

Factors Determining Prostate Cancer Treatment Decision-Making at St. Charles Health
System and Hospital de Clínicas “José de San Martín”

by
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A THESIS

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the requirements for the
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Honors Baccalaureate of Science in Biology
(Honors Associate)

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Prostate cancer is the second most common cancer in men and the fourth most common cancer overall, causing an estimated 307,000 deaths in 2012. Prostate cancer is distinct from other cancers in that there are numerous treatment options, yet very few guarantees in relation to outcome. The most common treatments for prostate cancer in early stages include radical prostatectomy, brachytherapy, and external beam radiation – all with similar levels of documented efficacy. Healthcare practitioners often provide information regarding treatment options to their patients, but leave treatment decision-making to the patient, resulting in a substantial portion of patients that decline treatment. This investigation aimed to identify the factors that influence patient treatment decision-making by analyzing data from St. Charles Health System and making a cross-cultural comparison with Hospital de Clínicas “José de San Martín.” Factors examined include: marital status, race/ethnicity, religion, payer at diagnosis, stage, and age at diagnosis. From the analysis of data at St. Charles Health System, statistically significant associations were found between payer at diagnosis and age at diagnosis and receiving radiation treatment, while stage and age at diagnosis were associated with not receiving

biopsy or surgery treatment. In comparing St. Charles Health System with Hospital de Clínicas “José de San Martín,” similarities were seen in age at diagnosis, while differences in receiving treatment were apparent in regards to marital status. Future studies should focus upon quantifying the relationships between age at diagnosis and marital status and treatment at Hospital de Clínicas “José de San Martín.” Further understanding the factors that influence prostate cancer treatment decision-making could assist healthcare practitioners in providing guidance to patients as they explore treatment options, with an ultimate goal of providing enhanced, more-individualized care.

Key Words: Prostate cancer, treatment decision-making, Argentina

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I understand that my project will become part of the permanent collection of Oregon State University, Honors College. My signature below authorizes release of my project to any reader upon request.

Rebecca A. Gibbon, Author

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Factors Determining Prostate Cancer Treatment Decision-Making at St. Charles Health System and Hospital de Clínicas “José de San Martín”

1. Introduction

Prostate cancer is the second most common cancer in men and the fourth most common cancer overall. A projected 1.1 million men were diagnosed across the globe in 2012. Prostate cancer is the fifth leading cause of death from cancer in men, with 307,000 estimated deaths in 2012, according to the World Health Organization.¹ It is distinct from other cancers in that there are numerous treatment options, yet very few guarantees in relation to outcome. The most common treatments for prostate cancer in early stages include radical prostatectomy, brachytherapy, and external beam radiation; however, many patients elect to decline all forms of treatment.² This study will look at possible factors that influence a patient’s decision to accept or decline treatment for prostate cancer.

1.1. *THESIS STATEMENT*

I hypothesized that factors, such as marital status and religion, would be associated with greater likelihood to receive prostate cancer treatment, while other factors, payer at diagnosis, stage, and age at diagnosis, would be inversely associated with receiving treatment at St. Charles Health System (SCHS). Comparing SCHS with Hospital de Clínicas “José de San Martín” (HCJSM) is expected to show some similarity, but a large amount of contrast due to societal and cultural differences with regards to marital status, religion, and payer at diagnosis.

2. Protocol

2.1. PARTICIPANTS AND SETTING

Men with diagnosed localized prostate cancer were identified through St. Charles Health System cancer centers between January 2013 and December 2014. The group contained patients from four hospitals, including two cancer care centers, throughout Central Oregon. Localized prostate cancer status was verified through chart review and was defined as no evidence of metastasis. After further eligibility review, 222 men were included in the study. Thirteen men were excluded from the study due to incomplete data fields.

St. Charles Health System is a hospital system that serves nearly one-quarter of a million people in three counties of Central Oregon: Crook, Jefferson, and Deschutes.³ According to the 2012 Central Oregon Regional Health Assessment, Deschutes County is the most urban of the three, with only 27.6 percent of residents living in rural designations, compared to 48.0 percent in Crook and 63.1 percent in Jefferson.⁴ According to the United States Census Bureau, 90.8 percent of the tri-county region is non-Hispanic White. The second largest group, the Hispanic or Latino population, makes up 8.8 percent of the region.⁵⁻⁷

2.2. AIMS

- 2.2.1. Examine and compare patients with complete and incomplete data fields.
- 2.2.2. Describe the patient population.
- 2.2.3. Analyze and differentiate between treatment and non-treatment groups.

2.3. *METHODS*

2.3.1. When the data set was initially reviewed, 222 men were identified as eligible for this study based on a localized prostate cancer diagnosis. Upon review, thirteen men had incomplete data sets, marking them as appropriate for exclusion. Before removing any patients from the analysis, the complete and incomplete data set groups were compared to ascertain the potential for selection bias. The key data fields that were required for participation were age, marital status, payer at diagnosis, race/ethnicity, religion, and cancer stage.

2.3.2. The group was divided into two principal groups to be utilized for comparison purposes throughout the remainder of this study. Prior to conducting an analysis on the patients that were deemed eligible for the study, descriptive statistics were computed. The mean age of all participants was calculated, as well as for each treatment group (Table 10).

