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14. ABSTRACT The purpose of this award is to undertake research focused on evaluating whether racial differences in access to and intensity of medical care for prostate cancer are a fundamental cause of the disparity in prostate cancer outcomes. This work involves first examining how care patterns are correlated throughout all phases of cancer care within racial groups in order to gain a fuller understanding of how racial differences across the continuum of care contribute to disparity. The second layer of this proposal is the development of a computer model that integrates the complex patterns of care and differences by race identified in the first phase in order to quantify their potential impact on mortality. This work demonstrates that disparities in treatment do appear to partially contribute to differences in mortality outcomes. The increased use of curative therapy among blacks which lagged behind whites in the 1980s can account for 14% of the prostate cancer mortality reduction among blacks assuming efficacy estimates from the Scandinavian trial. However, even when treatment rates among blacks and whites are equal, prostate cancer mortality among blacks remains significantly higher compared to whites.					
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INTRODUCTION

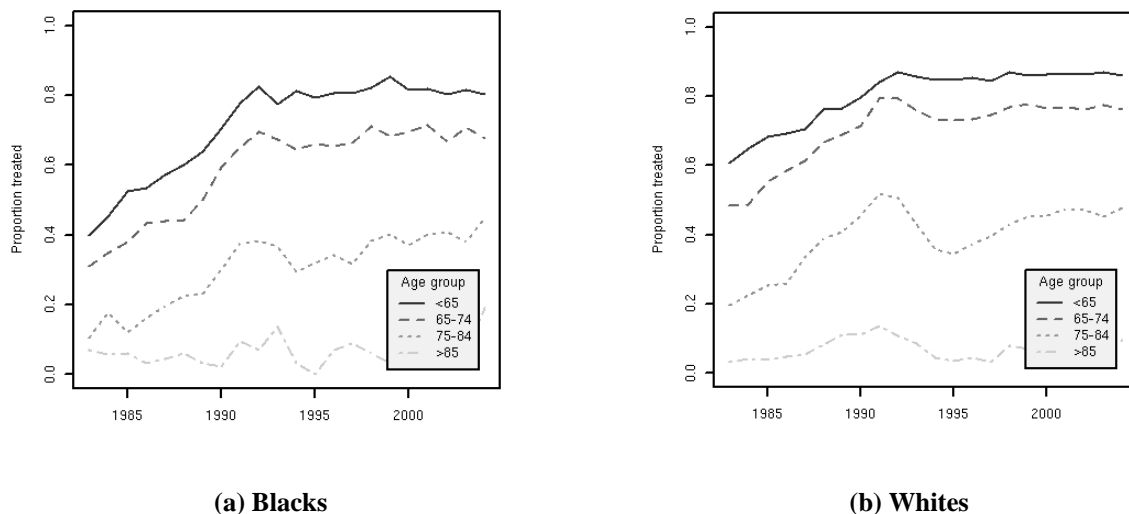
The purpose of this training award is to undertake research focused on evaluating whether racial differences in access to and intensity of medical care for prostate cancer are a fundamental cause of the disparity in prostate cancer outcomes. This work involves first examining how care patterns are correlated throughout all phases of cancer care within racial groups in order to gain a fuller understanding of how racial differences across the continuum of care contribute to disparity. The second layer of this proposal is the development of a computer model that integrates the complex patterns of care and differences by race identified in the first phase in order to quantify their potential impact on mortality. This award was transferred from Steven Zeliadt, PhD to Megan Fesinmeyer, PhD in June 2007. Dr. Zeliadt was no longer eligible for support through this mechanism as he received a faculty appointment with the VA Puget Sound Health Care System and the University of Washington as a Research Assistant Professor.

BODY

Task 1. Estimate how patterns of care by race are correlated across the continuum of care. This work utilized historical data for 477,621 men from the Surveillance Epidemiology and End Results Registry¹, focusing initially on differences in the use of surgery or radiation before and after the introduction of PSA screening. This work has been presented at IMPaCT (Innovative Minds in Prostate Cancer Today) meeting in Atlanta September, 2007 and a manuscript is in process of being submitted to Cancer Causes and Control. Key findings from this work highlight the differences in the historical patterns of aggressive treatment by race, with use of aggressive treatment increasing over time for all races, but with treatment initially lagging among blacks.

