

# Economic Analysis of the PRONTO Study

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## INTRODUCTION

- Prostate cancer (PCa) is the most common form of cancer among Canadian men, with estimates that 1 in 8 men will develop PCa during their lifetime, and 1 in 29 will succumb to the disease. In 2022, the Canadian Cancer Society reported that approximately 24,600 men will be diagnosed with PCa, and 4,600 men will die of it (1).
- The Personalized Risk Stratification for patients with Early Prostate Cancer (PRONTO) study is a well-annotated and curated PCa bank of samples collected as part of a pan-Canadian initiative. The objective of the PRONTO study was to develop and validate diagnostic tests of risk stratification for patients with early PCa to inform treatments, such as active surveillance (AS) versus more invasive treatments (2).
- Research in risk stratification also requires information on PCa-related costs, resources, and clinical outcomes to expand and optimize AS and treatment of PCa patients.

## OBJECTIVE

- The objective of our study was to determine the health resource utilization (HCRU) and costs of men with PCa from the PRONTO Study, and their two match-controlled cohorts in Canada to determine how representative the cases are in demonstrating the set outcomes.

## METHODS

- The PRONTO Study (2010-2015) included men diagnosed with stage I or II PCa, with a PSA value <20, a Gleason score between 5-7, and received no treatment for PCa within 1-year after diagnosis (“cases”).
- Men who were not enrolled in the PRONTO Study, but diagnosed with PCa could be matched to the cases as “controls”. There was 1:1 matching by age ± five years, Charlson Co-morbidity score, PSA value, and year of diagnosis. There were two control groups: Men only on active surveillance (“AS Controls”), and men who received treatment within the first year of diagnosis (“Treatment Controls”).
- All cases and controls were followed from 1 year after diagnosis (index date) to five years of follow-up. Thus, HCRU and costs are reported from index date to end of follow-up.

## RESULTS

- 1,276 cases were matched to an AS Control (**Table 1**), and 696 cases were matched to a Treatment Control (**Table 2**). For the AS Matched grouping, median age was 67 years (controls) and 66 years (cases) and two thirds were stage I. For the Treatment Matched grouping, mean age was 65 years (controls) and 67 years (cases) and more than half were stage I.

**Table 1: Baseline Characteristics of AS Matched (on dxyear ± 1) Cohort**

VARIABLE	VALUE	PRONTO CASES N=1,276	AS CONTROLS N=1,276	STANDARDIZED DIFFERENCE
Age at index (years)	Mean ± SD	65.7 ± 8.1	66.3 ± 7.9	0.07
	Median (IQR)	66 (60-71)	67 (60-72)	0.07
Rurality	No (Urban)	1,122 (87.9%)	1,120 (87.8%)	0
	Yes	154 (12.1%)	156 (12.2%)	0
Income Quintile	1 (lowest)	0 (0.0%)	<=5 (0.1%)	0.04
	2	203 (15.9%)	191 (15.0%)	0.03
	3	229 (17.9%)	235 (18.4%)	0.01
	4	246 (19.3%)	230 (18.0%)	0.03
	5 (highest)	241 (18.9%)	266 (20.8%)	0.05
Charlson Co-morbidity Index	Mean ± SD	0.96 ± 1.21	0.99 ± 1.26	0.02
	Median (IQR)	0 (0-2)	0 (0-2)	0.01
Charlson Group	0	340 (26.6%)	342 (26.8%)	0
	1	52 (4.1%)	43 (3.4%)	0.04
	2	181 (14.2%)	196 (15.4%)	0.03
	3+	53 (4.2%)	51 (4.0%)	0.01
	No prior hospitalization	650 (50.9%)	644 (50.5%)	0.01
Collaborative Staging	Stage I	889 (69.7%)	841 (65.9%)	0.08
	Stage II	387 (30.3%)	435 (34.1%)	0.08

