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Evaluating the clinical impact of a genomic classifier in prostate cancer using individualized decision analysis.

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Abstract

BACKGROUND: Currently there is controversy surrounding the optimal way to treat patients with prostate cancer in the post-prostatectomy setting. Adjuvant therapies carry possible benefits of improved curative results, but there is uncertainty in which patients should receive adjuvant therapy. There are concerns about giving toxicity to a whole population for the benefit of only a subset. We hypothesized that making post-prostatectomy treatment decisions using genomics-based risk prediction estimates would improve cancer and quality of life outcomes.

METHODS: We developed a state-transition model to simulate outcomes over a 10 year horizon for a cohort of post-prostatectomy patients. Outcomes included cancer progression rates at 5 and 10 years, overall survival, and quality-adjusted survival with reductions for treatment, side effects, and cancer stage. We compared outcomes using population-level versus individual-level risk of cancer progression, and for genomics-based care versus usual care treatment recommendations.

RESULTS: Cancer progression outcomes, expected life-years (LYs), and expected quality-adjusted life-years (QALYs) were significantly different when individual genomics-based cancer progression risk estimates were used in place of population-level risk estimates. Use of the genomic classifier to guide treatment decisions provided small, but statistically significant, improvements in model outcomes. We observed an additional 0.03 LYs and 0.07 QALYs, a 12% relative increase in the 5-year recurrence-free survival probability, and a 4% relative reduction in the 5-year probability of metastatic disease or death.

CONCLUSIONS: The use of genomics-based risk prediction to guide treatment decisions may improve outcomes for prostate cancer patients. This study offers a framework for individualized decision analysis, and can be extended to incorporate a wide range of personal attributes to enable delivery of patient-centered tools for informed decision-making.

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