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Social Determinants of Health and Treatment Delays in Pediatric Differentiated Thyroid Cancer

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Abstract

INTRODUCTION: Social determinants of health (SDoH) are environmental conditions that influence health outcomes. As treatment delays have been found to affect outcomes in cancer care, we seek to assess the effects of specific SDoH on delays in the treatment of pediatric differentiated thyroid cancer (DTC).

METHODS: The National Cancer Database (NCDB) was queried from 2004-2018 to identify patients ≤ 18-years-old who underwent treatment for follicular of papillary thyroid cancer. Specific SDoH assessed included socioeconomic status (SES), education status, and racial/ethnic identity. Multivariable regressions were performed to examine associations between specific SDoH and extant of disease at presentation, as well as delays from diagnosis to treatment, definitive surgery, and radioiodine initiation.

RESULTS: Of the 5,839 patients who underwent treatment for thyroid cancer, 4,714 (81%) were female, 4,150 (71%) identified as Caucasian, and 5,335 (91%) has papillary histology. Hispanic individuals (OR: 1.57, CI: 1.13-2.16), uninsured individuals (OR: 3.44, CI:2.26-5.12), and individuals from areas with lower educational attainment (OR: 1.43, CI:1.06-1.93) presented at a more advanced stage after adjusting for covariates. In linear regression analysis, African Americans patients (β=5.7; p=0.037), Asian/Pacific Islander patients (β=7.4; p=0.006), and Hispanic patients (β=9.5; p<0.001) all had greater time from diagnosis to definitive surgery than Caucasian patients. Those with government provided insurance had longer duration from diagnosis to radioactive iodine therapy than those with private insurance (β=9.7; p<0.001).

CONCLUSIONS: Disparities exist in the time from diagnosis to treatment between individuals of different SES and race presenting with pediatric thyroid cancer.

BACKGROUND

- Social determinants of health (SDoH) are environmental conditions that influence health outcomes.[1]
- Prior studies have found disparities in the outcomes of pediatric thyroid cancer based on patient race and socioeconomic status; including: differences in access to high-volume surgeons, longer postoperative hospital stay, higher complication rates, and increased overall costs of care.[2,3]
- As treatment delays have been found to affect outcomes in cancer care, we seek to assess the effects of specific SDoH on delays in the treatment of pediatric differentiated thyroid cancer (DTC).[4]

TABLES AND FIGURES

Characteristic	N = 5,839[1]
AGE	16 (14, 18)
SEX	
Female	4,714 (81%)
Male	1,125 (19%)
AGE	
Age < 10	219 (3.8%)
Age ≥ 10	5,620 (96%)
RACE	
Caucasian	4,150 (71%)
African American	291 (5.0%)
API	282 (4.8%)
Hispanic	861 (15%)
Other	245 (4.2%)
MEDIAN INCOME	
≤ $50,353	1,832 (35%)
> $50,353	3,341 (65%)
HIGH SCHOOL DIPLOMA	
Low HSD Attainment	2,322 (45%)
High HSD Attainment	2,860 (55%)
URBAN/RURAL	
Non-Metro	4,034 (72%)
Metropolitan	1,577 (28%)
PRIMARY PAYOR	
Private	4,192 (72%)
Government	1,370 (23%)
Not Insured/Unknown	277 (4.7%)

Table 1 –Patient characteristics, extant of disease at presentation and time in days from diagnosis to treatment, Mean (SD); n (%)

Characteristic	OR	95% CI	p
SEX			
Female	—	—	
Male	1.61	1.21, 2.12	**<0.001**
RACE			
Caucasian	—	—	
African American	1.58	0.92, 2.57	0.08
API	0.89	0.46, 1.56	0.697
Hispanic	1.57	1.13, 2.16	**0.006**
Other	1.2	0.61, 2.14	0.565
MEDIAN INCOME			
> $50,353	—	—	
≤ $50,353	0.85	0.63, 1.15	0.306
PRIMARY PAYOR			
Private	—	—	
Government	1.1	0.81, 1.49	0.527
Not Insured/Unknown	3.44	2.26, 5.12	**<0.001**
URBAN/RURAL			
Non-Metro	—	—	
Metropolitan	0.74	0.55, 0.99	**0.044**
HIGH SCHOOL DIPLOMA ATTAINMENT			
High HSD Attainment	—	—	
Low HSD Attainment	1.43	1.06, 1.93	**0.021**

