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PROTOCOL: New York State Race, Ethnicity, and Insurance Disparities in Follow-up Prostate Cancer Screening

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TITLE: New York State Race, Ethnicity, and Insurance Disparities in Follow-up Prostate Cancer Screening

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PURPOSE AND SPECIFIC AIMS:

Using de-identified reports from the Statewide Planning and Research Cooperative System (SPARCS) data, this descriptive study will identify the impact of socioeconomic status (SES) metrics on the follow-up prostate cancer screening care within 3 years of index prostate cancer screening test in NYS. The socioeconomic status metrics will be subclassified into race, insurance, and ethnicity and each of these sub-components will be evaluated for its impact on the follow-up cancer screening care. The exclusion criteria for this study includes patients records with unknown age, age <55 or >75, previous history of prostate cancer or radical prostatectomy, previous prostate biopsy, female sex, lives outside NYS, unknown or missing data on race, ethnicity, or insurance status, or multi-ethnic patients. For the included patients, initial prostate cancer screening, follow-up screening, characteristics (e.g., age, SES), and risk profiles will be evaluated. Moreover, patients diagnosed with prostate cancer or receiving prostatectomy will be reported.

Additionally, the following hypotheses will be tested:

H(0): Among patients with a baseline PSA test, socioeconomic status (SES) metrics (i.e., vulnerability based upon race/insurance/ethnicity) may pose as barriers to follow-up prostate cancer screening care within 3 years of index prostate cancer screening test (e.g., Vulnerability = V = Black, Hispanic, and Self-pay Insurance)

- H(0): Among patients with a baseline PSA test, race does not impact the likelihood of follow-up prostate cancer screening care within 3 years of index prostate cancer screening test (e.g., R-FC)
- H(0): Among patients with a baseline PSA test, insurance does not impact the likelihood of follow-up prostate cancer screening care within 3 years of index prostate cancer screening test (e.g., I-FC)
- H(0): Among patients with a baseline PSA test, ethnicity does not impact the likelihood of follow-up prostate cancer screening care within 3 years of index prostate cancer screening test (e.g., E-FC)

Please note, the SPARCS database de-identified reports will be used. Additionally, a not human subject's research (NHSR) determination is requested.

BACKGROUND AND SIGNIFICANCE:

For the period from January 2010 to December 2018, this analysis will use the NYS SPARCS database trends to evaluate the influence of race and insurance on follow-up prostate cancer screening. Disparities in prostate cancer survival based on patient's race has been well documented by previous research. A 2018 retrospective propensity analysis of prostate cancer patients diagnosed between 2004-2010 found that white men had a greater overall survival than black men, and that this survival difference was eliminated when their model simulated equal access to prostate cancer care.[2] A 2017 study found that African American and Hispanic men are less likely to receive definitive treatment for prostate cancer than white men, and the rates of treatment declined throughout their study period from 2004-2011.[3] Additionally, while Black men have a greater lifetime incidence of prostate cancer, a recent study found that they are less likely to receive PSA-testing.[4] Moreover, a 2013 post-hoc study of patients enrolled in the Prostate, Lung, Colorectal, and Ovarian (PLCO) trial found that among patients screened with a PSA test, Black patients were less likely than non-Hispanic Whites to receive follow-up PSA testing or prostate biopsies.[5]

In addition to the racial disparities in prostate cancer outcomes, previous research has exhibited that there are disparities in prostate cancer care based on the patient's insurance status. A 2018 study on the association between expanded insurance coverage and prostate cancer screening found that the gap in PSA test utilization between the higher and lower income male patients in Medicaid early expansion states was significantly reduced.[6] A 2019 study conducted on patients diagnosed with prostate cancer in Florida found that patients without insurance or with Medicaid were more likely to be diagnosed with late-stage prostate cancer.[7] Furthermore, a 2019 retrospective cohort study found that patients with private and public insurance were more likely to receive favorable treatment.[8] Bledsoe et al. (2018) found that insurance has an effect on treatment modality, as patients with private insurance were more likely to receive minimally invasive surgery and less likely to receive external beam radiotherapy than patients without insurance.[9]

Our study intends to further explore the relationship between socioeconomic factors and access to prostate cancer care, by examining how race and insurance affects patient's access follow up prostate cancer screening with PSA or biopsy. While this disparity has been studied with respect to Black and White race,[5] there are no previous studies examining the effect of insurance and ethnicity on follow-up screening. All results will be adjusted for patient comorbidities and age. Lastly, these variables will be stratified by year, so that trends over time can be evaluated.