**Table 2: Baseline Characteristics of Treatment Matched (on dxyear) Cohort**

VARIABLE	VALUE	PRONTO CASES N=696	AS CONTROLS N=696	STANDARDIZED DIFFERENCE
Age at index (years)	Mean ± SD	66.3 ± 8.5	66.6 ± 8.9	0.03
	Median (IQR)	66 (60-73)	67 (60-72)	0.01
Rurality	No (Urban)	579 (83.1%)	589 (84.6%)	0.04
	Yes	117 (16.8%)	107 (15.4%)	0.04
Income Quintile	1 (lowest)	121 (17.4%)	123 (17.7%)	0.01
	2	130 (18.7%)	136 (19.5%)	0.02
	3	147 (21.1%)	137 (19.7%)	0.03
	4	135 (19.4%)	145 (20.8%)	0.04
	5 (highest)	162 (23.2%)	155 (22.3%)	0.02
Charlson Co-morbidity Index	Mean ± SD	2.02 ± 1.08	2.05 ± 1.04	0.03
	Median (IQR)	2 (2-2)	2 (2-2)	0.06
Charlson Group	0	79 (11.3%)	72 (10.3%)	0.03
	1	20 (2.9%)	16 (2.3%)	0.04
	2	452 (64.8%)	454 (65.2%)	0.01
	3+	111 (15.9%)	127 (18.2%)	0.06
	No prior hospitalization	35 (5.0%)	27 (3.9%)	0.06
Collaborative Staging	Stage I	409 (58.7%)	416 (59.8%)	0.02
	Stage II	288 (41.3%)	280 (40.2%)	0.02

## CONCLUSIONS

- The overall costs for each of the groups were similar within the first year. However, as the PRONTO treatment cases subsequently received more radiation, the 5-year costs for this group resulted in higher costs accordingly.

