Virtual care as a tool to improve health equity? A national racial and ethnic analysis of telemedicine utilization among cancer patients and survivors during COVID-19

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INTRODUCTION

The COVID-19 pandemic rapidly expanded telemedicine care. Now, as the public health emergency ends, healthcare professionals have pushed to codify telehealth expansion to improve access. Although delivery of telemedicine may exacerbate certain disparities via the "Digital Divide," it may effectively deliver high-quality, accessible, and equitable oncologic care. Therefore, we analyzed patient-level demographic information and self-reported clinical data of cancer patients to determine the impact of race and ethnicity on telemedicine receipt. We hypothesized that telehealth receipt for prostate cancer patients and survivors would facilitate a potential reduction in racial and ethnic differences compared to other oncological conditions.

MATERIALS and METHODS

- Cross-sectional analysis from July 2020 to December 2021
- Identification of specific populations via National Health Interview Survey
- Statistical Analysis:
  - Weighted descriptive table for national prevalence of telehealth utilization
  - Complex-weighted multivariable Poisson regression analysis adjusted for survey period, age, cancer type, immunocompromised status, gender, education, race and ethnicity, health status, family income, insurance coverage, and residence classification
  - Two-way interaction between cancer type as well as race and ethnicity, followed by an adjusted marginal probability and adjusted risk difference

PENN UROLOGY

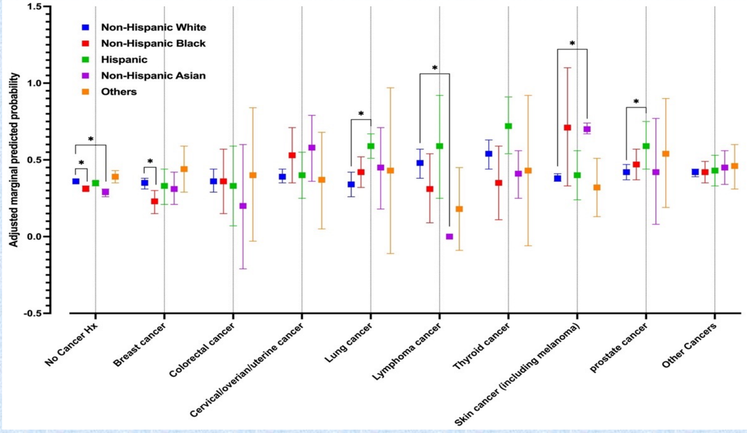
RESULTS

TABLE 1. National weighted demographics and characteristics of participants with history of cancer factored by receipt of telemedicine in the National Health Interview Survey between July 2020 and December 2021.