RESEARCH DESIGN AND METHODS:

This retrospective observational cohort study will be done using the SPARCS Health Facts dataset. With the help of the SBU SOM Bioinformatics Department and Biostatistics Core Lab, the SPARCS database will be matched/merged to the enclosed coding listings to create a study-specific de-identified prostate cancer screening database. Furthermore, the Bioinformatics and Biostatistics team members will be responsible for providing the descriptive statistics listed below as well as providing a study-database for future analyses. For this study's primary hypothesis, a p-value of <0.001 will be used (however, all p-values will be reported by separate interpretation by readers). All secondary and tertiary analyses, as well as all exploratory analyses, will use a p-value of < 0.01. SAS version 9.4 will be used to complete all the

necessary statistical tests. More detailed methods including ICD-10, ICD-9, and CPT codes used in this study are described in the protocol below.

REFERENCES

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4. Kearns JT, Adeyemi O, Anderson WE, et al. Contemporary racial disparities in PSA screening in a large, integrated health care system. Journal of Clinical Oncology 2020;38:308-.
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7. Ramirez E, Morano J, Beguiristain T, et al. Insurance status as a modifier of the association between race and stage of prostate cancer diagnosis in Florida during 1995 and 2013. Cancer Epidemiol 2019;59:104-8.
8. Awasthi S, Gerke T, Williams VL, et al. Interrelationship Between Health Insurance Status and Prostate Cancer Grade Can Have Critical Impact on Prostate Cancer Disease Control: A Retrospective Cohort Study. Cancer Control 2019;26:1073274819837184.
9. Bledsoe TJ, Park HS, Rutter CE, Aneja S, Nguyen PL, Yu JB. Impact of Health Insurance Status on Prostate Cancer Treatment Modality Selection in the United States. Am J Clin Oncol 2018;41:1062-8.

Protocol:

Population: The population of this study is NYS males from the ages of 55-75 who received a prostate cancer screening test from 2010-2018 as defined in **Table 1**. Each patient will be sorted by the year of the initial screening test performed, in order to track trends over time.

Table 1: Prostate Cancer Screening Test Codes

Prostate Cancer Screening Codes				
Procedure	**ICD-9**	**ICD-10**	**CPT**	**Notes**
Elevated Prostate Specific Antigen (PSA)	790.93, Elevated prostate specific antigen	R97.20, Elevated PSA	NA	
Prostate Specific Antigen (PSA)	V76.44	Z12.5	84152, Complex PSA	
			84153, Total PSA	
			84154, Free PSA	
			81593, Panel PSA	
Prostate Needle Biopsy (Open or Closed)	60.11, 60.12	0VB03ZX 0VB04ZX 0VB07ZX 0VB08ZX, 0VB00ZX	55700, 55705, 55706	Any ONE ICD-9, ICD-10, or CPT satisfies criteria

Inclusion Criteria:

-PSA test, elevated PSA test, or prostate biopsy between 2010-2018
-Male sex
-Age 55-75
-NYS Resident

Exclusion Criteria:

-In-hospital death in initial record
-With prostate cancer diagnosis prior to or at the time of initial encounter (**Table 2a** or **2b** codes)
-With prostatectomy or prostatectomy prior to or at the time of initial encounter (**Table 3** codes)
-With prostate biopsy prior to or at the time of initial encounter
-With unknown or missing data on race, ethnicity, or insurance or multi-ethnic patients

Step 1: The population will be divided into **three** groups based on the **first** screening test recorded in SPARCS. They are listed in order of priority below (Group 1 = highest priority)

Group 1: Elevated PSA test from diagnostic code
Group 2: Prostate Specific Antigen (PSA) test, results unspecified (outpatient data only)
Group 3: Prostate biopsy

Table 2a: Prostate Cancer Diagnosis Codes:

