

## The Effect of Electronic Medical Record Decision Support Tool on Prostate Cancer Screening Rates at a Community Health Centre in South Bronx

Sandhya Cautha<sup>1\*</sup>, Shekhar Bhatta<sup>1</sup>, MD, Asona Lui<sup>2</sup>, MD, Shitij Shrivastava<sup>1</sup>, MD, Valentina Moirangthem<sup>3</sup>, MD, Thanh-Ha T. Luong<sup>3</sup>, MD, David Ferris<sup>4</sup>, MD, Kevin Jain<sup>3</sup>, MD

<sup>1</sup>Resident Physician, Internal Medicine, BronxCare Health System

<sup>2</sup>Radiation oncology resident, University of California San Diego School of Medicine

<sup>3</sup>Hematology/Oncology, Attending, BronxCare Health System

<sup>4</sup>Infectious Diseases, Attending, BronxCare Health System

\*Corresponding author: Sandhya Cautha Affiliation: BronxCare Health System, Title: Resident Physician, Internal Medicine  
Email Address: scautha@bronxcare.org; Address: 1650 Grand Concourse, Bronx, NY, 10457 Phone: 718-590-1800; Fax: 718-960-2055.

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### Abstract

Prostate cancer is a significant public health concern in the United States, with considerable mortality rates and disparities among different populations. This study examines the effect of an Electronic Medical Record (EMR) decision support tool on prostate cancer screening rates in a community health center located in the high-risk South Bronx area. The tool was implemented to address the challenges posed by evolving screening guidelines and uncertainties surrounding prostate-specific antigen (PSA) testing.

The study's methodology involves a comprehensive analysis of PSA screening rates among men aged 55-69, comparing pre- and post-EMR tool implementation periods (2016-2022). Lipid panel screening rates were considered as a control. The results demonstrate a remarkable increase in both PSA screening rates and newly-diagnosed prostate cancer cases following the introduction of the EMR decision support tool. This improvement indicates the tool's efficacy in promoting shared decision-making and appropriate screening discussions between patients and primary care providers.

The discussion section delves into the historical evolution of prostate cancer screening guidelines and the associated controversies. The importance of early detection and the impact of screening on prostate cancer survival rates are highlighted. Notably, the study's focus on the South Bronx population, which exhibits elevated risk factors and disparities, underlines the significance of tailored interventions.

In conclusion, the findings suggest that an EMR decision support tool can substantially enhance prostate cancer screening rates and potentially contribute to reduced mortality rates in high-risk communities.

The study contributes to the ongoing discourse on prostate cancer screening and underscores the importance of targeted interventions in underserved areas. Further longitudinal studies are warranted to assess the tool's impact on long-term prostate cancer outcomes.

**Keywords:** Community Health Center; Electronic Medical Record; Health Disparities; Prostate Cancer; South Bronx.

### Introduction

Prostate cancer remains the most commonly diagnosed cancer and the second leading cause of cancer-related death in men in the United States. The lifetime probability of developing prostate cancer is 1 in 8 men. As of 2022, 14% of all new cancer cases and 5.7% of all cancer deaths in the United States were caused by prostate cancer [1, 2, 3]. Prostate cancer is one of the cancers with established cancer-screening guidelines. Cancer screening is intended to detect early-stage aggressive cancers when they are asymptomatic and curable. Currently, the most common method for prostate cancer screening is the measurement of serum prostate-specific antigen (PSA). The United States Preventive Services Task Force (USPSTF) is an independent

volunteer panel of national experts that conducts a rigorous review of scientific evidence on the outcomes and feasibility of preventative health measures. The USPSTF assigns a letter grade (A, B, C, D, I) to recommendations for clinical practice based on the strength of the

evidence and a balancing of the benefits and harms of preventive measures. Due to some reduction in overall mortality, current USPSTF guidelines state that for healthy men aged 55-69, the decision to undergo prostate cancer screening with serum PSA-based screening should be individualized, with shared-decision making between the physician and the patient with a grade C recommendation. This should include a discussion of the risk factors, including race, age, co-morbid conditions, and patient values as well

as potential uncertainties, benefits, and harms of screening on a case-by-case basis [4].