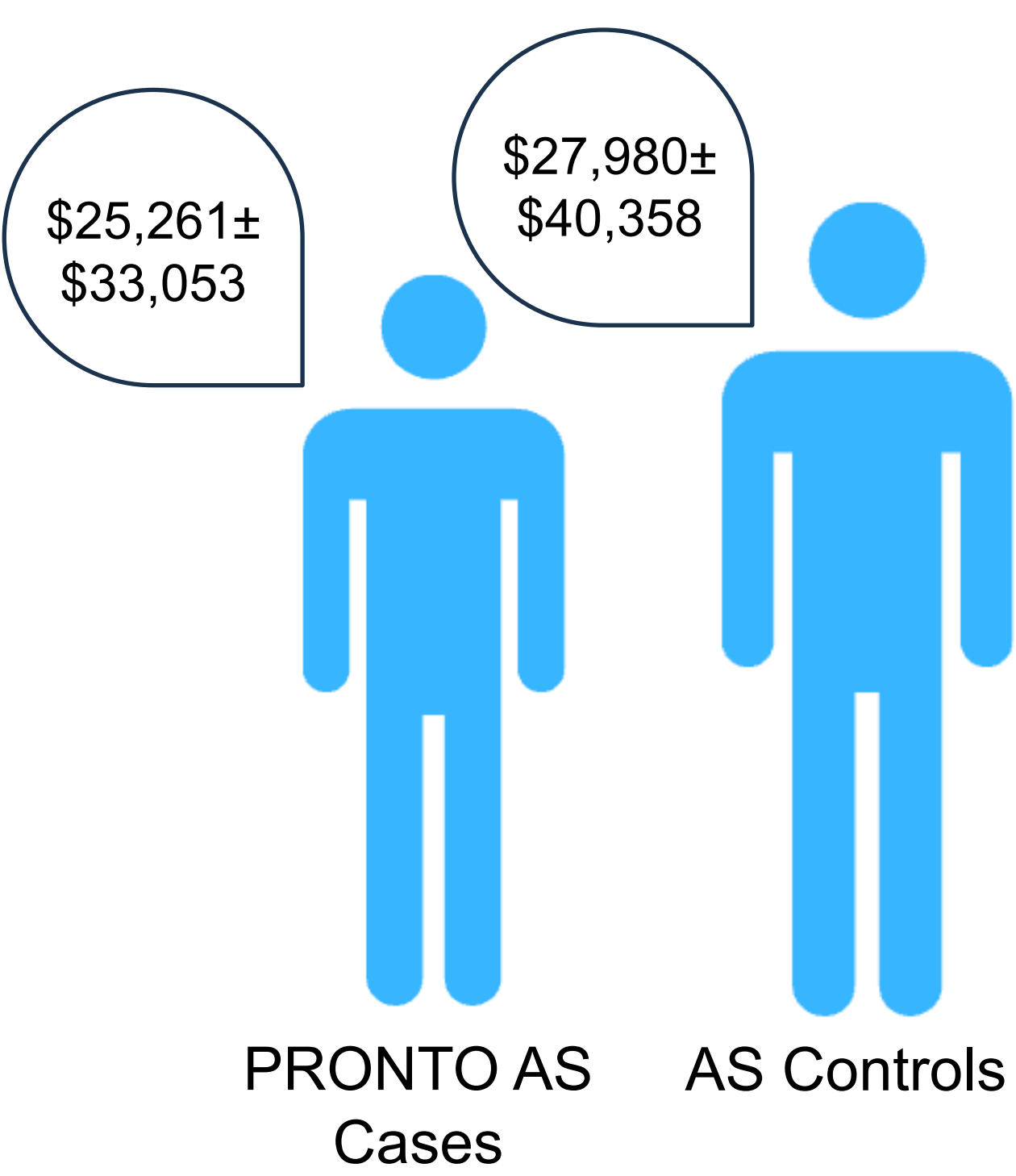
## REFERENCES

- Prostate cancer statistics. Canadian Cancer Society. Available online: <https://cancer.ca/en/cancer-information/cancer-types/prostate/statistics> (accessed on 12 September 2023).
- Berman, D. M., Lesurf, R., Lee, A. Y., et al. (2018). Personalized risk stratification for patients with early prostate cancer (PRONTO): A Canadian team biomarker project. Journal of Clinical Oncology, 36(6), 109–109.