2.3.3. In order to analyze and differentiate between those that received treatment and those that did not, comparative analyses were conducted. It was hypothesized that factors such as increasing age, lack of payer at diagnosis, and advanced stage would be more strongly associated with the non-treatment group.

2.3.3.1. First, unadjusted associations between factors were analyzed in each treatment group.

2.3.3.1.1. Numerical variables (age) were analyzed using a T-test or non-parametric equivalent. An independent samples T-test is an

inferential statistical test that determines whether there is a statistically significant difference between the means in two groups, treatment groups in this case. The resulting T-value from this test corresponds to a P-value, for which a value less than 0.05 will represent a statistically significant difference in mean age between the treatment groups. The resulting P-value for each treatment group is displayed in Table 10.

2.3.3.1.2. Categorical variables (religion, payer at diagnosis, race/ethnicity) were examined against treatment using a contingency tables and Chi-square tests of independence. The test is used to determine whether there is a significant association between the two variables of interest. The resulting Chi-square test statistic from this test again corresponds to a P-value, for which a value less than 0.05 represents a significant association between treatment/non-treatment and each factor of interest. Contingency tables, Chi-square values, and P-values are displayed in Tables 19-22.

2.3.3.1.3. Finally, Chi-square tests of independence and trend were utilized to examine the association that exists between the ordered variables (stage) in each treatment group. A Chi-square test of independence, as described in the above section, was repeated using treatment and stage as the variables of interest. A Chi-square test for trend was utilized to test whether there was a linear

trend between row number (stage of prostate cancer) and the fraction of subjects in the left column (treatment groups).

Relevant contingency tables, Chi-square values, and P-values are displayed in Tables 11-14.

2.3.3.2. Following analyses of unadjusted association between factors, a logistic regression was conducted, with treatment as the dependent variable and a block of four factors – payer at diagnosis, stage, age at diagnosis, and family history – as the independent variables. The goals were to see whether the probability of getting a particular value of the dependent variable was associated with an independent variable and to predict the probability of getting a particular value of the dependent variable, given an independent variable. An odds ratio uses the difference between the probability of obtaining the observed results under the logistic model and the probability of obtaining the observed results in a model with no relationship between the independent and dependent variables. These correspond to P-values, for which values less than 0.05 represent a significant association between treatment group and each factor of interest. Odds ratios and 95% confidence intervals were calculated and presented in Tables 19-22.

3. Data

3.1. *TREATMENT CATEGORIES*

This study was originally intended to compare those that received treatment for prostate cancer with those that did not receive treatment. There were not enough cases

within the SCHS dataset that received no treatment to accurately characterize the reasons for which someone would decline treatment.

TREATMENT	FREQUENCY	PERCENT
NO	6	2.7%
YES	216	97.3%
TOTAL	222	100.0%

Table 1. Prostate cancer treatment frequencies at SCHS.

Consequently, cases that received treatment were compared based upon the type of treatment received. Treatment for the purpose of this study falls into four categories: biopsy, surgery, hormone therapy, and radiation.

TREATMENT		FREQUENCY	PERCENT
BIOPSY	Yes	174	83.3%
	No	35	16.7%
SURGERY	Yes	150	71.8%
	No	59	28.2%
HORMONE	Yes	37	17.7%
	No	172	82.3%
RADIATION	Yes	51	24.4%
	No	158	75.6%

Table 2. Prostate cancer treatment frequencies at SCHS by treatment type.

3.2. AGE

The mean age of the entire population was 67.12 years with a standard deviation of 7.470 years. The mean age for each treatment group is shown within the Results section in Table 10.

3.3. RACE/ETHNICITY

The population was found to be too homogenous to differentiate on either race or ethnicity. This information is likely not representative of the entire SCHS population and could be explained by the age demographics of ethnic groups. Perhaps the Spanish/Hispanic/Latino population is primarily female in the area, or perhaps males that

identify with these ethnic groups are not within the common age range of prostate cancer patients.

RACE	FREQUENCY	PERCENT
WHITE	219	98.6%
BLACK	1	0.5%
VIETNAMESE	1	0.5%
OTHER	1	0.5%
TOTAL	222	100.0%

Table 3. Race frequencies at SCHS.

ETHNICITY	FREQUENCY	PERCENT
NON-SPANISH	217	97.7%
SPANISH, HISPANIC, LATINO	4	1.8%
CUBAN	1	0.5%
TOTAL	222	100.0%

Table 4. Ethnicity frequencies at SCHS.

3.1. STAGE

Initial descriptive statistics for stage were computed and are shown below in

Table 5. Stage was later examined as a predictor of treatment (Tables 11-14).

	FREQUENCY	PERCENT
STAGE I	35	15.8%
STAGE II	150	67.9%
STAGE III	23	10.4%
STAGE IV	13	5.9%
TOTAL	221	100.0%

Table 5. Stage frequencies at SCHS.

3.2. MARITAL STATUS

MARITAL STATUS	FREQUENCY	PERCENT
MARRIED	170	76.6%
SINGLE	20	9.0%
DIVORCED	11	5.0%
UNMARRIED OR DOMESTIC PARTNER	3	1.4%
WIDOWED	6	2.7%
UNKNOWN	12	5.4%
TOTAL	222	100.0%

Table 6. Initial marital status categories with frequencies.

