

Automated Patient Pre-Screening Using a Clinical Trials Patient Matching Algorithm

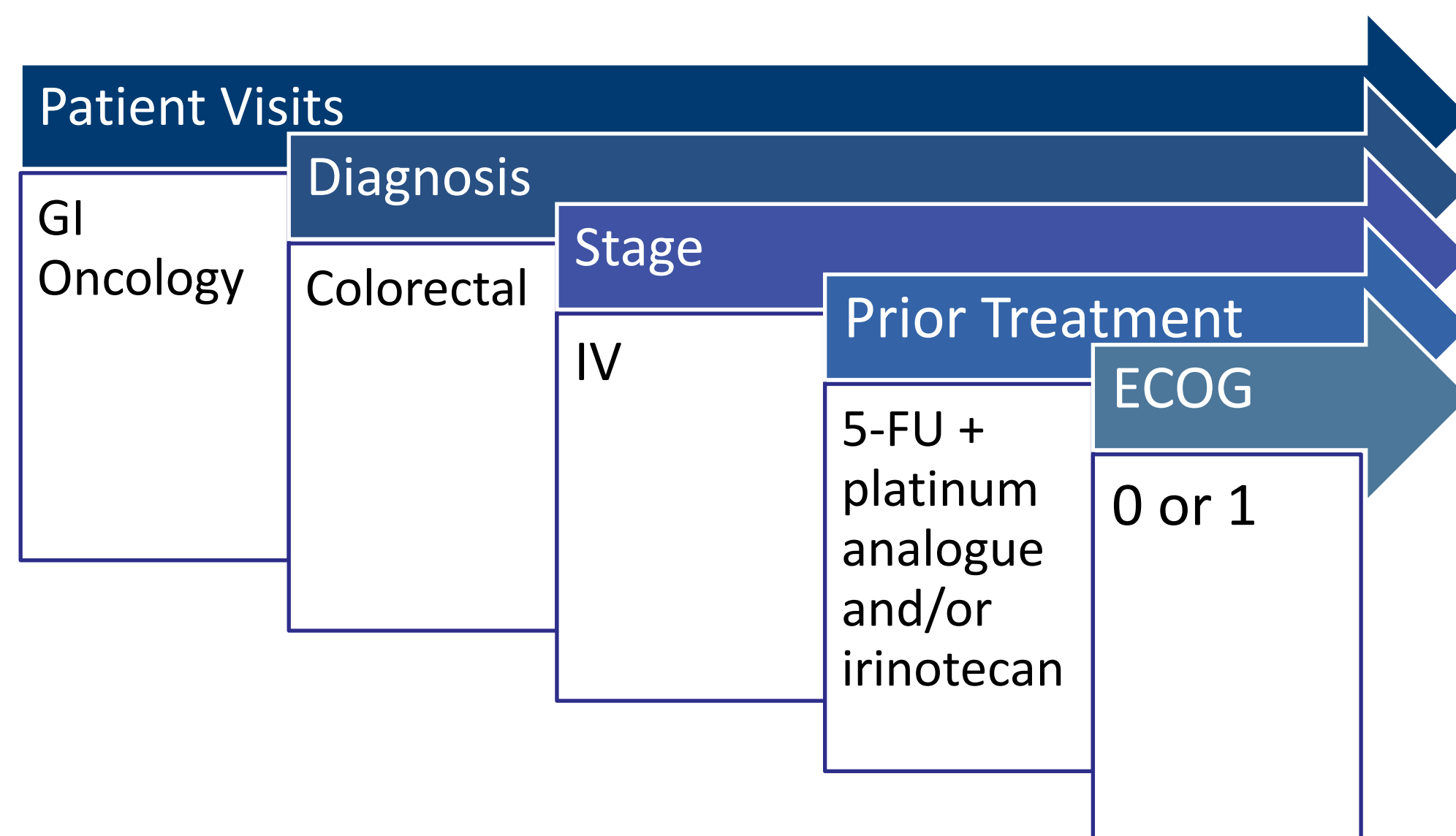
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Goals

Develop and test a Clinical Trial Patient Matching (CTPM) algorithm designed to pre-screen patients with GI cancers for an interventional clinical trial, while increasing the efficiency of review by research staff.

