Variation in Prostate Cancer Detection Rates in a Statewide Quality Improvement Collaborative

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Purpose: There remains significant controversy surrounding the optimal criteria for recommending prostate biopsy. To examine this issue further urologists in MUSIC assessed statewide prostate biopsy practice patterns and variation in prostate cancer detection.

Materials and Methods: MUSIC is a statewide, physician led collaborative designed to improve prostate cancer care. From March 2012 through June 2013 at 17 MUSIC practices standardized clinical and pathological data were collected on a total of 3,015 men undergoing first-time prostate biopsy. We examined pathological biopsy outcomes according to patient characteristics and across MUSIC practices.

Results: The average cancer detection rate was 52% with significant variability across MUSIC practices (range 43% to 70%, p <0.0001). Of all patients biopsied 27% were older than 69 years, ranging from 19% to 36% at individual practices. Men with prostate specific antigen less than 4 ng/ml comprised an average of 26% of the study population (range 10% to 37%). The detection rate in patients older than 69 years ranged from 42% to 86% at individual practices (p = 0.0008). In the 793 patients with prostate specific antigen less than 4 ng/ml the cancer detection rate ranged from 22% to 58% across individual practices (p = 0.0065). The predicted probability of cancer detection varied significantly across MUSIC practices even after adjusting for patient age, prostate specific antigen, prostate size, family history and digital rectal examination findings (p <0.0001).

Conclusions: While overall detection rates are higher than previously reported, the cancer yield of prostate biopsy varies widely across urology practices in Michigan. These data serve as a foundation for our efforts to understand and improve patient selection for prostate biopsy.

Key Words: prostate, prostatic neoplasms, biopsy, physician's practice patterns, Michigan

Abbreviations and Acronyms

DRE = digital rectal examination

MUSIC = Michigan Urological Surgery Improvement Collaborative

PCa = prostate cancer

PSA = prostate specific antigen

TRUS = transrectal ultrasound guided

GROWING scrutiny surrounds early detection practices for men at risk for PCa. Reflecting this concern, the AUA (American Urological Association) recently revised its recommendations to limit routine PSA based screening to men 55 to 69 years old after a discussion of risks and benefits.[1] The USPSTF (United States Preventive Services Task Force) entirely recommends against routine screening.[2] Such conflicting

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guidelines are emblematic of the uncertainty surrounding the relative benefits vs harms of PSA based early detection strategies.

At least part of this uncertainty relates to differences in cancer detection rates at initial prostate biopsy. While it is well established that certain patient characteristics (eg PSA and DRE findings) correlate with cancer yield, much less is known about the potential impact of different care settings and providers on the likelihood of cancer diagnosis after prostate biopsy. If present, such variation would suggest the possibility of important differences in practice patterns related to patient selection, biopsy technique and/or pathological interpretation. Accordingly better understanding of this issue could guide ongoing efforts aimed at improving early detection practices in men at risk for PCa.

In this context we examined variation in contemporary cancer detection rates across the diverse academic and community practices participating in MUSIC.

MATERIALS AND METHODS

Michigan Urological Surgery Improvement Collaborative

Established in 2011 with funding from Blue Cross Blue Shield of Michigan, MUSIC is a physician led, statewide collaborative that currently comprises 32 urology practices throughout Michigan, including more than 70% of urologists in the state.[3] These practices represent geographically, socioeconomically and racially diverse regions of Michigan. The goal of this organization is to improve the quality and cost-efficient nature of care provided to men with PCa in Michigan.

Data for this analysis were obtained from 17 participating practices where at least 25 initial prostate biopsies were performed from March 2012 through June 2013. Each practice participates under institutional review board approval. One urologist per practice serves as the clinical champion with responsibilities that include oversight of the local data collection process, regular attendance and participation in tri-annual collaborative-wide meetings, and leadership around local implementation of quality improvement activities. The University of Michigan coordinating center is responsible for overall administration and management of collaborative activities.

Trained clinical abstractors in each participating practice submit data to a web based clinical registry developed in conjunction with a private software vendor. The MUSIC registry includes data on all patients who undergo prostate biopsy in participating practices as well as all seen for newly diagnosed PCa. The registry includes approximately 150 unique variables with information on patient demographics, laboratory, imaging and pathology results, comorbid conditions, PCa treatments and patient outcomes, including complications and mortality, among others. Data collection is guided by standard variable definitions and collaborative-wide operating procedures. Each abstractor also completes a formal training session before commencing data collection and participates in quarterly educational webinars developed and administered by the coordinating center staff. In terms of quality assurance coordinating center members perform quality audits on site to ensure proper case identification and data integrity. This process involves direct review of sample cases from each participating practice, collaboration between administrators and data abstractors to reconcile missing and erroneous data, and database review to identify and resolve incomplete or missing information.

Primary Outcome

The primary outcome of this analysis was the pathological finding of prostate adenocarcinoma on initial prostate biopsy in patients with no PCa history. Pathology services are provided to MUSIC practices by a mixture of community based general pathologists, genitourinary pathology specialists employed by large groups, academic genitourinary pathologists and large commercial pathology laboratories. After reviewing pathology reports the results of prostate biopsies (ie presence or absence of cancer and other relevant pathological findings) are entered in the registry by data abstractors with any discrepancies or uncertainties in pathological interpretation adjudicated by the local clinical champion. There is no central pathology review. In addition, the prostate biopsy technique is not standardized across MUSIC practices. Because our study was restricted to patients who underwent initial prostate biopsy, all except 1 biopsy was TRUS. The number of cores sampled was only available for patients diagnosed with PCa. In those patients the mean and median number of cores were 12 (72.5% of all patients underwent 12-core TRUS biopsy). The 10th percentile was 11 cores and the 90th percentile was 14.

Data Analysis

We first generated descriptive summary statistics for all patients in the analytical sample. We then used appropriate univariate statistical tests to compare the proportion of biopsies positive for cancer (ie the cancer detection rate) across MUSIC practices and according to patient characteristics (eg age, PSA, TRUS prostate volume and DRE results). We fit a multivariate logistic regression model to examine the association between specific patient characteristics and positive biopsy. From this model we also generated and compared the predicted cancer detection rate for each MUSIC practice, adjusting for differences in patient characteristics (age, family history, PSA, DRE findings and prostate size) across participating sites. All statistical testing was 2-sided, performed at the 5% significance level and completed using SAS®, version 9.2. The chi-square test was used for all univariate analysis of categorical variables and the nonparametric Wilcoxon rank test was applied to compare medians.

RESULTS

From March 2012 through June 2013 a total of 3,015 men underwent initial prostate biopsy at 1 of 17 MUSIC practices (table 1). The average patient