For the purposes of this study, the original marital status groups were condensed into the following groups on the basis of relevance and frequency: Unmarried, Married, and Other.

MARITAL STATUS	FREQUENCY	PERCENT
UNMARRIED	40	18.0%
MARRIED	170	76.6%
OTHER	12	5.4%
TOTAL	222	100.0%

Table 7. Revised marital status categories with frequencies.

3.3. RELIGION

Although religion was an original demographic marker of interest, this information was unavailable in the data set received from SCHS. This leaves room for additional research in which the relationship between religious beliefs and prostate cancer treatment decision-making could be examined within the setting and population of interest.

3.4. PAYER CATEGORIES

The original payer categories provided by SCHS, shown in Table 8, were condensed for the purpose of this study. Many of the categories were merged into larger, broader categories that were determined to be more relevant to the original aims set forth.

PAYER	FREQUENCY	PERCENT
INSURANCE STATUS UNKNOWN	1	0.5%
INSURANCE, NOT OTHERWISE SPECIFIED (NOS)	9	4.1%
MANAGED CARE PROVIDER, HEALTH MAINTENANCE ORGANIZATION, PREFERRED PROVIDER ORGANIZATION	52	23.4%
MEDICAID ADMINISTERED, THROUGH A MANAGED CARE PLAN	8	3.6%
MEDICARE WITH MEDICAID ELIGIBILITY	2	0.9%
MEDICARE WITH PRIVATE SUPPLEMENT	6	2.7%
MEDICARE WITH SUPPLEMENT	80	36.0%
MEDICARE WITHOUT SUPPLEMENT, MEDICARE, NOS	11	5.0%
MEDICARE ADMINISTERED THROUGH A MANAGED CARE PLAN	37	16.7%
MILITARY	1	0.5%
NOT INSURED	1	0.5%
NOT INSURED, SELF-PAY	2	0.9%
PRIVATE INSURANCE: FEE FOR SERVICE	6	2.7%
TRICARE	2	0.9%
VETERANS AFFAIRS	4	1.8%
TOTAL	222	100.0%

Table 8. Initial payer at diagnosis categories with frequencies.

The Medicare with Supplement group contains the original groups titled ‘Medicare with Private Supplement’ and ‘Medicare with Supplement.’ The Medicare without Supplement group contains the original groups titled ‘Medicare Administered through a Managed Care Plan,’ ‘Medicare with Medicaid Eligibility,’ and ‘Medicare without Supplement, Medicare, Not Otherwise Specified.’ The Commercial group contains the original groups titled ‘Commercial Managed Care Plan’ and ‘Commercial Indemnity.’ The Other Government group contains the original groups titled ‘Medicaid,’ ‘Military,’ ‘Tricare,’ and ‘Veterans Affairs.’ The final payer categories are depicted in Table 9.

PAYER CATEGORY	PAYER DESCRIPTION	FREQUENCY	PERCENT
1	Medicare with Supplement	86	41.1%
2	Medicare without Supplement	50	23.9%
3	Commercial	58	27.7%
4	Other Government	15	7.2%
TOTAL		209	100.0%

Table 9. Revised payer at diagnosis categories with frequencies.

4. Results

4.1. AGE VS. TREATMENT

Age was examined as a predictor of treatment decision. The relationship was examined for each type of treatment: biopsy, surgery, radiation, and hormone. When compared against type of treatment (Table 10), age was found to be statistically significantly associated with all types of treatment.

TREATMENT		MEAN AGE (YEARS)	STANDARD DEVIATION (YEARS)	
BIOPSY	Yes	66.42	7.30	$p=0.002$
	No	70.65	7.41	
SURGERY	Yes	65.64	7.08	$p<0.001$
	No	70.94	7.15	
HORMONE	Yes	70.55	7.66	$p=0.002$
	No	66.41	7.25	
RADIATION	Yes	71.06	6.51	$p<0.001$
	No	65.95	7.32	

Table 10. Mean age by treatment type with age as a predictor of treatment.

4.2. STAGE VS. TREATMENT

Stage (I-IV) was examined as a predictor of treatment decision. The relationship was examined for each type of treatment: biopsy, surgery, radiation, and hormone. When compared against any type of treatment (Tables 11-14), stage was found to be significantly associated with receiving biopsy and hormone treatment.

	BIOPSY	NO BIOPSY	TOTAL
STAGE I	24	11	35
	68.6%	31.4%	100.0%
STAGE II	130	20	150
	86.7%	13.3%	100.0%
STAGE III	21	2	23
	91.3%	8.7%	100.0%
STAGE IV	9	4	13
	69.2%	30.8%	100.0%
TOTAL	184	37	221
	83.3%	16.7%	100.0%

Table 11. Stage as a predictor of biopsy. $\chi^2=9.570$; $p=0.023$.

