



Implementation of a Head and Neck Survivorship Program Is Associated with Earlier Identification of Radiation-Associated Hypothyroidism: A Single Institution Cohort Study

Zvonimir L. Milas, MD¹; Daniel Carrizosa, MD²; Daniel S. Brickman, MD¹; Catherine H. Frenkel, MD¹; Ashley A. Stewart, MD³; Ashley L. Sumrall, MD²; Brittany Neelands, MS⁴; Sally J. Trufan, MS⁵; Jennifer Benbow, PhD⁴; Shwetha M. Sudhakar, MD³; Matthew C. Ward, MD⁶

Levine Cancer Institute, Atrium Health, Charlotte, NC

¹Division of Surgical Oncology, ²Department of Medical Oncology, ³Department of Endocrinology, ⁴Clinical Trials Office, ⁵Department of Cancer Biostatistics, ⁶Department of Radiation Oncology

Introduction

- Post-treatment sequelae of head and neck cancer (HNC) treatment can significantly affect a patients’ quality of life¹.
- The purpose of a Survivorship Care Plan (SCP) is to educate patients on post-treatment side effects and mitigate their impact².
- **To determine whether implementation of a SCP impacted identification and management of post-treatment hypothyroidism in our HNC population and evaluate the impact of socio-demographic factors on effectiveness of the survivorship program.**

Methods

- Single institution retrospective review (*n*=483) between January 2011 and January 2019.
- Thyroid function evaluated by laboratory thyroid stimulating hormone (TSH) values and timing of thyroid hormone supplementation.
- Development of hypothyroidism defined as TSH value > 5.0 [IU]/mL or initiation of supplementation post-HNC treatment.
- Cumulative incidence of hypothyroidism analyzed with Gray’s method, treating death as a competing risk.