The incidence of prostate cancer is 73% higher in Black men than in white men for unclear reasons. Black men in the US have the highest rates of prostate cancer incidence in the world [2]. African-Americans account for over 43% of the population of the Bronx as of 2022 [5]. The incidence of prostate cancer in the Bronx is in the highest quintile in New York State with high levels of mortality. Given the increased need for prostate cancer screening among the patient population we serve, we felt it is important to study prostate cancer screening rates at our hospital.

Primary care providers (PCPs) follow USPSTF guidelines more than recommendations given by other societies [7,8,9]. Guidelines for prostate cancer screening with PSA measurement have changed several times in the past two decades leaving primary care providers unsure of how to integrate PSA testing into their medical practice, resulting in wide variation in prostate cancer screening between and within institutions [7]. Data suggests that PCPs are confused about current recommendations, unsure of how to apply the current guidelines to their patient population, and uncomfortable with discussions about PSA screening with their patients [7, 10]. There is discomfort especially because the USPSTF guidelines emphasize the importance of “shared decision making” when deciding whether or not to conduct PSA testing, but do not provide guidelines on how to conduct this conversation [4]. The wording of the USPSTF guidelines is instead left up to interpretation. Due to this discomfort, physicians often opt to eliminate PSA screening altogether, order PSA testing routinely without a discussion with the patient, or only order PSA if a patient requests it [11, 12].

In light of the changing guidelines, a study was undertaken at our hospital in 2019 to study the understanding of PCPs about prostate cancer screening and to assess their comfort with shared decision-making. An anonymous voluntary paper survey was conducted among the primary care providers working at the outpatient practices. There was a total of 91 participants and the study results showed that PCPs approach PSA testing in a wide variety of ways and

screen a wide age range of patients. To counteract this problem, we programmed our electronic medical record (EMR) to flag the charts of men aged 55-69 years to remind PCPs to engage in a prostate cancer screening discussion with patients during their primary care visits as per the latest USPSTF guidelines. We are now conducting a follow-up study to determine the efficacy of this EMR decision support tool on PSA order rates and prostate cancer diagnosis rates at our facility.

**Methodology**

The total number of patients who had PSA screening were extracted from the electronic medical records of BronxCare Health System for potentially eligible men (aged 55-69) seen during primary care visits during the years 2016-2022. For comparison, the total number of men who underwent lipid panel screening during primary care visits was also collected for the same time period and age group. A lipid panel test is done annually as a part of routine screening for adults in the age group 55-69 years and is used here to estimate the number of primary care visits. PSA screening rates were compared to lipid screening rates to control for unforeseen variables during this period. Similarly, the number of newly-diagnosed prostate cancers among the same population of men was extracted for the years 2016-2021. Pathological data for the year 2022 is not yet available. Since the electronic medical record decision support tool for prostate cancer screening was implemented at our healthcare system in January 1, 2021, the years 2016-2020 provide pre-EMR flag relative screening rates and 2021 - 2022 post-EMR rates. We calculated yearly relative PSA screening tests (PSA tests/ lipid panels) and conducted a two-sided t-test to compare the pre-and post-EMR flag PSA screening rates and prostate cancer diagnosis numbers.

**Results**

The mean number of men aged 55-69 years who underwent PSA screening in primary care offices increased dramatically when comparing pre- and post-EMR flag years (746.8 vs. 2337 men). However, the mean number of men of the same group who underwent lipid panel testing per year also increased (2763 vs. 3362 men) (Table 1).

**Table 1:** Yearly numbers of lipid panel tests, screening PSA tests, and newly-diagnosed prostate cancer cases.

	Year	Lipid panel	PSA	Newly-diagnosed prostate cancers
Pre-EMR Flag	2016	2531	728	91
	2017	2561	651	82
	2018	2834	686	80
	2019	2972	792	79
	2020	2917	877	73
Post-EMR Flag	2021	3359	2428	126
	2022	3365	2246	NA

Further analysis confirmed that the number of relative PSA screening tests increased significantly (0.27 vs. 0.70,  $p < 0.001$ ) after the EMR decision support tool was implemented (Table 2).

**Table 2:** Comparison of relative PSA screening tests during pre-EMR flag to post-EMR flag years. Relative PSA-tests represent the number of PSA tests per Lipid panels ordered for men aged 55-69 in primary care offices for the given year.

