

**askMUSIC<sup>®</sup>: leveraging a clinical registry to inform patients**

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**INTRODUCTION AND OBJECTIVES:** Clinical registries increasingly provide physicians with a means for making data-driven decisions; however, few opportunities exist for patients to interact with registry data to support their own decisions. Herein, we report a web-based system that uses a prostate cancer (CaP) registry to provide newly-diagnosed men with a platform to understand treatment decisions made by others with similar characteristics.

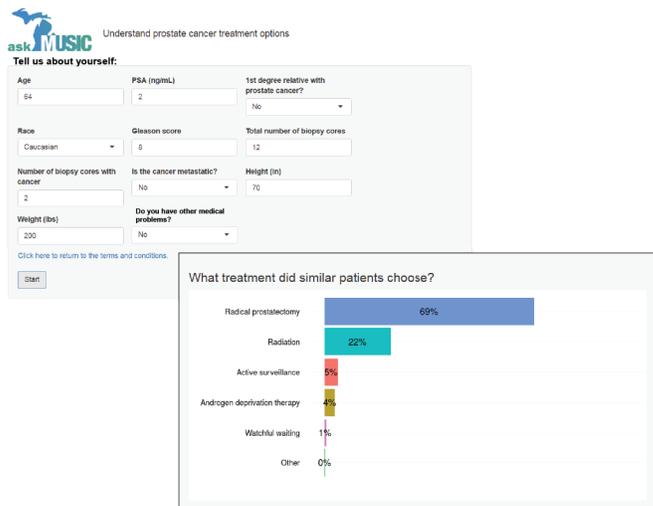
**METHODS:** The Michigan Urological Surgery Improvement Collaborative (MUSIC) is a consortium of 43 diverse urology practices that maintains a prospective registry of men with CaP. We developed a patient-facing, web-based tool that uses self-reported information and registry data to generate a personalized prediction of the likelihood of receiving a given treatment for CaP (Figure 1). The treatment predictions rely on registry data from 1/2011 to 12/2015 and were generated using a random forest machine learning model derived in a 2/3 random sample of the data. Predictive performance was measured in this derivation cohort (using 10-fold cross validation) and verified in the remaining data using multinomial area-under-the-curve (AUC) and calibration plots.

**RESULTS:** Between the included dates, 11,456 men were diagnosed with CaP and 44.7% underwent prostatectomy, 22.0% surveillance, 19.5% radiation (RT), 8.8% androgen deprivation, and 3.6% watchful waiting (WW). The predictive model demonstrated consistent discrimination between treatments in the derivation and validation cohorts (AUCs 0.762 and 0.744, respectively). The predicted likelihood of receiving a given treatment was accurate for the most common treatment types in the derivation and validation cohorts although the model overpredicted the likelihood of receiving WW in both cohorts and RT in the validation cohort (Figure 2).

**CONCLUSIONS:** With MUSIC registry data and machine learning methods, we were able to create a tool, designed for patients, that generates accurate predictions for most CaP treatments. As a newly diagnosed man considers treatment options, this tool will provide insight into choices made by similar men.

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**Figure 1.** Screenshot of askMUSIC web-interface



**Figure 2.** Calibration plots for model predictions in derivation (panel a) and validation (panel b) cohorts. Perfect predictive accuracy indicated by dashed line