Diagnosis	**ICD-9**	**ICD-10**	**Notes**
Prostate Cancer	185	C61	
Carcinoma in situ of prostate	233.4	D07.5	

Table 2b: Prostate Cancer Metastasis Codes

Diagnosis	**ICD-9**	**ICD-10**	**Notes**
Prostate Cancer Metastasis	198.5 198.82 196.2 196.6	C79.51 C79.82 C77.2 C77.5	

Table 3: Radical Prostatectomy Codes

Procedure	**ICD-9**	**ICD-10**	**CPT**	**Notes**
Radical Prostatectomy (Laparoscopic/robotic or open)	60.3, 60.4, 60.5, 60.62, or 60.69	0VT00ZZ, 0VT04ZZ, 0VT07ZZ, or 0VT08ZZ	55810, 55812, 55815, 55840, 55842, 55845, 55866	Any ONE ICD-9, ICD-10, or CPT satisfies criteria

Table 4: Radiation Procedure Codes

Procedure	**ICD-9**	**ICD-10 PCS**	**CPT**	**Notes**
Radiation (Stereotactic Radiosurgery, Brachytherapy, IMRT, Beam Radiation)	92.30, 92.31, 92.32, 92.33, 92.39, 92.20, 92,23, 92. 28, 92.27, 92.22, 92.24, 92.25, 92.26, 92.21, 99.85, 92.29, 17.69, 92.41	DV20DZZ, DV20HZZ, DV20JZZ, DV1097Z, DV1098Z, DV1099Z, DV109BZ, DV109CZ, DV109YZ, DV10B7Z, DV10B8Z, DV10B9Z, DV10BBZ,	77373, 77385, 77386, 77424, 77425, 77520, 77522, 77523, 77525,77600, 77605, 77610, 77615, 77620, 77770, 77771, 77772, 77778, 77371, 77372, 77373, 7740177402, 77403, 77404, 77406, 77407, 77408, 77409, 77411, 77412, 77413, 77414, 77416, 77418, 77423, 77424, 77425, 77520, 77522, 77523,	Any ONE ICD-9, ICD-10, or CPT satisfies criteria

		DV10BB1, DV10BCZ, DV10BYZ, 3E0N304, 3E0N704, 3E0N804, DV000ZZ, DV001ZZ, DV002ZZ, DV003Z0, DV003ZZ, DV004ZZ, DV005ZZ, DV006ZZ, DVY07ZZ, DVY08ZZ, DVY0CZZ, DVY0FZZ, DVY0KZZ	77525, 77781, 77782, 77783, 77784, 77785,77786, 77787 0395T, G0173, G0251, G0339, G0340, G6003, G6004, G6005, G6006, G6007, G6008, G6009, G6010, G6011, G6012, G6013, G6014, G6015, G6016	

Step 2: For each group of patients, the number/percentage that had each of the following follow-up scenarios will be recorded as outcomes.

Screening Outcomes:

Outcome 1A: Repeat/Follow-up PSA, results unspecified, within 3 years
Outcome 1B: Repeat/Follow-up elevated PSA within 3 years
Outcome 1C: Follow up biopsy (**Table 2)** within 3 years

No follow-up

Outcome 2: No repeat screening tests within 3 years

Step 3: Initially, a univariate analysis will be performed to determine the marginal association between the following variables/exposures and the above outcomes using either Chi-Square tests and/or other statistical tests. Additionally, the specific vulnerable groups listed below will be compared to others who are outside that group.

Variables/Exposures:

Age: Yearly
Race: Black, Non-Hispanic White, other races
Ethnicity: Hispanic, Non-Hispanic
Insurance: Medicare, Medicaid, Commercial, Self-pay
Vulnerable groups: Black race, Hispanic ethnicity, Self-pay insurance status

Additional note: The following variables will be adjusted for in the analysis including comorbidities, risk factors for prostate cancer, and subsequent prostate cancer diagnosis/treatment after initial treatment. To clarify, our study will **exclude** patients who are diagnosed/treated with prostate cancer before their initial PSA test or biopsy but will **adjust for** patients in the analysis who received a prostate cancer diagnosis or treatment after their initial screening test but before their subsequent screening test.