	SURGERY	NO SURGERY	TOTAL
STAGE I	24	11	35
	68.6%	31.4%	100.0%
STAGE II	107	43	150
	71.3%	28.7%	100.0%
STAGE III	21	2	23
	91.3%	8.7%	100.0%
STAGE IV	7	6	13
	53.8%	46.2%	100.0%
TOTAL	159	62	221
	71.9%	28.1%	100.0%

Table 12. Stage as a predictor of surgery. $\chi^2=6.606$; $p=0.086$.

	HORMONE	NO HORMONE	TOTAL
STAGE I	1 2.9%	34 97.1%	35 100.0%
STAGE II	23 15.3%	127 84.7%	150 100.0%
STAGE III	5 21.7%	18 78.3%	23 100.0%
STAGE IV	9 69.2%	4 30.8%	13 100.0%
TOTAL	38 17.2%	183 82.8%	221 100.0%

Table 13. Stage as a predictor of hormone treatment. $\chi^2=30.475$; $p<0.001$.

	RADIATION	NO RADIATION	TOTAL
STAGE I	8 22.9%	27 77.1%	35 100.0%
STAGE II	40 26.8%	109 73.2%	150 100.0%
STAGE III	4 17.4%	19 82.6%	23 100.0%
STAGE IV	1 7.7%	12 92.3%	13 100.0%
TOTAL	53 24.1%	167 75.9%	221 100.0%

Table 14. Stage as a predictor of radiation. $\chi^2=3.124$; $p=0.373$.

4.3. MARITAL STATUS VS. TREATMENT

Marital status (unmarried or married) was first examined as a predictor of treatment decision. The relationship was examined for each type of treatment: biopsy, surgery, radiation, and hormone. When compared against any type of treatment (Tables 15-18), marital status was not found to be significantly associated with receiving or not receiving treatment.

MARITAL STATUS	BIOPSY	NO BIOPSY	TOTAL
UNMARRIED	6 17.1%	34 19.4%	40 19.0%
MARRIED	29 82.9%	141 80.6%	170 81.0%
TOTAL	35 100.0%	175 100.0%	210 100.0%

Table 15. Marital status as a predictor of biopsy. $\chi^2=0.753$; $p=0.482$.

MARITAL STATUS	SURGERY	NO SURGERY	TOTAL
UNMARRIED	11 18.6%	29 19.2%	40 19.0%
MARRIED	48 81.4%	122 80.8%	170 81.0%
TOTAL	59 100.0%	151 100.0%	210 100.0%

Table 16. Marital status as a predictor of surgery. $\chi^2=0.926$; $p=0.548$.

MARITAL STATUS	HORMONE	NO HORMONE	TOTAL
UNMARRIED	35 20.2%	5 13.5%	40 19.0%
MARRIED	138 79.8%	32 86.5%	170 81.0%
TOTAL	173 100.0%	37 100.0%	210 100.0%

Table 17. Marital status as a predictor of hormone treatment. $\chi^2=0.345$; $p=0.243$.

MARITAL STATUS	RADIATION	NO RADIATION	TOTAL
UNMARRIED	32 20.4%	8 15.4%	40 19.1%
MARRIED	125 79.6%	44 84.6%	169 80.9%
TOTAL	157 100.0%	52 100.0%	209 100.0%

Table 18. Marital status as a predictor of radiation. $\chi^2=0.427$; $p=0.282$.

4.4. PAYER VS. TREATMENT

When payer, age, and family history were adjusted for, those in Stage II of prostate cancer had greater odds of undergoing a biopsy than those in Stage I (AOR=3.76, 95% CI=1.43-9.84). Both prior to and after adjusting for payer, stage, and family history, increasing age was associated with decreasing odds of biopsy (OR=0.92, 95% CI=0.87-0.97; AOR=0.94, 95% CI=0.86-1.00).

BIOPSY	UNADJUSTED			ADJUSTED		
	O.R.	Lower 95% C.I.	Upper 95% C.I.	O.R.	Lower 95% C.I.	Upper 95% C.I.
PAYER CATEGORY 1	1.00			1.00		
PAYER CATEGORY 2	0.65	0.28	1.50	0.69	0.28	1.71
PAYER CATEGORY 3	3.03	0.96	9.59	1.84	0.48	7.03
PAYER CATEGORY 4	1.49	0.31	7.25	0.89	0.16	4.87
STAGE I	1.00			1.00		
STAGE II	0.97	0.25	3.84	3.76	1.43	9.84
STAGE III	2.89	0.81	10.27	3.67	0.66	20.29
STAGE IV	2.25	0.72	30.23	2.33	0.43	12.52
AGE	0.92	0.87	0.97	0.93	0.86	1.00
NO FAMILY HISTORY	1.00			1.00		
FAMILY HISTORY	0.69	0.64	3.24	1.35	0.56	3.27
FAMILY HISTORY UNKNOWN	4.69	0.27	1.83	0.56	0.20	1.62

Table 19. Payer, stage, age, and family history as predictors of biopsy.