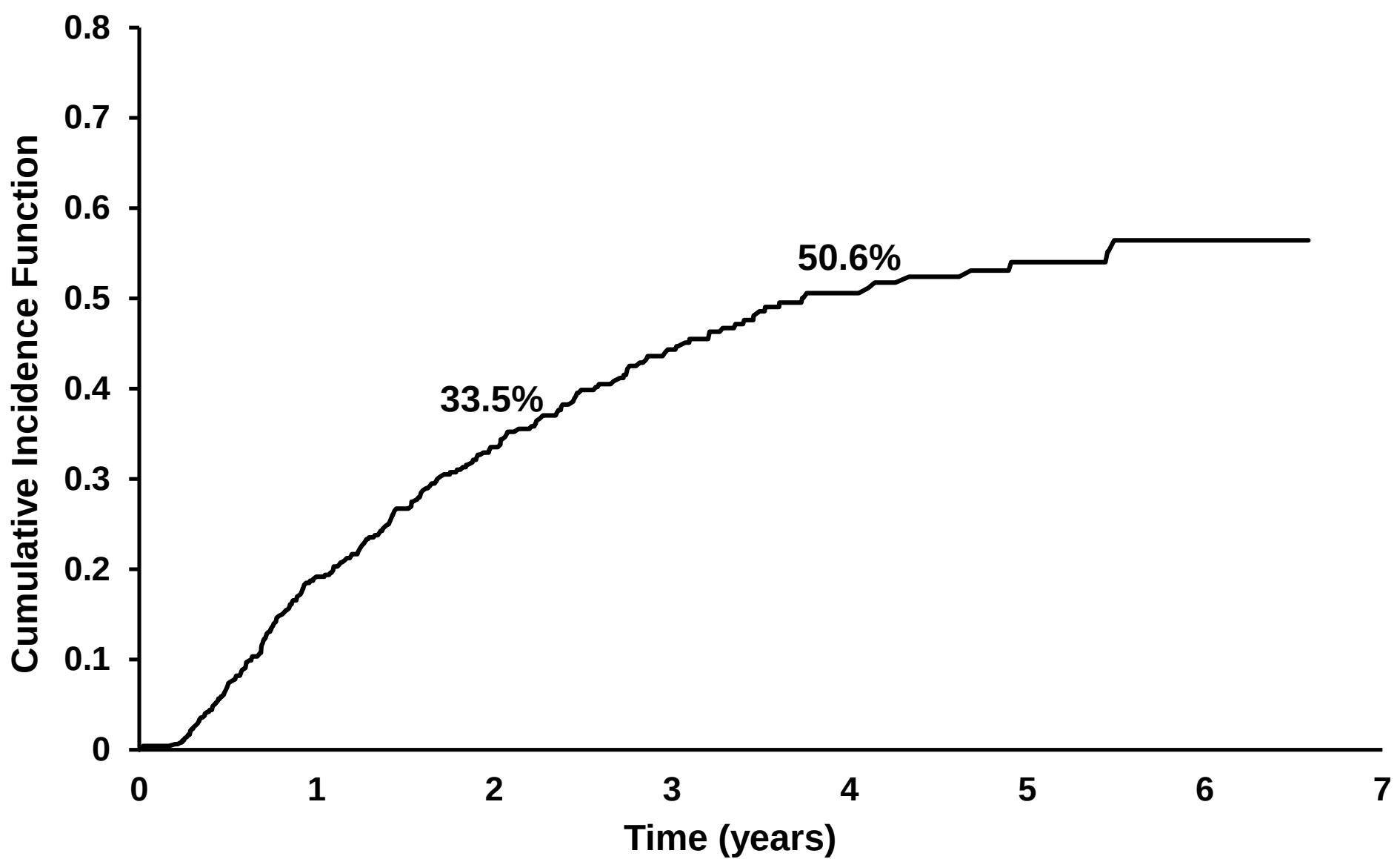
Results

Table 1: Demographics and Clinicopathologic Variables			
	No SCP	SCP	p-value
N	430	53	
Sex, no. (%)			0.451
Male	329 (76.5)	43 (81.1)	
Female	101 (23.5)	10 (18.9)	
Age (years), Median [IQR]	60.9 (54.4-98.5)	57.7 (53.1-63.8)	0.139
Race			0.004
Caucasian	317 (73.7)	50 (94.3)	
African American	102 (23.7)	3 (5.7)	
Other	11 (2.6)	0 (0.0)	
Insurance, no. (%)			0.001
Private	94 (21.9)	12 (22.6)	
Medicaid	65 (15.1)	4 (7.6)	
Medicare	176 (40.9)	13 (24.5)	
Uninsured/Other/Unknown	95 (22.1)	24 (45.3)	
Head and Neck Subsites			0.236
Oropharynx	147 (34.2)	19 (35.8)	
Oral Cavity	90 (20.9)	18 (34.0)	
Larynx/Hypopharynx	110 (25.6)	10 (18.9)	
Nasopharynx	24 (5.6)	1 (1.9)	
Nasal Cavity/Sinus	25 (5.8)	3 (5.7)	
Salivary Gland	34 (7.9)	2 (3.8)	

Table 2: Multivariable Competing Risk Analysis for the Development of Hypothyroidism			
	Hazard Ratio	Odds Ratio (95%CI)	p-value
Age (years)	0.99	0.98-1.00	0.077
Race	-	-	0.003
African American vs Caucasian	0.48	0.31-0.75	0.001
Other vs Caucasian	0.47	0.15-1.49	0.201
Larynx Cancer (yes vs no)	1.92	1.44-2.20	0.077
Survivorship (yes vs no)	1.51	1.04-2.20	0.030