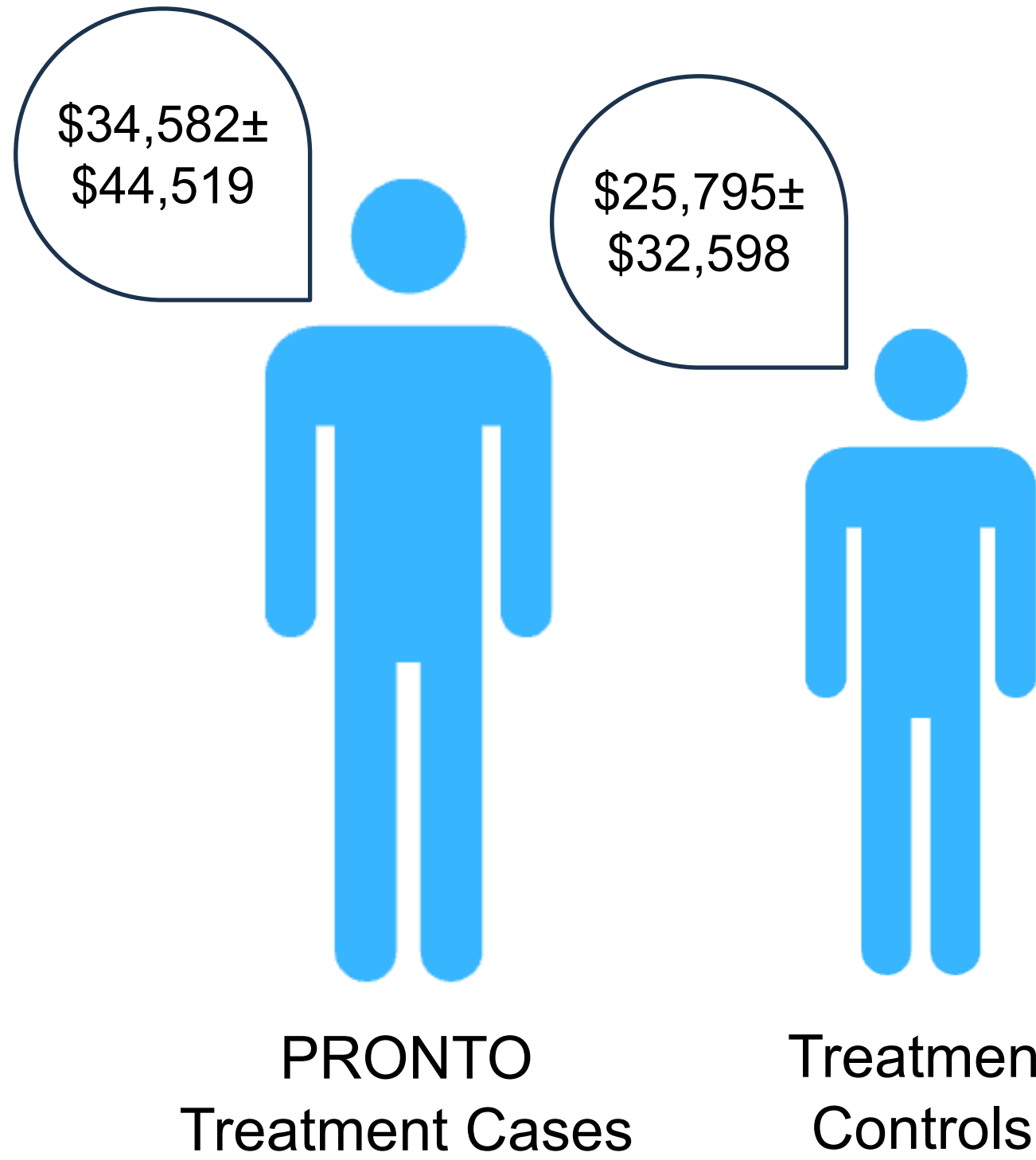
## FIGURES AND TABLES

For the matched PRONTO AS cases and controls (**Figure 1**), the total 5-year mean cost per patient was \$25,261±\$33,053 and \$27,980±\$40,358, respectively (p=0.06). For the matched PRONTO Treatment cases and controls, the total 5-year mean cost per patient was \$34,582±\$44,519 and \$25,795±\$32,598, respectively (p<0.0001).