Background

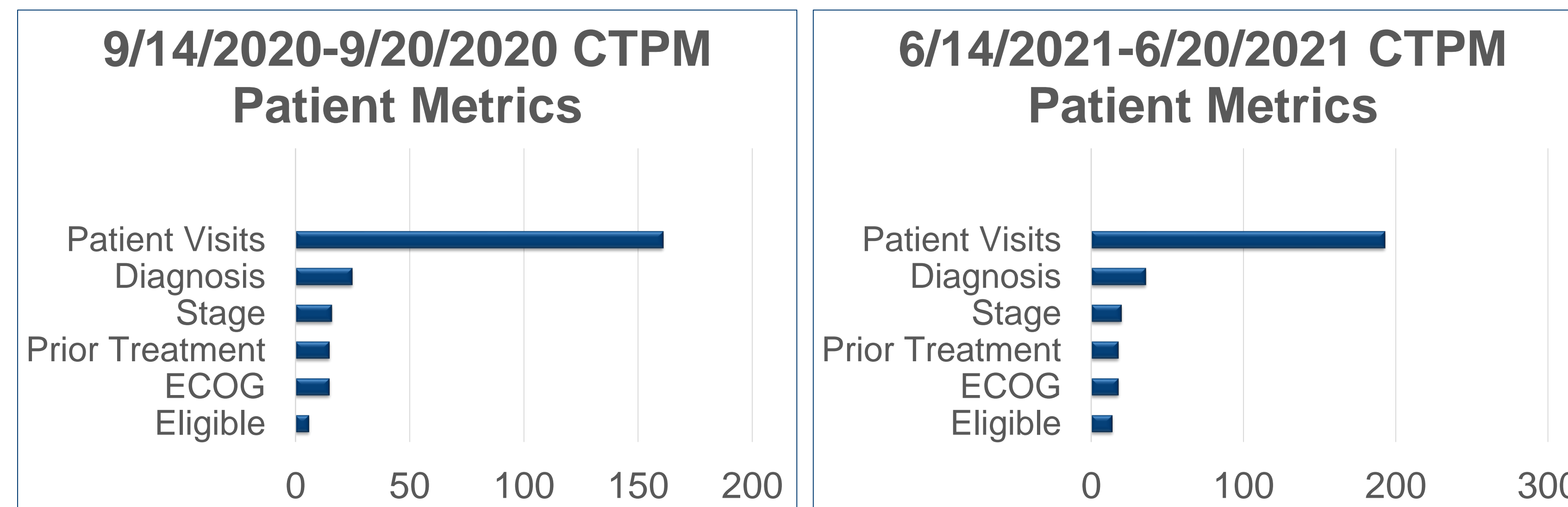
- ❖ Effective participant recruitment is key to the success of clinical trials. To optimize recruitment of participants, pre-screening patient electronic health records prior to their scheduled oncology clinic visit is essential.
- ❖ Pre-screening has become increasingly burdensome due to the increasing complexity of clinical trials and limited staffing resources. This challenge is further compounded when pre-screening is required across multiple geographic oncology clinic locations.
- ❖ Current healthcare information technology systems are typically limited in their ability to support the development of automated information extraction methods, and this is particularly true in oncology, where specific clinical vocabularies are needed to capture the meaning and context of clinical findings.



Solutions and Methods

In this pilot study, a clinical trials patient matching (CTPM) algorithm was created using artificial intelligence (AI) and natural language processing (NLP) applied to the electronic medical record in order to filter patients based on defined eligibility criteria, extract relevant patient data, and export the data in an easily reviewable format for research staff. The study consisted of retrospective and prospective use of the CTPM for pre-screening. In the retrospective cohort, patients seen previously in GI Oncology clinics were reviewed to validate the accuracy and efficiency of the CTPM algorithm. In the prospective cohort, patients who had future visits to the GI Oncology department were pre-screened using the CTPM weekly in advance of the participant's scheduled visit.