Prior to adjustment, it appeared that patients insured by a commercial provider had greater odds of receiving surgery as a form of treatment for prostate cancer when compared to patients whose primary payer was Medicare with a supplement (OR=3.45, 95% CI=1.45-8.22). Both prior to and after adjusting for payer, stage, and family history, it was found that increasing age was associated with decreasing odds of surgery (OR=0.90, 95% CI=0.86-0.94; AOR=0.88, 95% CI=0.82-0.94). Patients who reported a family history of prostate cancer had substantially lower odds of receiving surgery as treatment than patients that did not report family history both with and without adjusting for possible confounding variables (OR=0.29, 95% CI=0.15-0.57; AOR=0.23, 95% CI=0.11-0.50).

SURGERY	UNADJUSTED			ADJUSTED		
	O.R.	Lower 95% C.I.	Upper 95% C.I.	O.R.	Lower 95% C.I.	Upper 95% C.I.
PAYER CATEGORY 1	1.00			1.00		
PAYER CATEGORY 2	1.45	0.68	3.09	1.58	0.64	3.88
PAYER CATEGORY 3	3.45	1.45	8.22	1.09	0.36	3.32
PAYER CATEGORY 4	0.85	0.28	2.60	0.48	0.11	2.10
STAGE I	1.00			1.00		
STAGE II	1.14	0.51	2.53	1.64	0.64	4.24
STAGE III	4.81	0.96	24.23	5.79	1.00	33.55
STAGE IV	0.54	0.15	1.97	1.06	0.22	5.24
AGE	0.90	0.86	0.94	0.88	0.82	0.94
NO FAMILY HISTORY	1.00			1.00		
FAMILY HISTORY	0.29	0.15	0.57	0.23	0.11	0.50
FAMILY HISTORY UNKNOWN	1.95	0.61	6.24	2.29	0.56	9.41

Table 20. Payer, stage, age, and family history as predictors of surgery.

Patients using commercial insurance as primary payer for treatment were less likely to undergo hormonal treatment when compared to patients using Medicare with supplement, before adjusting for stage, age, and family history (OR=0.27, 95% CI=0.09-0.83). Both prior to and after adjusting for payer, age, and family history, patients with Stage IV prostate cancer had significantly greater odds of receiving hormonal treatment than those in Stage I (OR=76.50, 95% CI=7.58-771.62; AOR=143.19, 95% CI=10.78-1905.17). Furthermore, patients with a family history of prostate cancer were also more likely to receive hormones as a form of treatment than those without a family history, both with and without adjusting for possible confounding variables (OR=4.91, 95% CI=2.01-11.97; AOR=7.13, 95% CI=2.33-21.83).

HORMONE	UNADJUSTED			ADJUSTED		
	O.R.	Lower 95% C.I.	Upper 95% C.I.	O.R.	Lower 95% C.I.	Upper 95% C.I.
PAYER CATEGORY 1	1.00			1.00		
PAYER CATEGORY 2	0.57	0.22	1.48	0.36	0.11	1.15
PAYER CATEGORY 3	0.27	0.09	0.83	0.30	0.06	1.45
PAYER CATEGORY 4	3.09	0.99	9.60	3.54	0.83	15.00
STAGE I	1.00			1.00		
STAGE II	6.16	0.80	47.24	6.48	0.78	53.92
STAGE III	9.44	1.02	87.11	9.73	0.93	101.64
STAGE IV	76.50	7.58	771.62	143.19	10.76	1905.17
AGE	1.08	1.03	1.14	1.06	0.98	1.15
NO FAMILY HISTORY	1.00			1.00		
FAMILY HISTORY	4.91	2.01	11.97	7.13	2.33	21.83
FAMILY HISTORY UNKNOWN	1.41	0.39	5.14	2.04	0.42	9.97

Table 21. Payer, stage, age, and family history as predictors of hormone treatment.

Patients using commercial insurance as primary payer for treatment were less likely to undergo radiation when compared to patients using Medicare with supplement, prior to adjusting for stage, age, and family history (OR=0.21, 95% CI=0.08-0.59).

Patients in the Other Government primary payer group, including Medicaid, Military, Tricare, and Veterans Affairs, were more likely to receive radiation than patients utilizing Medicare with supplement, after adjustment (AOR=6.16, 95% CI=1.37-27.78). Both prior to and after adjusting for possible confounding variables, it was found that increasing age was associated with increasing odds of radiation (OR=1.11, 95% CI=1.06-1.17; AOR=1.18, 95% CI=1.08-1.27). As shown in other treatment options, men with a family history of prostate cancer were more likely to undergo radiation as a form of treatment than those without a family history, both with and without adjusting for possible confounding variables (OR=3.54, 95% CI=1.74-7.17; AOR=3.83, 95% CI=1.71-8.59).

RADIATION	UNADJUSTED			ADJUSTED		
	O.R.	Lower 95% C.I.	Upper 95% C.I.	O.R.	Lower 95% C.I.	Upper 95% C.I.
PAYER CATEGORY 1	1.00			1.00		
PAYER CATEGORY 2	0.69	0.31	1.53	0.73	0.29	1.88
PAYER CATEGORY 3	0.21	0.08	0.59	0.85	0.25	2.90
PAYER CATEGORY 4	1.91	0.63	5.81	6.16	1.37	27.78
STAGE I	1.00			1.00		
STAGE II	1.24	0.52	2.95	0.93	0.33	2.61
STAGE III	0.71	0.19	2.70	0.76	0.16	3.51
STAGE IV	0.28	0.03	2.51	0.03	0.00	0.54
AGE	1.11	1.06	1.17	1.18	1.08	1.27
NO FAMILY HISTORY	1.00			1.00		
FAMILY HISTORY	3.54	1.74	7.17	3.83	1.71	8.59
FAMILY HISTORY UNKNOWN	0.47	0.13	1.75	0.37	0.07	1.95

Table 22. Payer, stage, age, and family history as predictors of radiation.