	All Cohort		Recipient of telemedicine		MVA Poisson regression		
	Mean (SD)	[95% CI]	Mean (SD)	[95% CI]	Prevalence [95% CI]	IRR [95% CI]	P-Value
Age (continuous variable)	48.14 (18.54)	[47.88, 48.40]	50.92 (18.88)	[50.50, 51.33]	0.35 [0.35,0.36]	1.00 [1.00-1.01]	<0.01
	N (Weighted%)	Est population in Millions	N (Weighted%)	Est population in Millions	Prevalence [95% CI]	IRR [95% CI]	P-Value
Survey period							
July-December, 2020	17582 (35%)	64.78	6402 (32%)	21.06	0.33 [0.32,0.33]	1 [Ref]	-
January-June, 2021	14186 (33%)	60.48	5676 (35%)	22.94	0.38 [0.37,0.39]	1.15 [1.12-1.19]	<0.01
July-December, 2021	15031 (33%)	60.64	5708 (33%)	21.89	0.36 [0.35,0.37]	1.09 [1.05-1.13]	<0.01
Total	46799 (100%)	185.9	17786 (100%)	65.89	0.35 [0.35,0.36]	-	-
Type of cancer diagnosis							
No cancer history	40786 (90%)	167.69	14836 (87%)	57.02	0.34 [0.33,0.35]	1 [Ref]	
Breast cancer	873 (1%)	2.52	402 (2%)	1.14	0.45 [0.41,0.49]	0.94 [0.86-1.03]	0.19
Colorectal cancer	201 (0%)	0.66	87 (0%)	0.28	0.42 [0.34,0.52]	1.01 [0.82-1.24]	0.92
Cervical/ovarian/uterine cancer	415 (1%)	1.44	209 (1%)	0.73	0.5 [0.45,0.56]	1.15 [1.03-1.28]	0.01
Lung cancer	125 (0%)	0.37	67 (0%)	0.19	0.52 [0.42,0.62]	1.05 [0.88-1.25]	0.57
Lymphoma cancer	137 (0%)	0.44	74 (0%)	0.24	0.54 [0.44,0.64]	1.24 [1.03-1.50]	0.02
Thyroid cancer	141 (0%)	0.52	91 (1%)	0.34	0.66 [0.55,0.75]	1.51 [1.30-1.76]	<0.01
Skin cancer (including melanoma)	1906 (3%)	5.64	858 (4%)	2.44	0.43 [0.40,0.46]	1.07 [1.00-1.14]	0.06
prostate cancer	537 (1%)	1.62	256 (1%)	0.8	0.49 [0.44,0.54]	1.28 [1.16-1.42]	<0.01
Other Cancers	1678 (3%)	5	906 (4%)	2.71	0.54 [0.51,0.57]	1.18 [1.11-1.25]	<0.01
Total	46799 (100%)	185.9	17786 (100%)	65.89	0.35 [0.35,0.36]	-	-
Being told to have weak immunity							
No	44519 (96%)	177.7	16339 (93%)	60.83	0.34 [0.34,0.35]	1 [Ref]	-
Yes	2090 (4%)	7.53	1343 (7%)	4.7	0.62 [0.60,0.65]	1.38 [1.32-1.45]	<0.01
Total	46609 (100%)	185.23	17682 (100%)	65.53	0.35 [0.35,0.36]	-	-
Gender							
Female	25433 (52%)	96.17	10740 (59%)	38.63	0.4 [0.39,0.41]	1 [Ref]	-
Male	21363 (48%)	89.72	7046 (41%)	27.27	0.3 [0.30,0.31]	0.77 [0.75-0.79]	<0.01
Total	46796 (100%)	185.89	17786 (100%)	65.89	0.35 [0.35,0.36]	-	-
Educational attainment							
Highschool or less	15041 (39%)	71.4	4696 (32%)	20.82	0.29 [0.28,0.30]	1 [Ref]	-
Bachelor's or less	24289 (49%)	90.18	9746 (53%)	34.44	0.38 [0.37,0.39]	1.27 [1.22-1.32]	<0.01
masters	5405 (9%)	17.39	2453 (12%)	7.73	0.44 [0.43,0.46]	1.45 [1.37-1.53]	<0.01
Doctoral degree	1844 (3%)	5.78	821 (4%)	2.56	0.44 [0.42,0.47]	1.47 [1.37-1.58]	<0.01
Total	46579 (100%)	184.76	17716 (100%)	65.54	0.35 [0.35,0.36]	-	-
Race/Ethnicity							
NH White	31939 (63%)	116.88	12511 (66%)	43.71	0.37 [0.37,0.38]	1 [Ref]	-
NH Black	4849 (12%)	21.67	1788 (11%)	7.1	0.33 [0.31,0.35]	0.87 [0.83-0.92]	<0.01
Hispanics	6126 (17%)	31.4	2117 (15%)	9.75	0.31 [0.30,0.33]	0.97 [0.92-1.02]	0.19
NH Asians	2693 (6%)	10.99	896 (5%)	3.49	0.32 [0.29,0.34]	0.80 [0.74-0.86]	<0.01
Others	1192 (3%)	4.96	474 (3%)	1.84	0.37 [0.34,0.41]	1.08 [0.98-1.18]	0.12
Total	46799 (100%)	185.9	17786 (100%)	65.89	0.35 [0.35,0.36]	-	-
General Health Status							
Poor	1569 (3%)	5.6	922 (5%)	3.26	0.58 [0.55,0.61]	1 [Ref]	-
Fair	5161 (10%)	19.41	2618 (15%)	9.58	0.49 [0.48,0.51]	0.88 [0.82-0.93]	<0.01
Good	13311 (28%)	52.18	5485 (31%)	20.25	0.39 [0.38,0.40]	0.68 [0.64-0.73]	<0.01
Very Good	16137 (34%)	63.06	5787 (32%)	21.01	0.33 [0.32,0.34]	0.55 [0.52-0.59]	<0.01
Excellent	10598 (25%)	45.58	2961 (18%)	11.76	0.26 [0.25,0.27]	0.44 [0.41-0.48]	<0.01
Total	46776 (100%)	185.84	17773 (100%)	65.85	0.35 [0.35,0.36]		
Ratio of family income to poverty threshold for SA's family							
0.00 - 0.49	1110 (3%)	4.83	384 (2%)	1.5	0.31 [0.28,0.34]	1 [Ref]	-
0.50 - 0.74	1270 (3%)	5.31	466 (3%)	1.73	0.33 [0.29,0.36]	1.02 [0.88-1.17]	0.83
0.75 - 0.99	2053 (5%)	8.57	745 (4%)	2.76	0.32 [0.30,0.35]	0.99 [0.87-1.12]	0.84
1.00 - 1.24	1776 (4%)	7.25	639 (4%)	2.41	0.33 [0.31,0.36]	1.04 [0.92-1.18]	0.53
1.25 - 1.49	2254 (5%)	9.46	779 (5%)	3	0.32 [0.29,0.34]	1.01 [0.89-1.15]	0.86
1.50 - 1.74	1775 (4%)	7.14	613 (3%)	2.22	0.31 [0.28,0.34]	0.98 [0.85-1.12]	0.75
1.75 - 1.99	2127 (5%)	9.14	763 (4%)	2.96	0.32 [0.30,0.35]	1.01 [0.90-1.14]	0.88
2.00 - 2.49	3820 (8%)	15.49	1377 (8%)	5.05	0.33 [0.31,0.35]	1.00 [0.89-1.12]	0.99
2.50 - 2.99	3691 (8%)	15.41	1331 (8%)	5.21	0.34 [0.32,0.36]	1.04 [0.92-1.17]	0.57
3.00 - 3.49	3038 (6%)	11.93	1152 (7%)	4.29	0.36 [0.34,0.38]	1.07 [0.96-1.20]	0.22
3.50 - 3.99	3058 (7%)	12.66	1149 (7%)	4.5	0.36 [0.34,0.38]	1.05 [0.94-1.18]	0.36
4.00 - 4.49	2830 (6%)	10.71	1069 (6%)	3.68	0.34 [0.32,0.37]	1.00 [0.88-1.14]	0.97
4.50 - 4.99	2635 (6%)	10.53	1002 (6%)	3.88	0.37 [0.35,0.39]	1.08 [0.96-1.22]	0.18
5.00 or greater	15362 (31%)	57.48	6317 (34%)	22.7	0.39 [0.38,0.41]	1.11 [0.99-1.24]	0.06
Total	46799 (100%)	185.9	17786 (100%)	65.89	0.35 [0.35,0.36]	-	-
Health Coverage							
No	3592 (10%)	19.27	531 (4%)	2.65	0.14 [0.12,0.15]	1 [Ref]	-
Yes	43086 (90%)	165.94	17227 (96%)	63.11	0.38 [0.37,0.39]	2.29 [2.06-2.53]	<0.01
Total	46678 (100%)	185.21	17758 (100%)	65.76	0.36 [0.35,0.36]	-	-
Urban-Rural Classification							
Nonmetropolitan	6938 (14%)	25.2	2044 (11%)	7.01	0.28 [0.26,0.30]	1 [Ref]	-
Medium and small metro	14886 (31%)	57.14	5393 (29%)	19.11	0.33 [0.32,0.35]	1.23 [1.15-1.32]	<0.01
Large fringe metro	10945 (24%)	45.09	4469 (26%)	16.99	0.38 [0.36,0.39]	1.38 [1.29-1.48]	<0.01
Large central metro	14030 (31%)	58.48	5880 (35%)	22.79	0.39 [0.38,0.40]	1.49 [1.40-1.60]	<0.01
Total	46799 (100%)	185.9	17786 (100%)	65.89	0.35 [0.35,0.36]	-	-