	Year	Relative PSA Tests	Mean	p-value
Pre-EMR Flag	2016	0.288	0.270 ± 0.02	8.81E-06**
	2017	0.254		
	2018	0.242		
	2019	0.266		
	2020	0.301		
Post-EMR Flag	2021	0.723	0.695 ± 0.04	
	2022	0.667		

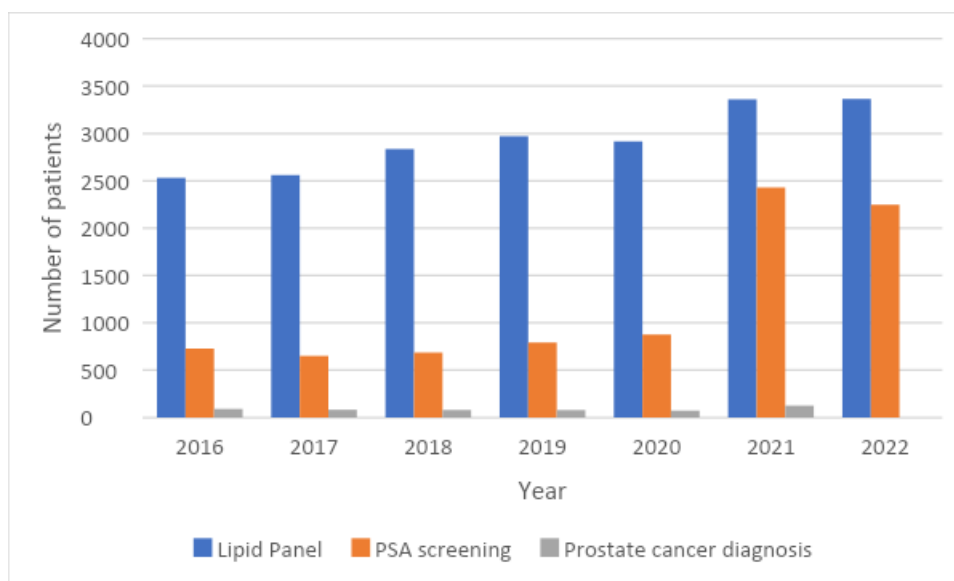
\*\*p-value calculated by comparing means with two-sided t-test.

Similarly, the mean number of newly-diagnosed prostate cancer cases per year among the same population of men increased after implementation of EMR decision support tool (81 vs. 126 men) (Table 2), which corresponded to a relative increase in new diagnoses (0.030 vs. 0.038) (Table 3).

**Table 3:** Comparison of relative newly-diagnosed prostate cancer cases during pre-EMR flag to post-EMR flag years. Relatively new prostate cancer diagnoses represents the number of new prostate cancer diagnoses per lipid panels ordered for men aged 55-69 in primary care offices for the given year.

	Year	Relative new prostate cancer diagnoses	Mean
Pre-EMR Flag	2016	0.036	0.030 ± 0.004
	2017	0.032	
	2018	0.028	
	2019	0.027	
	2020	0.025	
Post-EMR Flag	2021	0.038	0.038 ± NA

Notably, the rate of relative new prostate cancer diagnoses was dropping yearly among this population from 0.036 in 2016 to 0.025 in 2020 with a precipitous improvement in 2021 to 0.038 with the implementation of the EMR decision support tool (Figure 1).