5. Comparison to Hospital de Clínicas “José de San Martín”

5.1. SETTING

HCJSM is located in Buenos Aires, Argentina and serves as a teaching hospital affiliated with the Universidad de Buenos Aires. Each year HCJSM provides services to the city’s 2.9 million inhabitants, in addition to the entire Buenos Aires province that exceeds fifteen million people.⁸ Throughout my time volunteering at HCJSM during August 2014, it was not unusual to converse with patients who had travelled from over four hours outside of the city in order to attend their appointment. The hospital is highly regarded nationally for its training of superb healthcare practitioners.

5.2. PREVALENCE OF PROSTATE CANCER

According to the Pan American Health Organization, the greatest mortality rates due to cancer among Latin and Central American countries are observed in Argentina, Barbados, Chile, Peru and Uruguay.⁹ In Argentina specifically, prostate cancer is the

second most prevalent type of cancer, behind lung cancer in men, with 44 cases per 100,000 men and causing nearly 4,000 deaths in 2010.^{10,11} Since the introduction of prostate cancer screening via the PSA (Prostate Specific Antigen) test in the late 1980s, detection has increased by 70% and mortality has decreased by nearly 40%, as of 2008. Rate of metastases at diagnosis has also been observed to have decreased by 75%.¹² Although prostate-specific antigen testing has become more-routine in urban areas, as I witnessed while volunteering in the Urology department of HCJSM, it is not widely available in other provinces and is not included in public health prevention programs.¹³

5.3. PROSTATE CANCER TREATMENT

The Sociedad Argentina de Urología currently recommends localized radiation treatment or surgery as treatment for patients in early stages of prostate cancer. As in the United States, these treatments are performed with approximate equivalent effectiveness. For men in advanced stages of prostate cancer, such as those with localized progression, hormone therapy is preferred and suggested by physicians in specialized centers. The use of chemotherapy is entirely reserved for special cases, such as Hormone-Refractory Prostate Cancer.¹⁰ Patients at low risk are frequently given the choice between active monitoring with regular biopsies, radical prostatectomy, or radiation therapy, while patients at a high risk for metastases are recommended either of the latter options.¹² Throughout the time I spent at HCJSM, I only viewed radical prostatectomies, and when I asked the residents I was working with about the popularity of other procedures, they all agreed that surgery was the most common.

5.4. *DEMOGRAPHICS*

5.4.1. Age

As of 2013, the nationally reported sex ratio of inhabitants of the Buenos Aires province shows a negative relationship with age, which indicates that women have a higher life expectancy than men.¹⁴ Compared to Crook, Deschutes, and Jefferson Counties in Central Oregon, the Buenos Aires population pyramid is much more concentrated near the bottom, with the 15-19 age group being the largest for both men and women.¹⁴ Central Oregon hosts a population of much older individuals, with population pyramids most concentrated near the 45-49 age group.¹⁵ The lifetime cumulative risk of prostate cancer is one in six, but with increasing age comes increasing risk.¹⁶ Unfortunately, as the risk of prostate cancer rises with age, so does the risk of complications related to treatment interventions. In several cases that I observed at HCJSM, the patient's age restricted the treatment options they were given.

5.4.2. Marital Status

According to 2010 census data, 61.9% of the population is unmarried or without a partner and 38.1% is married or with a partner). When broken into age groups by five-year increments, the highest incidence of marriage lies within the 60-64 age group, while the highest incidence of separation or divorce corresponds to the 50-54 age group.¹⁴ When compared to the cases from the SCHS data set, the percentage of married males within the Buenos Aires province population is roughly equal. In my own experiences, nearly all of the men being seen for prostate cancer diagnosis or treatment were accompanied by their wives in the examination room. Although I cannot assume that

marriage encouraged the patients to receive treatment, it was evident that support from one's spouse plays a large role in the prostate cancer treatment process.

5.4.3. Religion

Considering its Spanish history, Argentina is a predominantly Catholic nation. Low-income individuals and individuals with low levels of education within the Buenos Aires metropolitan area, in comparison to individuals with a college education and middle- to high-income, are much more likely to turn to unconventional cancer treatment than traditional treatment options, according to Idoyaga Molina.¹⁷ However, 90% of patients within the study consulted unconventional treatment options at least once. The same study found that among Argentine Catholics, 75% prefer their own religious offering and 25% other religious practices, and do not reject traditional medicines because of religious factors.¹⁷ Depending upon a patient's religious affiliation, they may be more or less inclined to seek treatment at a facility such as HCJSM. In my experience, I found that self-proclaimed religious men were more inclined to receive and continue receiving prostate cancer treatment, regardless of their age or stage, than self-proclaimed non-religious men.