Comorbidities: Charlson or Elixhauser Comorbidity Score
Risk Factors: Smoking/Tobacco, Morbid Obesity, Family History of Prostate Cancer, Personal History of Irradiation
Prostate Cancer Diagnosis or Treatment w/ prostatectomy or radiation (Tables **2a**, **2b**, **3**, and **4**)

SAMPLE TABLES

Table 1: Descriptive table of patients' characteristics, risk factors, comorbidity score, index of comorbidities and outcomes by vulnerability status

Variable	Level	Total (N =)	V (N =)	NOT V (N =)	P-value*
Patients' characteristics at the time of Initial PC Screening					
Abnormal PSA					
Age	**Yearly**				
Age Categories	**40-55**				
	55-69				
	70 - 75				
Year of prostate cancer screening	**2011**				
	2012				
	2013				
	2014				

	2015				
Risk factors at the time of Initial PC Screening					
Smoking/Tobacco	**No**				
	Yes				
Morbid Obesity	**No**				
	Yes				
Family History of Prostate Cancer	**No**				
	Yes				
	Yes				
Personal History of Irradiation	**No**				
	Yes				
Comorbidities' score at the time of Initial PC Screening					
Elixhauser Score					
Charlson Score					
Elixhauser Comorbidities at the time of Initial PC Screening					
Congestive heart failure	**No**				
	Yes				
Cardiac arrhythmias	**No**				
	Yes				

Valvular disease	**No**				
	Yes				
Pulmonary circulation disease	**No**				
	Yes				
Peripheral vascular disease	**No**				
	Yes				
Hypertension, uncomplicated	**No**				
	Yes				
Hypertension, complicated	**No**				
	Yes				
Paralysis	**No**				
	Yes				
Other neurological disorders	**No**				
	Yes				
Chronic pulmonary disease	**No**				
	Yes				
Diabetes w/o chronic complications	**No**				
	Yes				

Diabetes w/ chronic complications	**No**				
	Yes				
Hypothyroidism	**No**				
	Yes				
Renal failure	**No**				
	Yes				
Liver disease	**No**				
	Yes				
Peptic ulcer Disease, excluding bleeding	**No**				
	Yes				
HIV and AIDS	**No**				
Lymphoma	**No**				
	Yes				
Metastatic cancer	**No**				
	Yes				
Solid tumor w/out metastasis	**No**				
	Yes				
	No				

Rheumatoid arthritis/collagen vascular d	**Yes**				
Coagulopathy	**No**				
	Yes				
Obesity	**No**				
	Yes				
Weight loss	**No**				
	Yes				
Fluid and electrolyte disorders	**No**				
	Yes				
Blood loss anemia	**No**				
	Yes				
Deficiency Anemia	**No**				
	Yes				
Alcohol abuse	**No**				
	Yes				
Drug abuse	**No**				
	Yes				
Psychoses	**No**				
	Yes				

Depression	**No**				
	Yes				
Charlson Comorbidities at the time of Initial PC Screening					
Congestive heart failure	**No**				
	Yes				
Chronic pulmonary disease	**No**				
	Yes				
Diabetes w/o chronic complications	**No**				
	Yes				
Diabetes w/ chronic complications	**No**				
	Yes				
Myocardial infarction	**No**				
	Yes				
Peripheral vascular disorder	**No**				
	Yes				
Cerebrovascular disease	**No**				
	Yes				
Dementia	**No**				

	Yes				
Rheumatic disease	**No**				
	Yes				
Peptic ulcer disease	**No**				
	Yes				
Mild liver disease	**No**				
	Yes				
Hemiplegia or paraplegia	**No**				
	Yes				
Renal disease	**No**				
	Yes				
Any malignancy w lymphoma and leukemia w/o malignant neoplasm of skin	**No**				
	Yes				
Moderate or severe liver disease	**No**				
	Yes				
Metastatic solid tumor	**No**				
	Yes				

AIDS/HIV	**No**				
Coronary Artery Disease	**No**				
	Yes				
Connective Tissue Disorder	**No**				
	Yes				
Moderate-Severe Renal Disease	**No**				
	Yes				
ANY Follow-up Screening	**Yes**				
	No				
Follow-up Biopsy	**Yes**				
	No				
Follow-up Abnormal PSA	**Yes**				
	No				
Follow-up PSA/ PC Screening (not abnormal PSA) NEW CODES+ CPT CODES	**Yes**				
	No				

*: For categorical variables, p-values were based on Chi-squared test with exact p-value from Monte Carlo simulation; for continuous variable, p-value was based on Wilcoxon rank sum test.

