

Health system costs and resources for stage-specific breast cancer: a population-based approach

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INTRODUCTION & OBJECTIVE

- Breast cancer is the most common form of cancer among women, and the second leading cause of cancer-related deaths; approximately 1 in 8 Canadian women will develop breast cancer during their lifetime and 1 in 34 will die from it (1).
- Treatment of breast cancer is determined by several factors, such as type, disease stage, and general health; common treatments include surgery, chemotherapy, and radiation therapy (1). Previous research reported in 2008 Canadian dollars (CAD) that the overall mean cost per case from a public payer perspective in the first two years after a breast cancer diagnosis was \$41,686, and the mean cost increased by stage: I=\$29,938; II=\$46,893; III=\$65,369; and IV=\$66,627. The main cost drivers were cancer clinic visits, physician billings, and hospitalizations (2).
- Another study calculated treatment-specific costs (2015 CAD) in the first year after a breast cancer diagnosis: mean per patient cost was \$8,167 and \$18,529 for chemotherapy and radiation therapy (3).
- The objective of our study was to determine current health system costs and health care resource utilization (HCRU) of women diagnosed with breast cancer in Ontario, Canada.

METHODS

- This was a retrospective, population-based study using provincial-level databases to identify women diagnosed with breast cancer in the Ontario Cancer Registry between April 1, 2015 to March 31, 2019, with a minimum of 2 years follow-up. Collaborative staging (stages 0, I, II, III and IV, unknown or missing [UNK/M]) was used.
- Total mean cost per woman (2021 Canadian dollars) was calculated using an individual person-level costing methodology (“getcost”). Treatment-specific person-level costs related to chemotherapy (“getchemo”) and radiation therapy (“getRT”) were calculated separately.
- HCRU per woman per year for each disease stage was also determined.

RESULTS

- In **Table 1**, mean age ranged from 59 – 64 years, almost 90% live in urban communities, and about half had a Charlson comorbidity group score of zero.

Table 1: Baseline characteristics of women in Ontario diagnosed with breast cancer, stratified by disease stage								
Baseline Characteristics	Variable Value	All Stages N=32,037	Stage 0 N=99	Stage I N=16,549	Stage II N=9,934	Stage III N=3,213	Stage IV N=898	UNK/M N=1,344
Age at diagnosis	Mean (SD)	60.8 (12.9)	62.9 (12.2)	62.0 (11.8)	59.8 (13.9)	58.1 (14.2)	60.2 (13.8)	60.6 (13.9)
	Median (Q1-Q3)	61 (51-70)	63 (54-73)	63 (54-70)	59 (50-70)	57 (48-68)	60 (50-70)	59 (51-70)
	Min - Max	20 - 100	35 - 92	21 - 99	20 - 99	22 - 100	23 - 95	22 - 96
Age group based on screening analysis	18 to 48 years - n (%)	5,688 (17.8%)	14 (14.1%)	2,147 (13.0%)	2,224 (22.4%)	856 (26.6%)	192 (21.4%)	255 (19.0%)
	49 to 74 - n (%)	21,732 (67.8%)	68 (68.7%)	12,213 (73.8%)	6,154 (61.9%)	1,887 (58.7%)	552 (61.5%)	858 (63.8%)
	75+ - n (%)	4,617 (14.4%)	17 (17.2%)	2,189 (13.2%)	1,556 (15.7%)	470 (14.6%)	154 (17.1%)	231 (17.2%)
Type of centre	Non-teaching - n (%)	21,536 (67.2%)	59 (59.6%)	10,997 (66.5%)	6,753 (68.0%)	2,104 (65.5%)	586 (65.3%)	1,037 (77.2%)
	Teaching - n (%)	10,501 (32.8%)	40 (40.4%)	5,552 (33.5%)	3,181 (32.0%)	1,109 (34.5%)	312 (34.7%)	307 (22.8%)
Rurality	Urban - n (%)	28,483 (88.9%)	90 (90.9%)	14,591 (88.2%)	8,888 (89.5%)	2,897 (90.2%)	811 (90.3%)	1,206 (89.7%)
	Rural - n (%)	3,497 (10.9%)	9 (9.1%)	1,923 (11.6%)	1,033 (10.4%)	309 (9.6%)	*82-86	*133-137
Charlson comorbidity group	No hospitalization – n (%)	13,948 (43.5%)	37 (37.4%)	7,073 (42.7%)	4,434 (44.6%)	1,450 (45.1%)	401 (44.7%)	553 (41.1%)
	0 - n (%)	14,744 (46.0%)	54 (54.5%)	7,745 (46.8%)	4,506 (45.4%)	1,431 (44.5%)	400 (44.5%)	608 (45.2%)
	1 - n (%)	2,326 (7.3%)	*3-7	1,240 (7.5%)	681 (6.9%)	238 (7.4%)	*59-63	101 (7.5%)
	2 - n (%)	700 (2.2%)	*1-5	337 (2.0%)	220 (2.2%)	69 (2.1%)	*10-14	59 (4.4%)
	3+ - n (%)	319 (1.0%)	*1-5	154 (0.9%)	93 (0.9%)	25 (0.8%)	*19-23	23 (1.7%)
Length of follow-up (months)	Mean (SD)	46.95 (14.10)	48.02 (15.02)	45.34 (14.23)	50.64 (13.09)	48.64 (13.57)	42.66 (13.53)	38.29 (13.12)
	Median (Q1-Q3)	46 (35-59)	48 (33-62)	43 (33-57)	51 (41-61)	48 (38-60)	40 (31-53)	34 (27-49)
	Min - Max	24 - 73	25 - 73	24 - 73	24 - 73	24 - 73	24 - 73	24 - 73
Censor reason	Death - n (%)	1,362 (4.3%)	*1-5	228 (1.4%)	472 (4.8%)	350 (10.9%)	*248-252	59 (4.4%)
	End of study - n (%)	29,588 (92.4%)	89 (89.9%)	15,879 (96.0%)	9,054 (91.1%)	2,705 (84.2%)	611 (68.0%)	1,250 (93.0%)
	LTC admission – n (%)	412 (1.3%)	*1-5	121 (0.7%)	171 (1.7%)	80 (2.5%)	23 (2.6%)	*12-16
	Loss of OHIP coverage - n (%)	128 (0.4%)	0 (0.0%)	56 (0.3%)	53 (0.5%)	11 (0.3%)	*1-5	*2-6
	Second cancer – n (%)	547 (1.7%)	*1-5	265 (1.6%)	184 (1.9%)	67 (2.1%)	*9-13	17 (1.3%)

