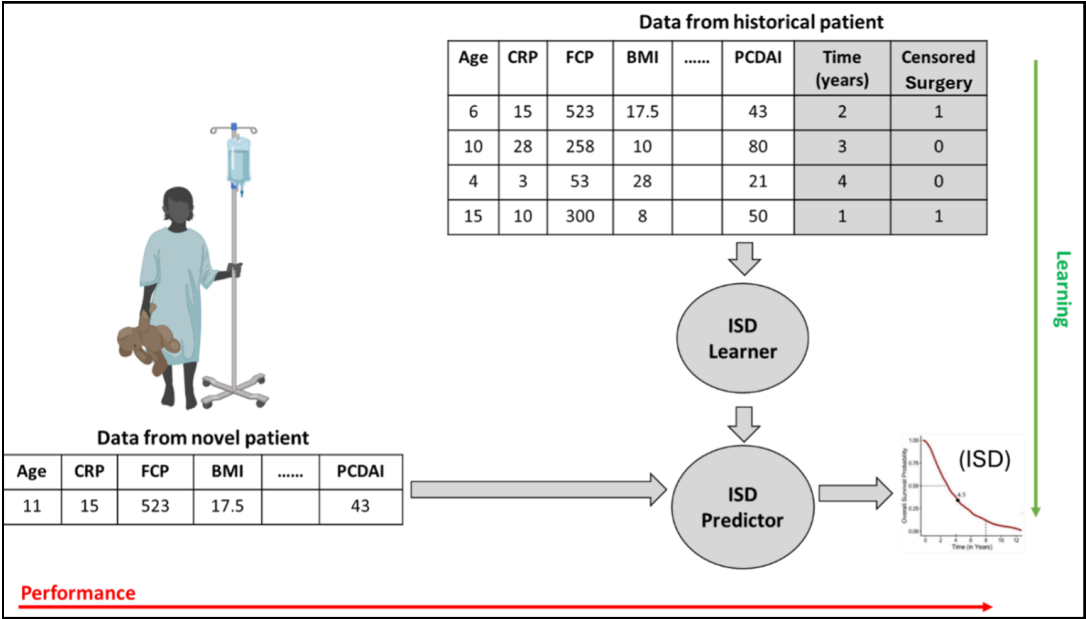
Primary Outcome

We've developed a Superlearner that learns a model to predict time until the first bowel resection. The model presents the prediction as individual survival distributions (ISDs).

Informing Patient Care

This research is the first attempt to build a tool that could automatize the decision-making process for time to first bowel resection after diagnosis. This could improve the life of pCD patients and alleviate healthcare systems where pIBD-specialized gastroenterologists and surgeons are limited.

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The Canadian Children Inflammatory Bowel Disease Network

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