Note: For continuous variable, median+/-IQR were reported.

Table 2: Descriptive table of patients' characteristics, risk factors, comorbidity score, index of comorbidities and outcomes by race

Variable	Level	Total (N =)	Black (N =)	NOT Black (N =)	P-value*
Patients' characteristics at the time of Initial PC Screening					
Abnormal PSA					
Age	Yearly				
Age Categories	40-55				
	55-69				
	70 - 75				
Year of prostate cancer screening	2011				
	2012				
	2013				
	2014				
	2015				
Risk factors at the time of Initial PC Screening					
Smoking/Tobacco	No				
	Yes				
Morbid Obesity	No				

	Yes				
Family History of Prostate Cancer	No				
	Yes				
	Yes				
Personal History of Irradiation	No				
	Yes				
Comorbidities' score at the time of Initial PC Screening					
Elixhauser Score					
Charlson Score					
Elixhauser Comorbidities at the time of Initial PC Screening					
Congestive heart failure	No				
	Yes				
Cardiac arrhythmias	No				
	Yes				
Valvular disease	No				
	Yes				
Pulmonary circulation disease	No				
	Yes				
	No				

Peripheral vascular disease	Yes				
Hypertension, uncomplicated	No				
	Yes				
Hypertension, complicated	No				
	Yes				
Paralysis	No				
	Yes				
Other neurological disorders	No				
	Yes				
Chronic pulmonary disease	No				
	Yes				
Diabetes w/o chronic complications	No				
	Yes				
Diabetes w/ chronic complications	No				
	Yes				
Hypothyroidism	No				
	Yes				
Renal failure	No				

	Yes				
Liver disease	No				
	Yes				
Peptic ulcer Disease, excluding bleeding	No				
	Yes				
HIV and AIDS	No				
Lymphoma	No				
	Yes				
Metastatic cancer	No				
	Yes				
Solid tumor w/out metastasis	No				
	Yes				
Rheumatoid arthritis/collagen vascular d	No				
	Yes				
Coagulopathy	No				
	Yes				
Obesity	No				
	Yes				

Weight loss	No				
	Yes				
Fluid and electrolyte disorders	No				
	Yes				
Blood loss anemia	No				
	Yes				
Deficiency Anemia	No				
	Yes				
Alcohol abuse	No				
	Yes				
Drug abuse	No				
	Yes				
Psychoses	No				
	Yes				
Depression	No				
	Yes				
Charlson Comorbidities at the time of Initial PC Screening					
Congestive heart failure	No				
	Yes				

Chronic pulmonary disease	No				
	Yes				
Diabetes w/o chronic complications	No				
	Yes				
Diabetes w/ chronic complications	No				
	Yes				
Myocardial infarction	No				
	Yes				
Peripheral vascular disorder	No				
	Yes				
Cerebrovascular disease	No				
	Yes				
Dementia	No				
	Yes				
Rheumatic disease	No				
	Yes				
Peptic ulcer disease	No				
	Yes				

Mild liver disease	No				
	Yes				
Hemiplegia or paraplegia	No				
	Yes				
Renal disease	No				
	Yes				
Any malignancy w lymphoma and leukemia w/o malignant neoplasm of skin	No				
	Yes				
Moderate or severe liver disease	No				
	Yes				
Metastatic solid tumor	No				
	Yes				
AIDS/HIV	No				
Coronary Artery Disease	No				
	Yes				
Connective Tissue Disorder	No				
	Yes				

Moderate-Severe Renal Disease	No				
	Yes				
ANY Follow-up Screening	Yes				
	No				
Follow-up Biopsy	Yes				
	No				
Follow-up Abnormal PSA	Yes				
	No				
Follow-up PSA/ PC Screening (not abnormal PSA) NEW CODES+ CPT CODE	Yes				
	No				

*: For categorical variables, p-values were based on Chi-squared test with exact p-value from Monte Carlo simulation; for continuous variable, p-value was based on Wilcoxon rank sum test.
Note: For continuous variable, median+/-IQR were reported.