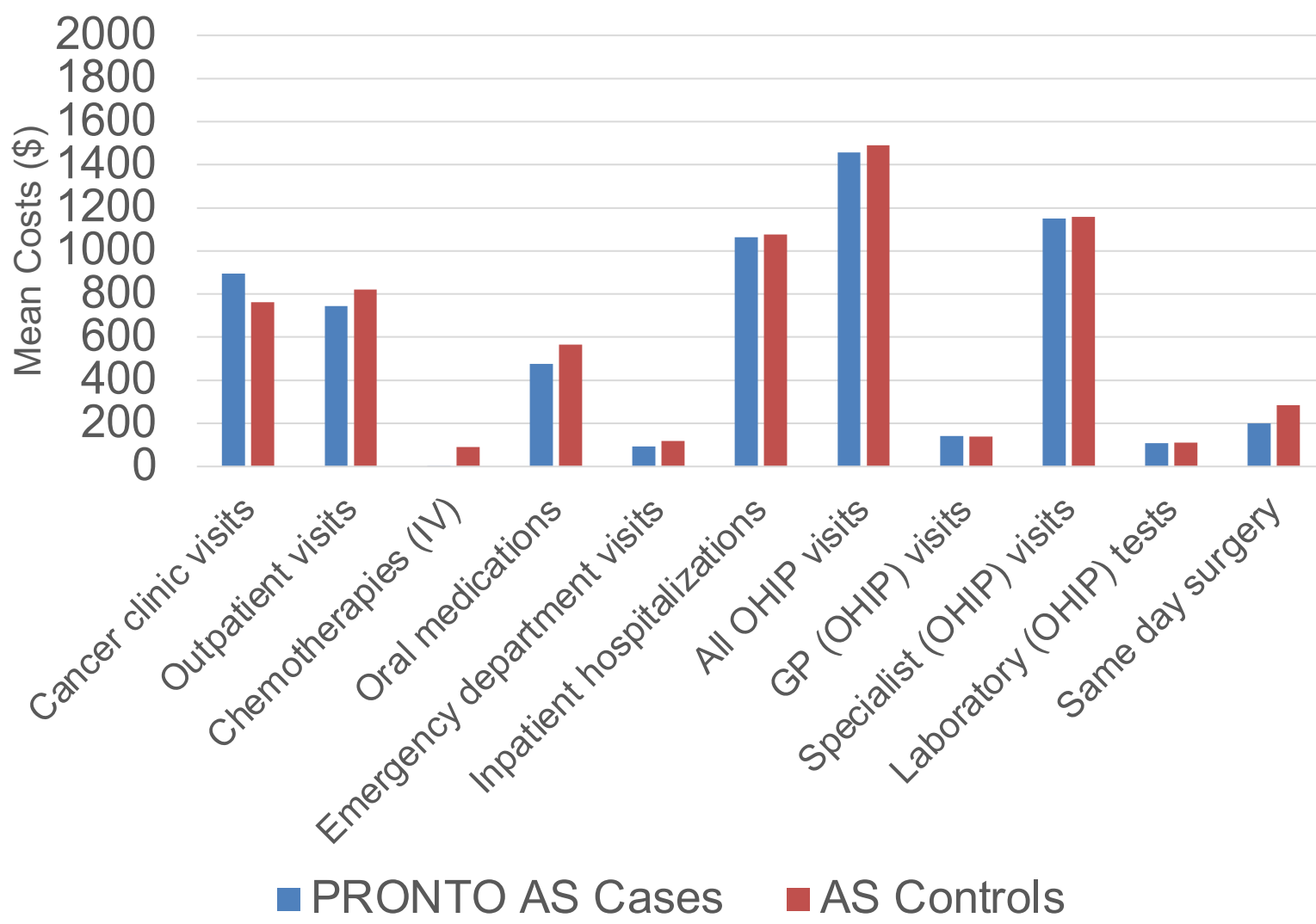
**Figure 1: Total 5-Year Mean Cost Per Patient (Matched AS Cases and Controls)**