Table 2 –Multivariable logistic regression model of factors associated with greater stage of disease at presentation

Table 3 – Multivariable linear regression analysis analyzing factors associated with increased time between a) diagnosis and treatment initiation; b) diagnosis and definitive surgery; and c) diagnosis and radioactive iodine treatment (days)

Characteristic	DIAGNOSIS-TREATMENT		DIAGNOSIS-SURGERY		DIAGNOSIS-RAI	
	Beta	CI	Beta	CI	Beta	CI
SEX						
Female	—	—	—	—	—	—
Male	**-3.7**	**-6.2, -1.1**	-0.41	-3.3, 2.5	-3.7	-9.5, 2.0
RACE						
Caucasian	—	—	—	—	—	—
African American	3.1	-1.6, 7.8	**5.7**	**0.34, 11**	**14**	**3.1, 25**
API	**7.1**	**2.4, 12**	**7.4**	**2.1, 13**	10	-0.54, 22
Hispanic	**9.3**	**6.2, 12**	**9.5**	**6.1, 13**	**17**	**10, 24**
Other	0.31	-4.9, 5.6	-0.11	-6.0, 5.8	-1.9	-14, 11
MEDIAN INCOME						
> $50,353	—	—	—	—	—	—
≤ $50,353	-2.3	-4.9, 0.21	-1.7	-4.6, 1.2	**-6.3**	**-12, -0.56**
PRIMARY PAYOR						
Private	—	—	—	—	—	—
Government	0.66	-1.9, 3.2	1.2	-1.7, 4.1	**9.7**	**3.9, 16**
Uninsured/Unknown	3.2	-1.8, 8.1	-1.1	-6.7, 4.5	-6.2	-19, 6.7
URBAN/RURAL						
Non-Metro	—	—	—	—	—	—
Metropolitan	-0.32	-2.6, 1.9	0.42	-2.1, 3.0	1.2	-3.9, 6.4
HIGH SCHOOL DIPLOMA ATTAINMENT						
High HSD Attainment	—	—	—	—	—	—
Low HSD Attainment	1.2	-1.3, 3.7	1.2	-1.6, 4.1	3.2	-2.5, 8.9

METHODS

- The National Cancer Database (NCDB) was queried from 2004-2018 to identify patients ≤ 18-years-old who underwent treatment for follicular of papillary thyroid cancer.
- Specific SDoH assessed included socioeconomic status (SES), education status, and racial/ethnic identity.
- Educational status was defined as the number of adults in the patient's zip code who did not graduate from high school, and is categorized as equally proportioned quartiles among all US zip codes.
- Multivariable regressions were performed to examine associations between specific SDoH and extant of disease at presentation, as well as delays from diagnosis to treatment, definitive surgery, and radioiodine initiation.

RESULTS

- Of the 5,839 patients who underwent treatment for thyroid cancer, 4,714 (81%) were female, 4,150 (71%) identified as Caucasian, and 5,335 (91%) has papillary histology. (Table 1)
- Time from diagnosis to *treatment* was 7 (0, 30) days, to *surgery* was 8 (0,30) days, *definitive surgery* was 18 (0, 38) days, and to *RAI treatment* was 84 (57, 121) days.
- Hispanic individuals (OR: 1.57, CI: 1.13-2.16), uninsured individuals (OR: 3.44, CI:2.26-5.12), and individuals from areas with lower educational attainment (OR: 1.43, CI:1.06-1.93) presented at a more advanced stage after adjusting for covariates. (Table 2)
- In linear regression analysis, African Americans patients (β=5.7; p=0.037), Asian/Pacific Islander patients (β=7.4; p=0.006), and Hispanic patients (β=9.5; p<0.001) all had greater time from diagnosis to definitive surgery than Caucasian patients. Those with government provided insurance had longer duration from diagnosis to radioactive iodine therapy than those with private insurance (β=9.7; p<0.001). (Table 3)

CONCLUSIONS

- Disparities exist in the time from diagnosis to treatment between individuals of different SES and race presenting with pediatric thyroid cancer.

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