Table 3: Descriptive table of patients' characteristics, risk factors, comorbidity score, index of comorbidities and outcomes by insurance status

Variable	**Level**	**Total (N =)**	**Self-Pay (N =)**	**NOT Self-Pay (N =)**	**P-value***
Patients' characteristics at the time of Initial PC Screening					
Abnormal PSA					

Age	Yearly				
Age Categories	40-55				
	55-69				
	70 - 75				
Year of prostate cancer screening	2011				
	2012				
	2013				
	2014				
	2015				
Risk factors at the time of Initial PC Screening					
Smoking/Tobacco	No				
	Yes				
Morbid Obesity	No				
	Yes				
Family History of Prostate Cancer	No				
	Yes				
	Yes				
Personal History of Irradiation	No				
	Yes				

Comorbidities' score at the time of Initial PC Screening					
Elixhauser Score					
Charlson Score					
Elixhauser Comorbidities at the time of Initial PC Screening					
Congestive heart failure	No				
	Yes				
Cardiac arrhythmias	No				
	Yes				
Valvular disease	No				
	Yes				
Pulmonary circulation disease	No				
	Yes				
Peripheral vascular disease	No				
	Yes				
Hypertension, uncomplicated	No				
	Yes				
Hypertension, complicated	No				
	Yes				
Paralysis	No				

	Yes				
Other neurological disorders	No				
	Yes				
Chronic pulmonary disease	No				
	Yes				
Diabetes w/o chronic complications	No				
	Yes				
Diabetes w/ chronic complications	No				
	Yes				
Hypothyroidism	No				
	Yes				
Renal failure	No				
	Yes				
Liver disease	No				
	Yes				
Peptic ulcer Disease, excluding bleeding	No				
	Yes				

HIV and AIDS	No				
Lymphoma	No				
	Yes				
Metastatic cancer	No				
	Yes				
Solid tumor w/out metastasis	No				
	Yes				
Rheumatoid arthritis/collagen vascular d	No				
	Yes				
Coagulopathy	No				
	Yes				
Obesity	No				
	Yes				
Weight loss	No				
	Yes				
Fluid and electrolyte disorders	No				
	Yes				
Blood loss anemia	No				
	Yes				

Deficiency Anemia	No				
	Yes				
Alcohol abuse	No				
	Yes				
Drug abuse	No				
	Yes				
Psychoses	No				
	Yes				
Depression	No				
	Yes				
Charlson Comorbidities at the time of Initial PC Screening					
Congestive heart failure	No				
	Yes				
Chronic pulmonary disease	No				
	Yes				
Diabetes w/o chronic complications	No				
	Yes				
Diabetes w/ chronic complications	No				

	Yes			
Myocardial infarction	No			
	Yes			
Peripheral vascular disorder	No			
	Yes			
Cerebrovascular disease	No			
	Yes			
Dementia	No			
	Yes			
Rheumatic disease	No			
	Yes			
Peptic ulcer disease	No			
	Yes			
Mild liver disease	No			
	Yes			
Hemiplegia or paraplegia	No			
	Yes			
Renal disease	No			
	Yes			

Any malignancy w lymphoma and leukemia w/o malignant neoplasm of skin	No				
	Yes				
Moderate or severe liver disease	No				
	Yes				
Metastatic solid tumor	No				
	Yes				
AIDS/HIV	No				
Coronary Artery Disease	No				
	Yes				
Connective Tissue Disorder	No				
	Yes				
Moderate-Severe Renal Disease	No				
	Yes				
ANY Follow-up Screening	Yes				
	No				
Follow-up Biopsy	Yes				
	No				

Follow-up Abnormal PSA	Yes				
	No				
Follow-up PSA/ PC Screening (not abnormal PSA) NEW CODES+ CPT CODE	Yes				
	No				

*: For categorical variables, p-values were based on Chi-squared test with exact p-value from Monte Carlo simulation; for continuous variable, p-value was based on Wilcoxon rank sum test.
Note: For continuous variable, median+/-IQR were reported.