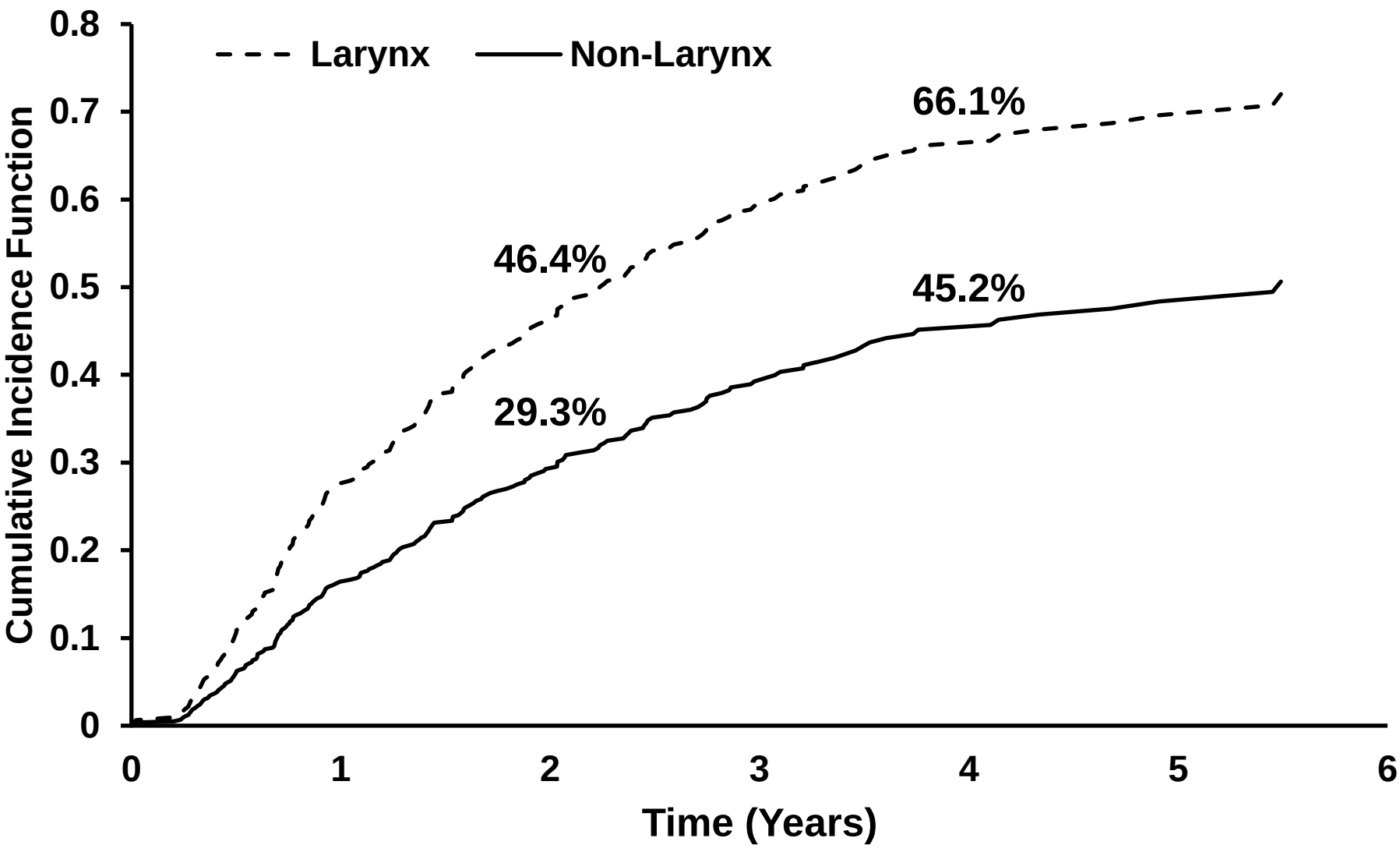
- Median follow-up was 1.4 years (IQR 0.7-2.6 years).
- Median time until hypothyroidism identification was 1.2 years (IQR 0.7-2.1 years).

Figure 1: Cumulative Incidence of Post-Treatment Hypothyroidism.