5.5. *HEALTHCARE SYSTEM*

Argentina's healthcare system consists of three main sub-systems: public health insurance, social health insurance, and private health insurance. In previous years, the system was fragmented, but there is a current movement toward further integration between each sub-system.¹⁸

5.5.1. Public Health Insurance (PHI)

PHI is funded by national taxes, but managed on the provincial or municipal level.¹⁸ Although perceived as having a poorer quality of care overall, persons within the social health or private sectors often utilize public hospitals. In my experiences, private hospitals were seen as preferred for emergency or routine care; however, more complex and/or expensive treatments, such as cancer treatment, were more frequently sought out in public institutions. In the case of HCJSM, the size of the facility and access to physicians of superior training brought people from all sectors.

5.5.2. Social Health Insurance (*Obras Sociales*)

Social health insurance, or *Obras Sociales*, is funded by employees and employers and administered by trade unions. Historically, a person was only allowed use of the fund specific to their profession, even if a separate fund provided better coverage within their region. Currently, the individual has the liberty to choose which fund to be affiliated with. Due to their smaller size, most *Obras Sociales* contract out or purchase health services from the private sector.¹⁸

Also included within the *Obras Sociales* is the *Programa de Atención Médico Integral (PAMI)*, which functions as a separate health insurance fund specifically for retired people. *PAMI* is funded by wage levies and pension benefits, making it the most comparable to Medicare within the United States. Unlike other *Obras Sociales*, *PAMI* contracts out to both the public and private sectors.¹⁸

5.5.3. Private Health Insurance

Currently, around 10% of the national population holds private insurance. Most white-collar workers are directly enrolled in private health insurance coverage through

their social health insurers, although many choose to use *Obras Sociales*. However, more well-off individuals are significantly more likely to use the private sector, followed by *Obras Sociales*.¹⁸ Due to the burden placed upon many public healthcare facilities by the sheer number of users, families that can afford private health insurance choose to do so for the shorter wait times and superior emergency care.

6. Discussion and Conclusion

6.1. DISCUSSION

Because of the variety of treatment options with approximately equivalent efficacy available to prostate cancer patients, there is substantial opportunity for patient decision-making. Several studies have confirmed that nearly 80% of individuals either select their treatment themselves or collaborate with their physician, while the remaining individuals report not having been involved in treatment decision-making.¹⁹ However, the process of selecting a treatment plan is not easy for patients due to the influence of several factors, such as age, stage, payer at diagnosis, marital status, religion, and race/ethnicity.

Due to a lack of data, this study was unable to assess the relationship between religion and treatment decision-making at SCHS. This data deficiency provides a possibility for future research, including both obtaining religious affiliation data and analyzing its potential relationship with prostate cancer decision-making. However, other studies and personal observations at HCJSM confirmed that religion does play a role in the type of medical treatment patients seek out for prostate cancer.¹⁷ Men that were self-identified as religious were more likely than their non-religious counterparts to seek and continue prostate cancer treatment.

Marital status was not found to be significantly associated prostate cancer treatment for patients at SCHS. Observations at HCJSM indicated that spousal support played an important role throughout the prostate cancer treatment process. As with other variables, further research should be conducted at HCJSM in order to confirm observations between marital status and patient treatment decision-making.

Payer at diagnosis was determined to be significant in one of the four treatment groups at SCHS. Those within the Other Government payer group, including those utilizing Medicaid, Military, Tricare, and Veterans Affairs as the primary payer at diagnosis, were more likely to receive radiation treatment than patients utilizing Medicare with supplement, after adjusting for age, stage, and family history. This could be explained by a difference in coverage between the two payer categories, with the Other Government group being more affordable for the patient. Although much is known about the healthcare system in Argentina and the preferred treatment centers by patients based upon their insurance type, further research is needed to evaluate whether or not differences in insurance are related to prostate cancer treatment.

Age at diagnosis was a significant predictor of receiving treatment in three of the four SCHS treatment groups: biopsy, surgery, and radiation. As expected, increasing age was associated with decreasing odds of both biopsy and surgery, possibly due to the rising risk of potential complications. Conversely, increasing age was associated with increasing odds of radiation treatment, perhaps serving as an alternative for those that are unable to undergo surgery. Similarly to the results of the analysis of SCHS, observations at HCJSM reflected older patients received surgical treatment for prostate cancer less frequently than other treatment options.

Consistent with the standard treatment guidelines in both the United States and Argentina, patients in advanced stages of prostate cancer were more likely to receive hormonal treatment and less likely to receive radiation treatment. In addition, those in Stage II of prostate cancer were more likely than those in Stage I to undergo a biopsy. This could be explained by the manifestation of signs and symptoms in later stages, urging a patient to contact their physician. Further research should be conducted with prostate cancer patients at HCJSM in order to examine the relationship between stage and patient treatment decision-making.