*Cells with a range of numbers were due to small cell suppression or preventing back calculation; therefore, percentages were not calculated. FYI: Results in this table were statistically significant across each disease stage.

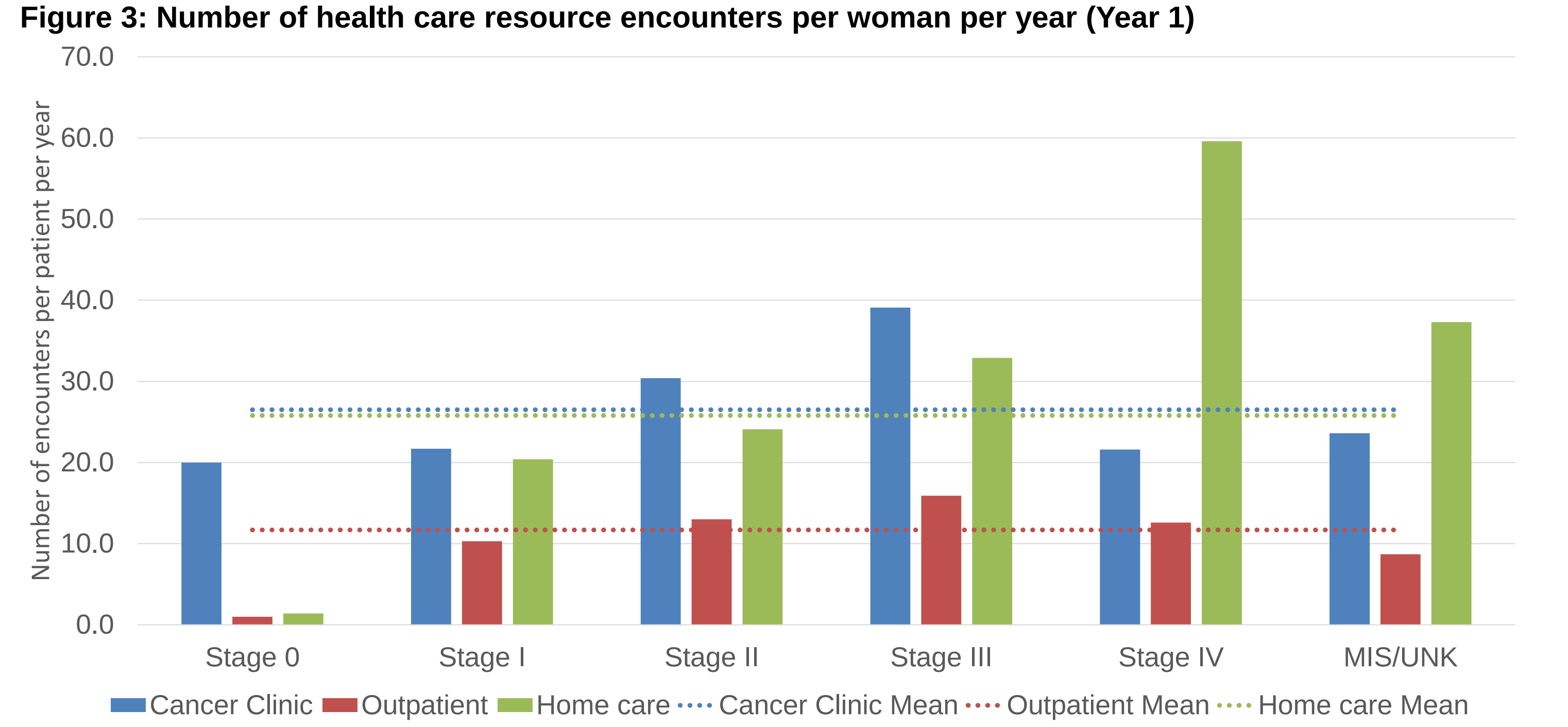
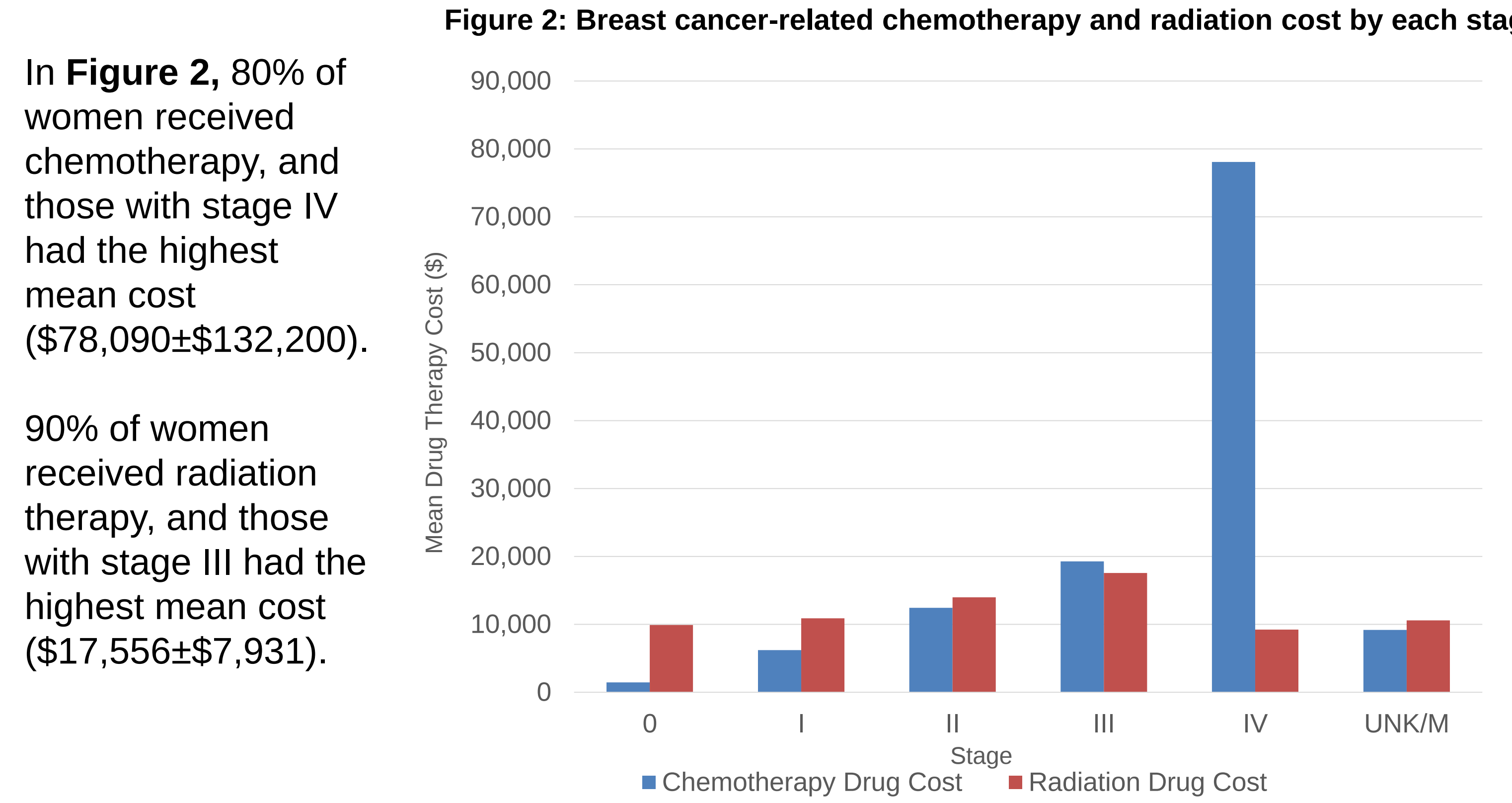
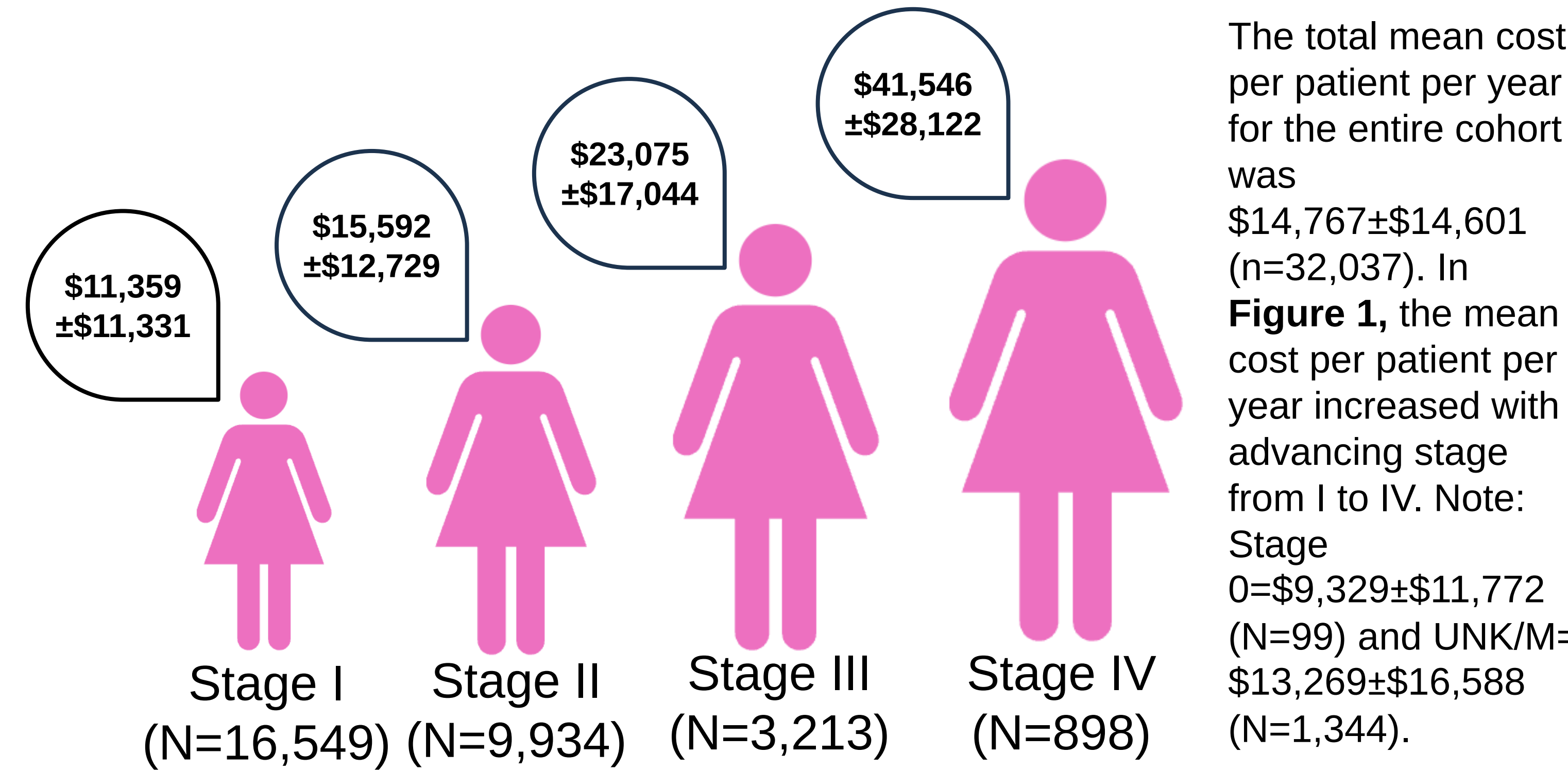
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Figure 1: Total mean cost per woman per year, by known stage.



- In Year 1, the mean number of visits per year was 26.5 for cancer clinics, 11.7 for outpatient clinics, and 25.8 for home care for all stages (dotted lines in **Figure 3**). For each stage, women with stage III breast cancer had the highest number of cancer clinic visits (39.1) and outpatient clinic visits (15.9). Women with stage IV had the highest number of home care visits (59.6), followed by the UNK/M (37.3).

CONCLUSIONS

- Not only do our results provide demographic information of women diagnosed between 2015-2019 with at least 2 years of follow-up, the mean cost per woman for stage IV patients has doubled in more than 10 years. While radiation therapy costs are relatively consistent for each disease stage, chemotherapy costs are vastly higher for women with stage IV. In terms of HCRU, homecare visits range from 20 – 80 per woman in the first year after diagnosis.