Outcomes

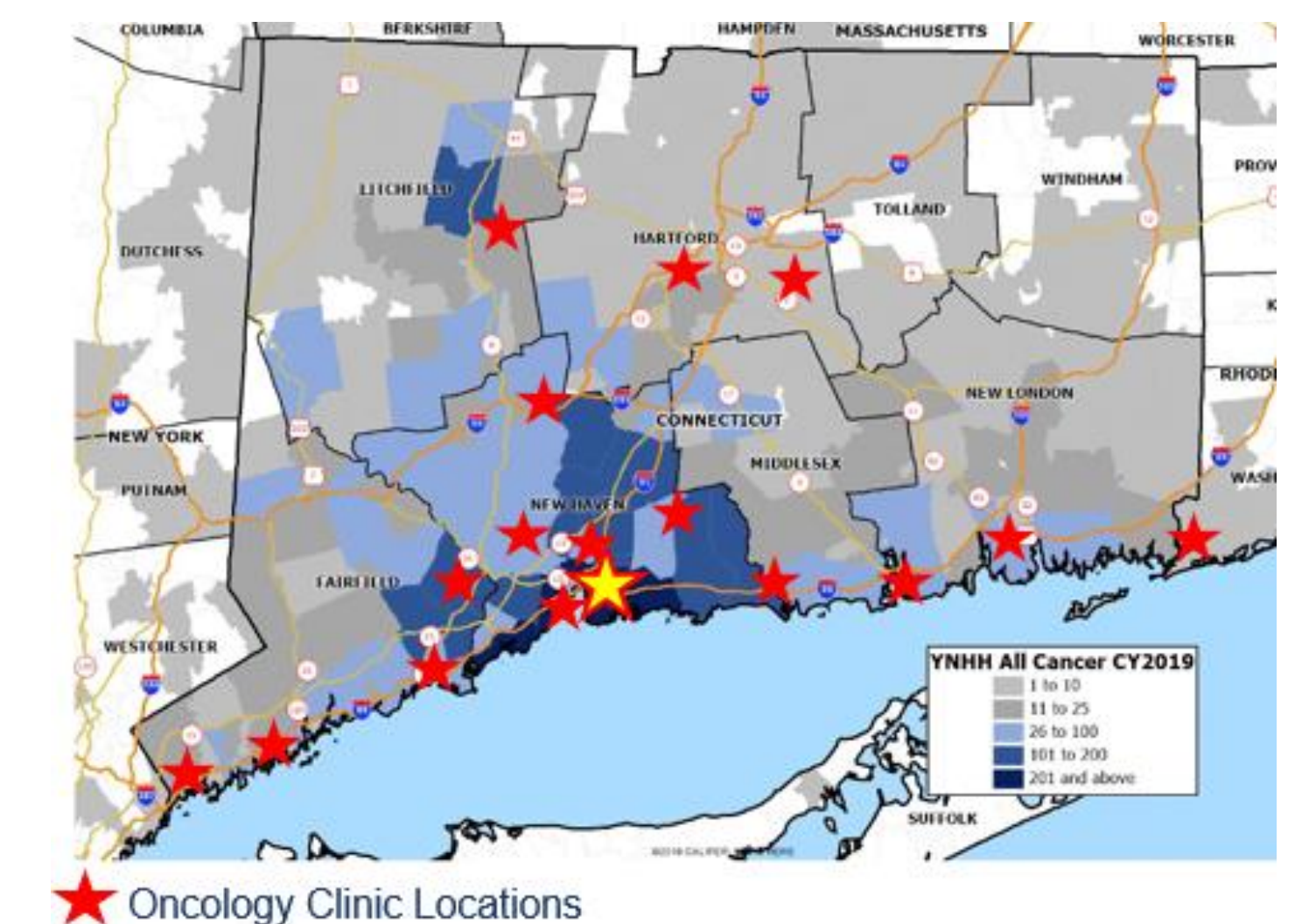


For the retrospective cohort, research staff conducted chart review without use of the CTPM for the randomly selected week of 9/14/2020-9/20/2020 during which 161 patients visited YNHH GI Oncology. Six patients were deemed eligible for consent. When the CTPM was applied it successfully excluded 146 patients, narrowing the pool to 15 patients for manual chart review, resulting in 100% sensitivity, 94.2% specificity, 40% precision, and overall accuracy of 94.4%. The time for eligibility review per subject with and without the use of the CTPM was tracked, taking an average of 1.82 and 3.11 minutes respectively, showing an improved efficiency of 41%.

For the prospective cohort, the week of 6/14/2021-6/20/2021 was analyzed. Research staff conducted chart review for this week without use of the CTPM during which 193 patients visited GI Oncology with 14 patients deemed eligible for consent. When the CTPM was applied it successfully excluded 156 patients, narrowing the pool to 37 patients for manual chart review, resulting in 100% sensitivity, 87.2% specificity, 37.8% precision, and overall accuracy of 88.1%.

Lessons Learned and Future Directions

- ❖ Matching eligible patients with clinical trials requires thoughtful selection of the eligibility criteria used for patient filtering to increase specificity while not compromising sensitivity. Additionally, a thorough understanding of the clinical data is required to optimize the technology used to establish the filters.
- ❖ There is an unmet need to explore future applications of the CTPM algorithm, such as pre-activation feasibility assessments and improving pre-screening for rare disease and biomarker driven trials.
- ❖ Use of the CTPM algorithm is being expanded to additional trials across oncologic specialties and geographic oncology clinic locations within the Yale Cancer Center.



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