6.2. CONCLUSION

Ultimately, the aims set forth at the beginning of this study were fulfilled. It was possible to describe the population of interest based upon the variables of interest: marital status, race/ethnicity, religion, payer at diagnosis, stage, and age at diagnosis. Payer at diagnosis and age at diagnosis were found to be associated with receiving radiation treatment, while stage and age at diagnosis were associated with not receiving biopsy or surgery treatment. Finally, in comparing SCHS with HCJSM similarities were seen in age at diagnosis, while differences in receiving treatment were apparent in regards to marital status. Acknowledging the limitations of this study, subsequent investigations should look at further examining the influences of religion and marital status on patient treatment decision-making at SCHS and the influences of payer at diagnosis and stage on patient treatment decision-making at HCJSM. With additional research surrounding the factors influencing decision-making, physicians can provide more effective and individualized care to prostate cancer patients.

References

1. International Agency of Research on Cancer. GLOBOCAN 2012: Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012. 2015.
http://globocan.iarc.fr/Pages/fact_sheets_cancer.aspx. Accessed July 26, 2015.
2. Davison BJ, Breckon E. Factors influencing treatment decision making and information preferences of prostate cancer patients on active surveillance. *Patient Educ Couns*. 2012;87(3):369-374. doi:10.1016/j.pec.2011.11.009.
3. Community Benefit Department. Community Health Needs Assessment: St. Charles Bend. 2013.
<http://www.stcharleshealthcare.org/~media/Files/CHNA/CHNA%20St%20Charles%20Bend.pdf>. Accessed February 20, 2016.
4. Central Oregon Health Council. 2012 *Central Oregon Regional Health Assessment*. Central Oregon; 2012.
http://cohealthcouncil.org/apps/uploads/2015/09/Pacific_Source_Community_Solutions_Coordinated_Care_Organization_Central_Oregon_Region_-_CHA1-1.pdf. Accessed April 9, 2016.
5. United States Census Bureau. Deschutes County, Oregon. U.S. Census Bureau QuickFacts. [//www.census.gov/quickfacts/](http://www.census.gov/quickfacts/). Accessed April 9, 2016.
6. United States Census Bureau. Crook County, Oregon. U.S. Census Bureau QuickFacts. [//www.census.gov/quickfacts/table/PST045215/41017,00](http://www.census.gov/quickfacts/table/PST045215/41017,00). Accessed April 9, 2016.
7. United States Census Bureau. Jefferson County, Oregon. U.S. Census Bureau QuickFacts. [//www.census.gov/quickfacts/table/PST045215/41017,00](http://www.census.gov/quickfacts/table/PST045215/41017,00). Accessed April 9, 2016.
8. El Instituto Nacional de Estadística y Censos de la República Argentina. República Argentina por provincia. Densidad de población. Año 2010. Mapas temáticos Censo 2010 (GEOCENSO). <http://www.sig.indec.gov.ar/censo2010/>. Published November 8, 2012. Accessed April 10, 2016.
9. Fact Sheet: Cancer in Latin America and the Caribbean.
http://www.cuidadospaliativos.org/archives/Cancer_in_Latin_America_and_the_Caribbean. Accessed April 8, 2016.
10. Cáncer de Próstata. Instituto Nacional del Cáncer.
<http://www.msal.gob.ar/inc/index.php/acerca-del-cancer/canceres-mas-frecuentes/cancer-de-prostata->. Accessed April 8, 2016.
11. Estadísticas: Análisis de la situación del cáncer en Argentina. Instituto Nacional del Cáncer. <http://www.msal.gob.ar/inc/index.php/acerca-del-cancer/estadisticas>. Accessed April 8, 2016.

12. Consenso Nacional Inter-Sociedades para el Diagnóstico y Tratamiento del Cáncer de Próstata. 2014. http://www.sau-net.org/publicaciones/lineamientos-diagnostico-tratamiento/consenso_ca_prostata_2014.pdf. Accessed April 8, 2016.
13. Niclis C, Pou SA, Bengió RH, Osella AR, Díaz M del P. Prostate cancer mortality trends in Argentina 1986-2006: an age-period-cohort and joinpoint analysis. *Cad Saúde Pública*. 2011;27(1):123-130. doi:10.1590/S0102-311X2011000100013.
14. Cámara Argentina de Comercio. Panorama demográfico de la Provincia de Buenos Aires: Serie Disparidades Regionales. May 2013. <http://www.ucaece.edu.ar/wp-content/uploads/Serie-Disparidades-Poblaci%C3%B3nBA-Mayo2013-Final.pdf>. Accessed April 10, 2016.
15. Oregon Age Distribution. CensusScope. http://www.censusscope.org/us/s41/chart_age.html. Accessed April 10, 2016.
16. Ko Y-J, Bubley GJ. Prostate Cancer in the Older Man. *Oncology*. 2001;15:1113-1131.
17. Idoyaga Molina N, Luxardo N. Medicinas no convencionales en cáncer. *Med B Aires*. 2005;65(5):390-394.
18. Cavagnero E, Carrin G, Xu K, Mylena Aguilar-Rivera A. Health Financing in Argentina: An Empirical Study of Health Care Expenditure and Utilization. 2006. http://www.who.int/health_financing/countries/argentina_cavagnero.pdf. Accessed April 8, 2016.
19. Fischer M, Visser A, Voerman B, Garssen B, van Andel G, Bensing J. Treatment decision making in prostate cancer: Patients' participation in complex decisions. *Patient Educ Couns*. 2006;63(3):308-313. doi:10.1016/j.pec.2006.07.009.