RESULTS

FIGURE 1. U.S. national predicted probability of telemedicine utilization among different cancer patients and survivors, stratified by race and ethnicity



LIMITATIONS

- Hypothesis-generating nature of the cross-sectional analysis
- Absence of causative patient- and provider-level variables that could explain why disparities in access decrease with telehealth receipt
- Absence of patient- and provider-level data examining quality of interactions

CONCLUSIONS

- Prostate cancer predicted telemedicine (TM) receipt (RR: 1.28, 95%CI: [1.16-1.42], p<0.01)
- Non-Hispanic Blacks (NHB) were less likely to receive TM vs. Non-Hispanic Whites (NHW) (RR: 0.87, 95%CI: [0.83-0.92], p<0.01)
- Significant interaction between race and ethnicity and cancer type (P_{int} <0.01)
- No significant difference found between NHB and NHW in prostate cancer (ARD: 0.05 [95%CI -0.06- -0.17], p=0.37), as opposed to no cancer history (ARD: -0.05, 95%CI:[-0.07- -0.03], p<0.01) and breast cancer history (ARD: -0.16, 95%CI:[-0.27- -0.05], p=0.01)
- TM may help reduce disparities for prostate cancer patients, since no statistical difference was identified opposed to those with no cancer history and breast cancer.
- Further studies identify best practices for TM follow-up among cancer patients