Table 4: Descriptive table of patients' characteristics, risk factors, comorbidity score, index of comorbidities and outcomes by ethnicity

Variable	Level	Total (N =)	Hispanic (N =)	NOT Hispanic (N =)	P-value*
Patients' characteristics at the time of Initial PC Screening					
Abnormal PSA					
Age	Yearly				
Age Categories	40-55				
	55-69				
	70 - 75				
Year of prostate cancer screening	2011				
	2012				
	2013				

	2014				
	2015				
Risk factors at the time of Initial PC Screening					
Smoking/Tobacco	No				
	Yes				
Morbid Obesity	No				
	Yes				
Family History of Prostate Cancer	No				
	Yes				
	Yes				
Personal History of Irradiation	No				
	Yes				
Comorbidities' score at the time of Initial PC Screening					
Elixhauser Score					
Charlson Score					
Elixhauser Comorbidities at the time of Initial PC Screening					
Congestive heart failure	No				
	Yes				
	No				

Cardiac arrhythmias	Yes				
Valvular disease	No				
	Yes				
Pulmonary circulation disease	No				
	Yes				
Peripheral vascular disease	No				
	Yes				
Hypertension, uncomplicated	No				
	Yes				
Hypertension, complicated	No				
	Yes				
Paralysis	No				
	Yes				
Other neurological disorders	No				
	Yes				
Chronic pulmonary disease	No				
	Yes				
	No				

Diabetes w/o chronic complications	Yes				
Diabetes w/ chronic complications	No				
	Yes				
Hypothyroidism	No				
	Yes				
Renal failure	No				
	Yes				
Liver disease	No				
	Yes				
Peptic ulcer Disease, excluding bleeding	No				
	Yes				
HIV and AIDS	No				
Lymphoma	No				
	Yes				
Metastatic cancer	No				
	Yes				
Solid tumor w/out metastasis	No				
	Yes				

Rheumatoid arthritis/collagen vascular d	No				
	Yes				
Coagulopathy	No				
	Yes				
Obesity	No				
	Yes				
Weight loss	No				
	Yes				
Fluid and electrolyte disorders	No				
	Yes				
Blood loss anemia	No				
	Yes				
Deficiency Anemia	No				
	Yes				
Alcohol abuse	No				
	Yes				
Drug abuse	No				
	Yes				
Psychoses	No				

	Yes				
Depression	No				
	Yes				
Charlson Comorbidities at the time of Initial PC Screening					
Congestive heart failure	No				
	Yes				
Chronic pulmonary disease	No				
	Yes				
Diabetes w/o chronic complications	No				
	Yes				
Diabetes w/ chronic complications	No				
	Yes				
Myocardial infarction	No				
	Yes				
Peripheral vascular disorder	No				
	Yes				
Cerebrovascular disease	No				
	Yes				

Dementia	No				
	Yes				
Rheumatic disease	No				
	Yes				
Peptic ulcer disease	No				
	Yes				
Mild liver disease	No				
	Yes				
Hemiplegia or paraplegia	No				
	Yes				
Renal disease	No				
	Yes				
Any malignancy w lymphoma and leukemia w/o malignant neoplasm of skin	No				
	Yes				
Moderate or severe liver disease	No				
	Yes				
Metastatic solid tumor	No				
	Yes				

AIDS/HIV	No				
Coronary Artery Disease	No				
	Yes				
Connective Tissue Disorder	No				
	Yes				
Moderate-Severe Renal Disease	No				
	Yes				
ANY Follow-up Screening	Yes				
	No				
Follow-up Biopsy	Yes				
	No				
Follow-up Abnormal PSA	Yes				
	No				
Follow-up PSA/ PC Screening (not abnormal PSA) NEW CODES+ CPT CODE	Yes				
	No				

*: For categorical variables, p-values were based on Chi-squared test with exact p-value from Monte Carlo simulation; for continuous variable, p-value was based on Wilcoxon rank sum test.

Note: For continuous variable, median+/-IQR were reported.