**Figure 1:** Trend of year-wise lipid panel tests, screening PSA tests, and newly-diagnosed prostate cancer cases.

## Discussion

According to American Cancer Society estimates for 2022, prostate cancer accounts for about 268,490 new cases and 34,500 annual deaths [1, 2]. Many factors affect prostate cancer survival and one amongst them is the extent of the tumor at the time of diagnosis. The five-year relative survival of prostate cancers with the loco-regional stage is 100% as opposed to 31% with distant stage [13]. It is important to screen for prostate cancers as they are frequently asymptomatic in the loco-regional stage. Screening with PSA is preferable over digital rectal examination (DRE) and transrectal prostatic ultrasonography as it is a more acceptable, objective, and quantitative approach. A look at the historical timeline of USPSTF recommendations on PSA testing shows that they have changed numerous times over the years based on evidence from randomized controlled trials and emerging management considerations for prostate cancer. In 2008, the USPSTF gave PSA-based prostate cancer screening a grade of "I", stating that there was insufficient evidence to assess the benefits and harms. From 2008- 2012, several controversial clinical trials were conducted to determine the efficacy of PSA screening with widely varying results with regard to the effects on mortality and harms of overtreatment [14]. Trials in Europe, for example, demonstrated a significant reduction in prostate cancer mortality with PSA testing, while trials in the United States and the United Kingdom did not. In a controversial statement, the USPSTF revisited its decision on prostate cancer screening in 2012 and gave PSA testing a grade of "D", recommending against it for all men, regardless of risk factors [15]. Many experts debated the meaning of the outcomes from the clinical trials and a re-analysis of the data was performed. It was demonstrated that the trial conducted in the United States actually had more PSA testing done in the control arm than in the PSA intervention arm, rendering the results invalid to many. Another flaw of the US study was having a median follow-up of only 10 years which is inadequate for a slowly progressive cancer like prostate cancer [16]. The interim 14-year follow-up results from Goteborg randomized population-based prostate cancer screening trial showed a significant reduction in death from prostate cancer in the screened arm [17]. It is likely the 2012 USPSTF guidelines improved prostate cancer screening stewardship as the incidence and treatment rates of early-stage prostate cancers significantly declined between 2010 and 2018 [18]. However, a major trade-off accompanied this benefit in the form of increased incidence of high-grade and metastatic prostate cancer at presentation [19, 20, 21].

Reduced screening, therefore, translates into a loss of the window of curability for a portion of men. As some reduction in overall mortality for certain men was noted, the USPSTF guidelines were updated again in 2017 and now state that for healthy men aged 55-69 the decision to undergo prostate cancer screening with serum PSA based screening should be individualized, with shared-decision making between the physician and the patient [4].

African-American men have a higher incidence, more aggressive disease, and higher mortality rates of prostate cancer than men of other races for various unknown reasons

[22]. Nearly half of the patients that receive care in our healthcare system are African-Americans. Our hospital system caters to the areas of the Bronx with the highest prostate cancer incidence in the country, indicating an above-average need for appropriate prostate cancer screening at our hospital. Prostate cancer screening rates at our institution for men aged 55-69 were lower than the national average suggesting a need for intervention [23]. Following the release of the latest USPSTF recommendations, nationwide studies demonstrated the uptake of these recommendations into clinical practice. Leapman et al., in a large national cohort study, showed that the rates of PSA testing increased, reversing the decline seen after earlier guidance against PSA testing for all patients [24]. Another study using National Health interview survey data revealed a significantly increasing trend in shared decision-making in prostate cancer screening among men aged 55-69 years in the second half of 2018 [25]. In order to meet appropriate and adequate screening at our facility in compliance with the latest USPSTF guidelines, an EMR decision support tool was implemented beginning January 1, 2021 that engages patient and provider in a shared decision-making discussion. Studies proved that implementation of EMR support tools is an effective approach in achieving study objectives [26, 27, 28]. A hard-stop flag inclusive of printable versions of the USPSTF patient decision guide and recommendation statement along with the latest PSA result for the patient was embedded in the EMR at the point of care. Subsequent to the implementation of this tool, a significant increase in screening PSA numbers and prostate cancer diagnosis rates has been observed at our facility. Bryant et al. studied prostate cancer screening rates in the national VHA system and concluded that higher facility-level PSA screening rates were associated with significantly lower facility-level metastatic prostate cancer incidence 5 years down the line [29]. We expect to see a similar impact at our facility wherein, increased PSA screening numbers translate into lower prostate cancer mortality rates in the future. Our paper will be a valuable addition to the existing body of work on prostate cancer screening and a longitudinal follow-up to our study can help answer controversies surrounding prostate cancer screening.

## Conclusion

A decision support tool embedded in the electronic medical record has been an effective approach in increasing our prostate cancer screening rates and may help curb prostate cancer mortality in the relatively high-risk patient population of the South Bronx. Future studies will assess the effect of the EMR decision support tool on prostate cancer outcomes at BCHS, including rates of metastasis and mortality.

## Conflict of Interest

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other



equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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