We are continuing to explore the feasibility of including data from Kaiser Permanente to explore the correlation of PSA screening with treatment. During Year 1 of this project we obtained approvals to receive de-identified data from Kaiser Permanente. Kaiser Permanente has provided an initial dataset containing PSA values for 18,000 men diagnosed with prostate cancer, although data on the correlation of screening and treatment or follow-up care have not yet been provided.

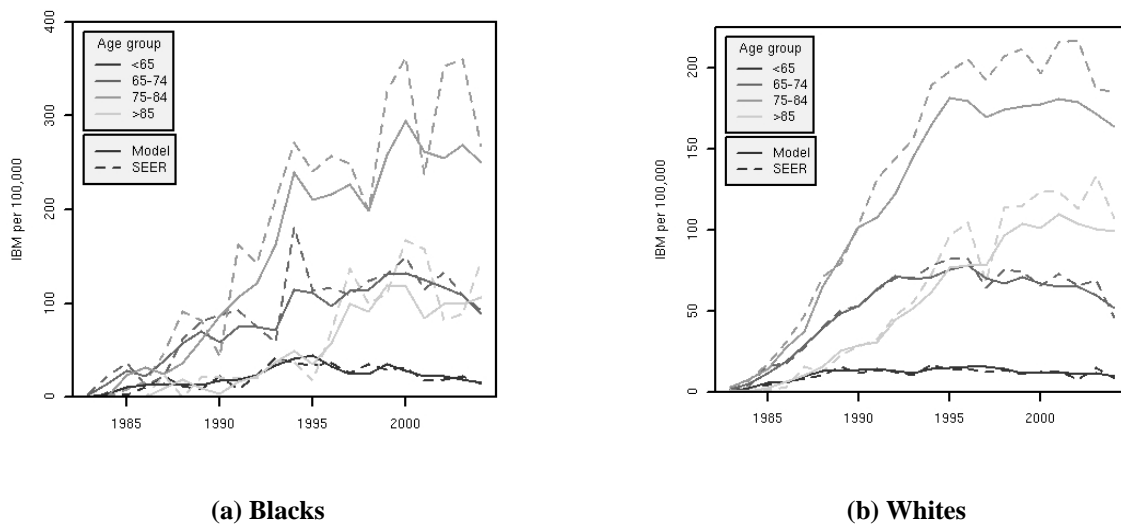
Figure 1. Proportion of localized prostate cancer cases treated over time by age and race



Task 2. Develop a computer model to quantify the disparity in mortality between whites and blacks that can be attributed to intensity of care. We developed a microsimulation model based on these historical treatment patterns to estimate the potential mortality differences attributable to disparities in care. This study integrates historical treatment data with survival estimates from the Scandinavian randomized treatment trial.² This flexible model structure simulates the U.S. population of men diagnosed with prostate cancer beginning in 1983, including age, race, and Gleason grade. Each subject is assigned an age at death and causes of death which is based on prostate-specific survival or other cause of death survival for each individual by race, age and year of diagnosis.³ This allows us to re-assign subjects who did receive treatment during the years 1983-2005 to a hypothetical untreated status reflecting the differences in survival between the treated and untreated arms of the Scandinavian trial. Long term estimates of prostate cancer survival are then generated and compared to observed survival patterns.

The structure of the model was validated by examining mortality among subjects newly diagnosed with prostate cancer within the SEER registries using incidence based mortality methods. This validation exercise established the ability of the model to replicate survival patterns as observed among this subgroup (Figure 2).

Figure 2. Validation of the model: Observed and projected age-adjusted incidence based mortality rates



We next applied this model to the increases in treatment observed since 1983 asking the specific research question about how much of the increase in treatment since 1983 has contributed to declines in mortality between 1983 and 2005. Subjects detected either prior to PSA or due to PSA are included in the model based on their observed prostate-specific survival. We then deflate that survival based on the efficacy estimate from the Scandinavian trial. This model demonstrates (Table 1) the total number of additionally treated men with prostate cancer in the U.S. who would not have received treatment if rates had remained at 1983 levels, and the estimated deaths associated with holding treatment constant at those earlier levels.

Table 1. Estimated count of additional treatments relative to 1983 and prostate cancer deaths averted by 2004 in the U.S.