**Figure 2: Total 5-Year Mean Cost Per Patient (Matched Treatment Cases and Controls)**

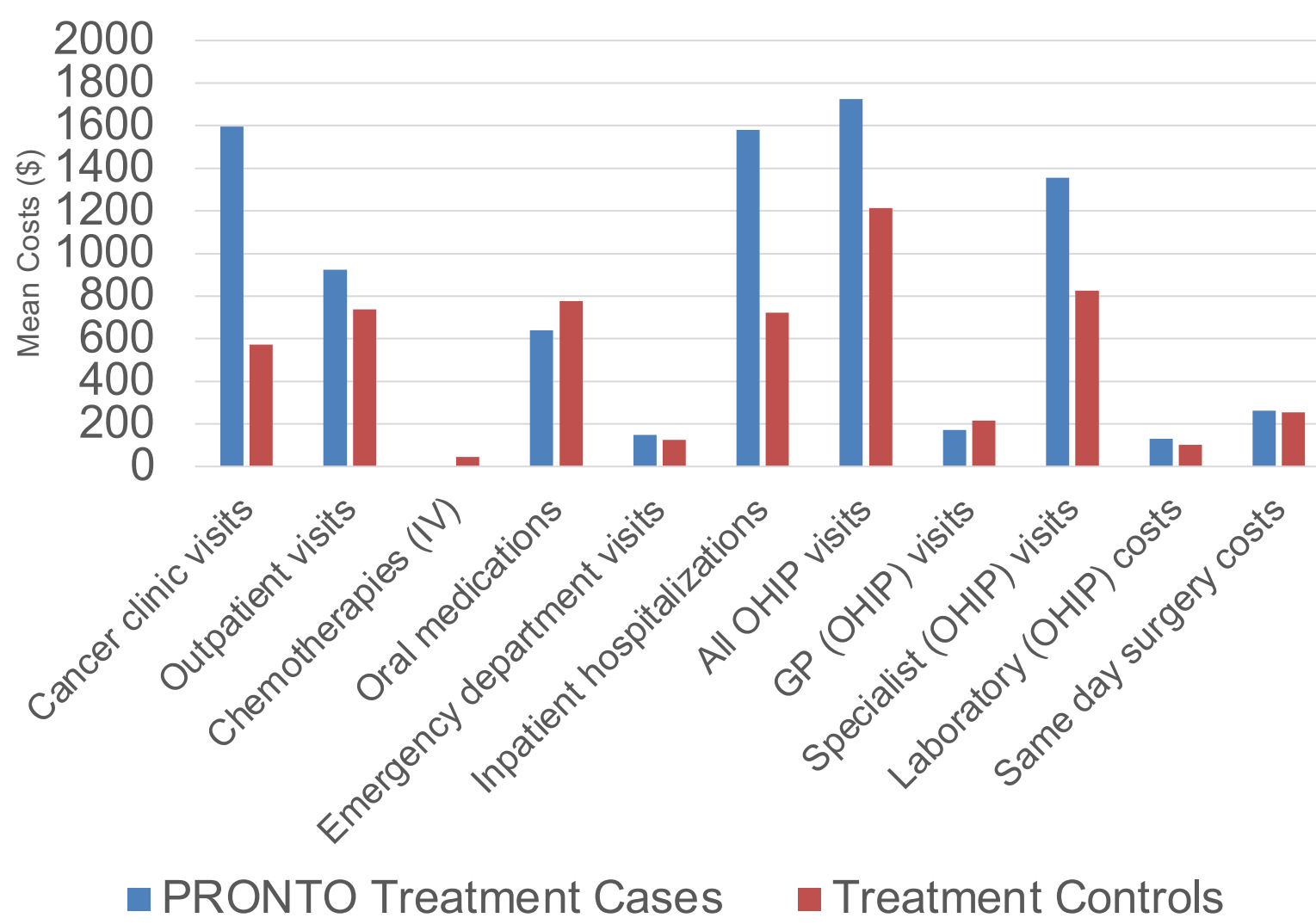


**Figure 3: Mean Costs for Matched AS Cases and Controls (Year 1)**



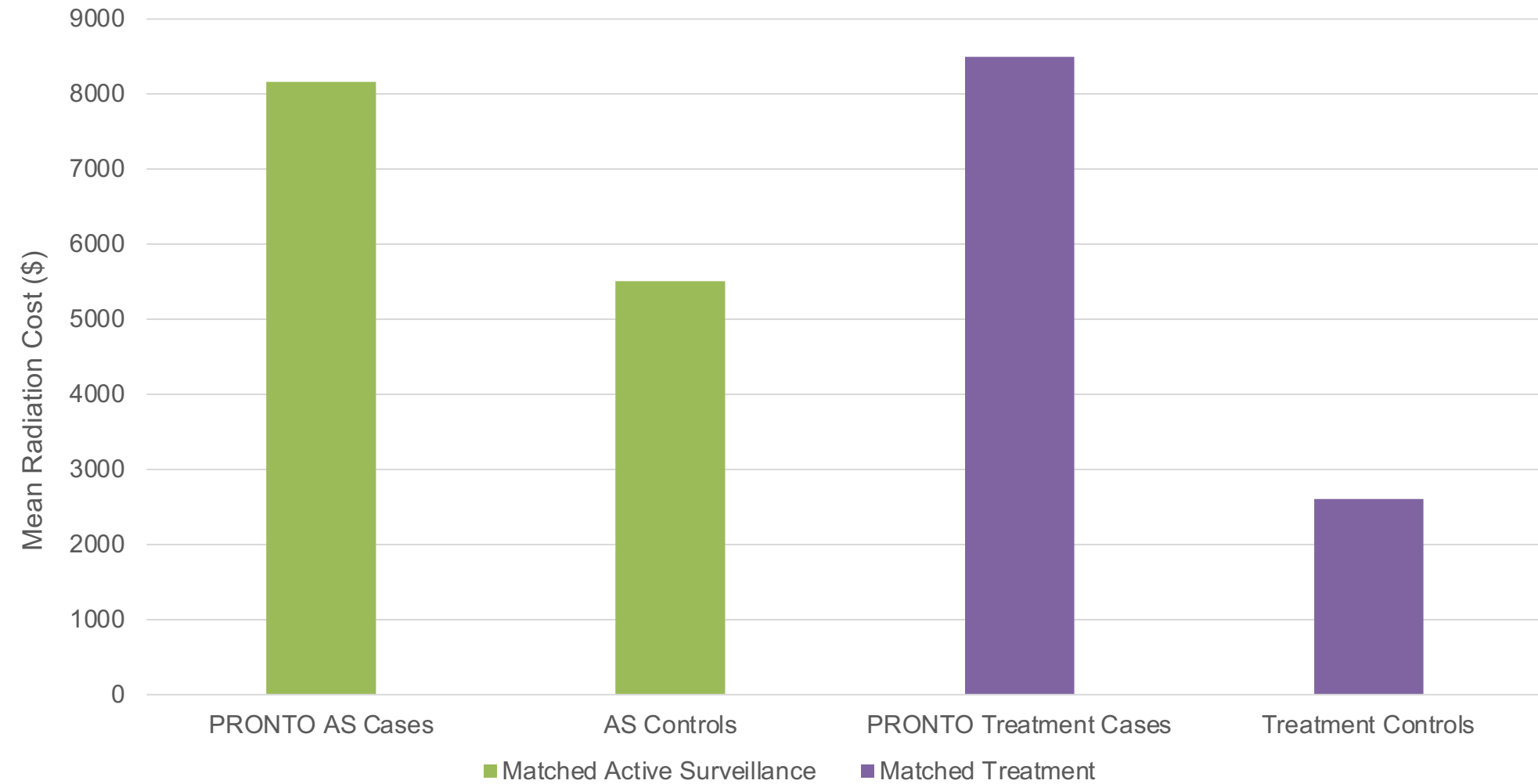
During the first year, PRONTO AS cases experienced similar costs as the AS controls, with cost drivers being OHIP visits, specialist visits, inpatient hospitalizations, and cancer clinic visits (**Figure 3**).

**Figure 4: Mean Costs for Matched Treatment Cases and Controls (Year 1)**



During the first year, PRONTO treatment cases experienced higher costs than the treatment controls, with cost drivers being OHIP visits, inpatient hospitalizations, cancer clinic visits, and specialist visits (**Figure 4**).

**Figure 5: Mean Control and Matched Case Radiation Costs (All Years)**



- In **Figure 5**, mean radiation costs were higher for the PRONTO AS cases than the AS controls for the active surveillance group. The PRONTO treatment cases also experienced significantly higher radiation costs than the treatment control group.

**Table 6: Annual Number of HCRU Encounters per patient per year**

Resource Type	PRONTO AS Cases	AS Controls	PRONTO Treatment Cases	Treatment Controls
Cancer Clinic Visits	4.9	4.7	4.6	3.7
OHIP Physician Visits	14.8	15.7	17.2	15.7
OHIP Specialist Visits	9.3	9.8	10.5	8.9

- Post-index, HCRU for the PRONTO cases and both control groups were similar, with an average annual number of 4-5 cancer clinic visits, 15-17 physician visits, and 9-11 specialist visits (**Table 6**).