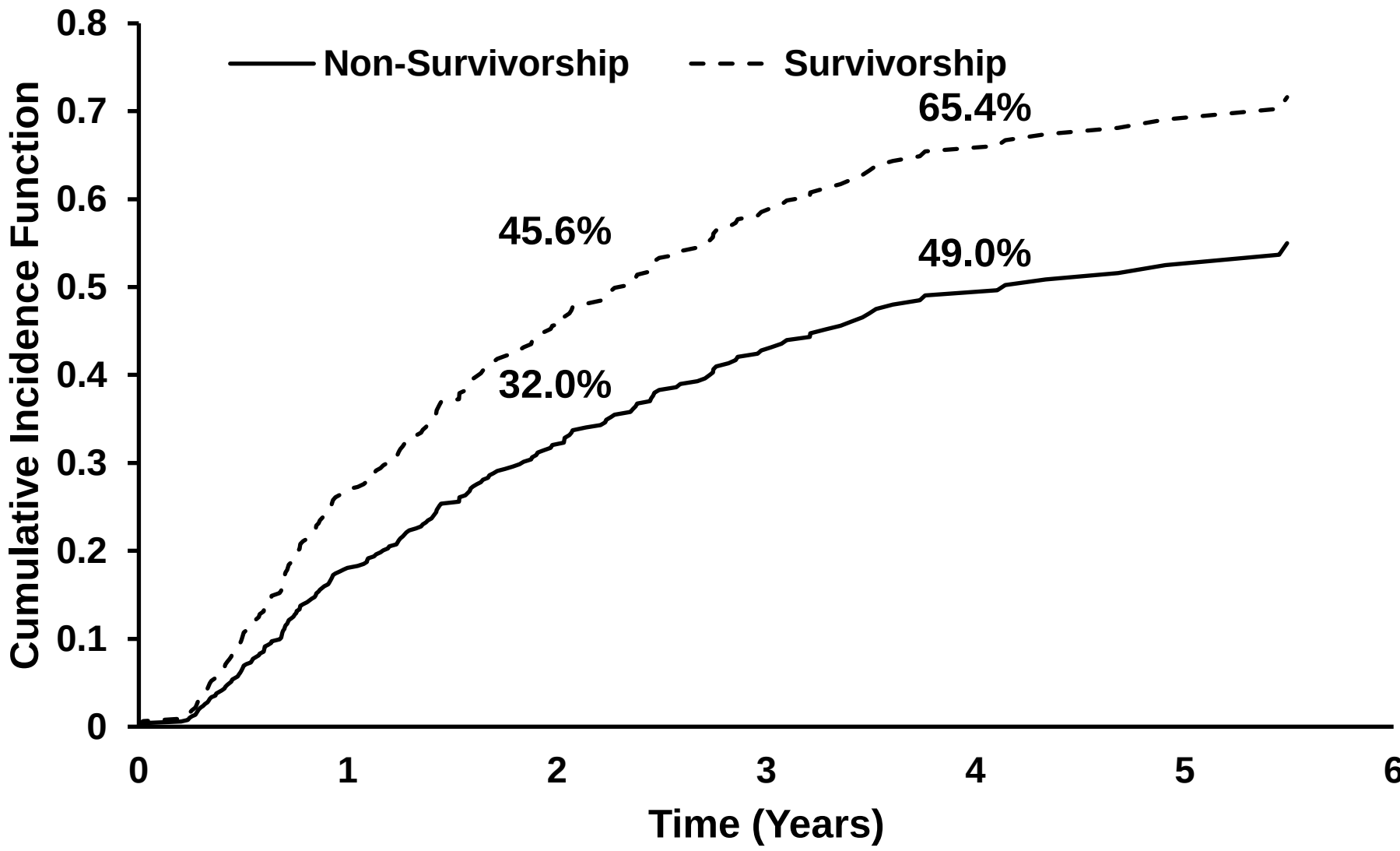
At Risk	Time (Years)					
Post-Treatment	232	127	62	38	13	1

Figure 2: Cumulative Incidence of Post-Treatment Hypothyroidism in HNC of the Larynx compared to other HNC Sites.



At Risk	Time (Years)					
Non-Larynx	180	101	50	28	10	1
Larynx	52	26	12	10	3	0

Figure 3: Cumulative Incidence of Post-Treatment Hypothyroidism based on the Initiation of Survivorship Care Plan.



At Risk	Time (Years)					
Non-Survivorship	213	122	59	37	13	1
Survivorship	19	5	3	1	0	0

- Median time to post-treatment hypothyroidism diagnosis was 12.0 months with SCP versus 14.2 months without a SCP.

Discussion

- Overall incidence of post-treatment hypothyroidism was 34% at 2 years and 51% at 4 years.
- Cumulative incidence of developing post-treatment hypothyroidism in HNC of the larynx (*n*=120) was 66% compared to 45% at other HNC sites (*n*=363) at 4 years.
- Cumulative incidence of post-treatment hypothyroidism 65% in HNC patients monitored by SCP (*n*=53) compared to 49% in those without (*n*=430).
- Receipt of a SCP was independently associated with an increased incidence of hypothyroidism detection (*p*=0.030).

Conclusions

- This study identified an association between SCP utilization and identification of post-treatment hypothyroidism in HNC patient population at a single institution.
- This study supports implementation of a survivorship program is associated with earlier identification and management of treatment induced hypothyroidism.

Resources

1. Shin YW, Choi YM, Kim HS, et al. Diminished Quality of Life and Increased Brain Functional Connectivity in Patients with Hypothyroidism After Total Thyroidectomy. *Thyroid*. 2016;26(5):641-649.
2. Hill RE, Wakefield CE, Cohn RJ, et al. Survivorship Care Plans in Cancer: A Meta-Analysis and Systematic Review of Care Plan Outcomes. *Oncologist*. 2020;25(2):e351-e372.

Contact Info

Zvonimir.milas@atriumhealth.org