	Blacks		Whites	
	Additional Treatments	Deaths averted	Additional treatments	Deaths averted
< 65	32,583	429	108,459	1,140
65–74	29,711	985	202,654	4,411
75–84	10,034	821	100,675	7,040
> 85	132	103	3,985	1,792

The results of this model demonstrate the influence of increases in historical treatment trends on prostate cancer mortality declines, and how these differ by race. Using 1987 as the baseline year for calculating mortality declines, among blacks mortality as observed declined from 158 per 100,000 deaths to 114 per 100,000 deaths, decline of 28%. Among whites the decline was 32%. Among blacks, approximately 14% of the decline can be attributed to increases in treatment, while among whites 11% is due to increases in treatment. This reflects the lower rates of treatment among blacks in 1983, with treatment rates comparable in recent years.

Table 2. Mortality rates (per 100,000) among localized prostate cancer cases

	Blacks				Whites			
	1987	1995	2000	2004	1987	1995	2000	2004
<i>Observed</i>	158	161	146	114	81	80	64	55
Model	159	168	154	121	81	85	69	58

Task 3. Investigate data necessary to incorporate dietary hypotheses into the computer model necessary to quantify the disparity in mortality explained by the combination of diet and access to care. Work on this aim has begun using the basic model described above as a template. Data describing historical obesity patterns for blacks and whites are being obtained from NHANES. Estimates of the impact of obesity on prostate cancer mortality are being estimated in collaboration with mentorship from Dr. Alan Kristal.⁴ This work will be a priority in the upcoming year.

Task 4. Identify reasons for differences in follow-up surveillance care in a racially diverse survey study of 570 prostate cancer patients. The development of survey questions to incorporate into a survey of treatment decision making was undertaken in year 1. The development work has led to the following survey item: “If you have NOT had your PSA measured in the past 6 months, please mark ALL THE REASONS that apply to you below: My doctor has not recommended a test during this time; My schedule has made it hard to find the time to see my doctor; I have not had insurance during this time; My health is good enough that I haven’t needed to get my PSA tested; I don’t want to get my PSA tested again.” We also developed another series of question: “What factors do you think are most important in determining the type of follow up care you are receiving?: Whether my PSA goes up or down;

My doctor's advice, The type of insurance I have, whether I request appointments, Whether I notice any problems with my health, characteristics of my disease when I was diagnosed such as my Gleason score, My age." These items are asked using a 3 point Likert type scale with the options Not Important, Somewhat Important or Very Important. These items have been incorporated into a survey about discounted factors 12 months following treatment decision that is being fielded as part of an ongoing project. The data will be collected and analyzed as part of that project as this training grant only included effort to review the literature and develop the survey items but no funds.

KEY RESEARCH ACCOMPLISHMENTS

- Development and validation of race-specific microsimulation model to estimate survival patterns of U.S. men with localized based on incidence parameters including age at diagnosis, year of diagnosis, Gleason score, type of initial treatment.
- Evaluation of historical treatment patterns among blacks and whites prior to and after introduction of PSA and the role of those treatment patterns on prostate cancer mortality declines.

REPORTABLE OUTCOMES

- Abstract: The Role of Aggressive Treatment in the 1980s & 1990s on Recent Prostate Cancer Mortality Trends Among Whites and Blacks – IMPaCT Meeting, September 2007
- Dr. Steven Zeliadt received a faculty position at the Research Assistant Professor level with the VA Puget Sound Health Care System in conjunction with the University of Washington.

CONCLUSION

This work demonstrates that disparities in treatment do appear to partially contribute to differences in mortality outcomes. The increased use of curative therapy among blacks which lagged behind whites in the 1980s particularly for younger men, can account for 14% of the prostate cancer mortality reduction among blacks assuming efficacy estimates from the Scandinavian trial. However, even when treatment rates among blacks and whites are equal, prostate cancer mortality among blacks remains significantly higher compared to whites.

REFERENCES

¹ Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 9 Regs Limited-Use, Nov 2007 Sub (1973-2005) <Katrina/Rita Population Adjustment> - Linked To County Attributes - Total U.S., 1969-2005 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2008, based on the November 2007 submission.

² Bill-Axelsson A, Holmberg L, Ruutu M, Haggman M, Andersson SO, Bratell S, et al. Scandinavian Prostate Cancer Group Study No. 4.. Radical prostatectomy versus watchful waiting in early prostate cancer. *N Engl J Med.* 2005;352:1977-84

³ Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Aggregated With State, Total U.S. (1969-2005) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2008. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).

⁴ Kristal AR, Gong Z. Obesity and prostate cancer mortality. *Future Oncol.* 2007 Oct;3(5):557-67.

APPENDICES

None