Original Article

Increasing Time to Treatment Initiation for Head and Neck Cancer: An Analysis of the National Cancer Database

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BACKGROUND: The objective of this study was to identify trends and predictors of the time to treatment initiation (TTI) for patients with head and neck squamous cell carcinoma (HNSCC). **METHODS:** The National Cancer Database (NCDB) was reviewed for the following head and neck cancer sites: oral tongue, oropharynx, larynx, and hypopharynx. TTI was defined as the number of days from diagnosis to the initiation of definitive treatment and was measured according to covariates. Significant differences in the median TTI across each covariate were measured using the Kruskal-Wallis test, and the Spearman test was used to measure trends within covariates. For multivariate analysis, a zero-inflated, negative, binomial regression model was used to estimate the expected TTI, which was expressed in the predicted number of days; and the Vuong test was used to identify the predictors of TTI. **RESULTS:** In total, 274,630 patients were included. Between 1998 and 2011, the median TTI for all patients was 26 days, and it increased from 19 days to 30 days ($P<.0001$). Treatment with chemoradiation (CRT) ($P<.0001$), treatment at academic facilities ($P<.0001$), and stage IV disease ($P<.0001$) were associated with increased TTI. TTI significantly increased for each disease stage ($P<.0001$), treatment modality ($P<.0001$), and facility type ($P<.0001$) over time. In addition, patients became more likely to transition care between facilities after diagnosis for treatment initiation ($P<.0001$) over time. On multivariate analysis, treatment at academic facilities (33 days), transitioning care (37 days), and receipt of CRT (39 days) predicted for a longer TTI. **CONCLUSIONS:** TTI is rising for patients with HNSCC. Those who have advanced-stage disease, receive treatment with CRT, are treated at academic facilities, and who have a transition in care realized the greatest increases in TTI. ***Cancer*** **2015;121:1204-13.** *© 2014 American Cancer Society.*

KEYWORDS: head and neck cancer, facility type, treatment time, National Cancer Database, One more.

INTRODUCTION

Increased treatment package time (defined as duration between the initiation and completion of curative therapy) is an independent poor prognostic factor of outcomes for head and neck squamous cell carcinoma (HNSCC).[1-3] Similarly, the timeliness of treatment initiation (defined as the duration between diagnosis and treatment of HNSCC) is a risk factor for disease recurrence.[4-7] Clinical data and radiobiologic modeling estimate that the local control rate of HNSCC decreases approximately 10% to 19% per month.[8,9] Prolonged wait times affect patient satisfaction and quality of life[10] and exacerbate the psychosocial distress accompanying a cancer diagnosis.[11,12] To our knowledge, no current estimate exists for the timeliness of treatment initiation for HNSCC in the United States, nor are there any recommendations regarding a goal time to definitive treatment initiation (TTI) for these malignancies. The objectives of this analysis of the National Cancer Database (NCDB) were to characterize baseline trends in TTI in the United States for patients with HNSCC and to identify predictors of increased TTI.

MATERIALS AND METHODS

The NCDB, a joint program of the American College of Surgeons Commission on Cancer (CoC) and the American Cancer Society, is a nationwide oncology database containing information regarding patterns of cancer care and treatment outcomes. The NCDB has been collecting data on newly diagnosed cancers since 1985 and now includes information regarding >29 million cancers from >1500 hospitals with CoC-accredited cancer programs in the United States and Puerto Rico. Approximately 70% of new cancer cases in the United States each year are diagnosed and treated at such hospitals and are reported to the NCDB. The data collection methods for this database have been described.[13]

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In a cohort of more than 270,000 individuals in the National Cancer Database, the current study identifies the trends and risk factors related to the increasing time to initiation of definitive treatment for patients with head and neck cancer in the United States.

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Patient Selection

We were granted access to the NCDB for the following disease sites for the years from 1998 to 2011: oral tongue, oropharynx, larynx, and hypopharynx. All patients with HNSCC were identified based on *International Classification of Diseases for Oncology*, third edition (ICD-O-3) site codes (codes 8000, 8053, 8070, 8071, 8072, 8076, 8082, 8083, 8084, 8052, 8074, 8023, 8430, 8560). The analysis included patients with HNSCC who were treated with curative intent by surgery, radiation therapy (RT), chemoradiation (CRT), or a combination of these modalities. TTI was defined as time from the date of diagnosis to the date when curative therapy began. Surgical codes from the CoC Facility Oncology Registry Standards (FORDS) manual were used to identify definitive therapeutic surgical procedures for each head and neck subsite. Surgical procedures that were not designed to extirpate tumor (eg, gastrostomy tube placement, tracheostomy) were not considered as curative therapy. The date of diagnosis is entered into the database as the date of the most definitive method of diagnostic confirmation on the basis of histologic, cytologic, or immunohistochemical confirmation from tissue biopsy specimens in the patient's record.[14] The following patients were excluded: those who had distant metastatic disease at presentation, those who initiated treatment >365 days after the diagnosis date, those with nonsquamous histology, those who received therapy with palliative intent (specifically coded in the NCDB by the treating institution), those who received chemotherapy alone, and those who had incomplete data regarding the number of days from diagnosis to the beginning of treatment. We excluded patients who had a TTI >365 days because of concerns surrounding miscoding, as their records were unlikely to reflect true frontline therapy for an initial diagnosis. Seventeen percent of patients were coded as having a TTI of "0" days, indicating diagnosis and initiation of definitive cancer treatment on the same day.

By using this final cohort, we analyzed trends in TTI over time according to factors that potentially could predict an increased time to therapy, including, but not limited to, stage, tumor subsite, facility type, and treatment modality; and, from the NCDB documents, whether diagnosis and definitive treatment were performed at different hospitals. A *care transition* was defined as a change in facility from diagnosis to definitive treatment.

Statistics

Covariates that were available for severity adjustment included race, Hispanic ethnicity, age, insurance status, urban/rural status, median income, education, Charlson/Deyo comorbidity score, disease stage, treatment modality, transitions, and facility type. The Charlson/Deyo score is truncated to zero (no comorbid conditions reported), 1, or 2 (>1 comorbid conditions reported), and is available for patients who were diagnosed after 2003. Each reporting facility is classified by 1 of 4 types: community program, comprehensive community program, academic/research program (these include National Cancer Institute-designated comprehensive cancer centers), or other. The CoC assigns these classifications over a 3-year period based on facility type, services provided, and cases accessioned. Those facilities categorized as "other" include: Veterans Affairs programs, hospital-associated cancer program (<100 newly diagnosed cases per year), and nonhospital-based, free-standing cancer center programs that offer at least 1 cancer-related treatment modality. Discrimination between facility types that were categorized as "other" was not possible.

The Kruskal-Wallis test was used to determine associations between TTI and categorical variables. To test for trend between TTI and year of diagnosis, we used the Spearman correlation (P_{trend}). The TTI had a skewed distribution and excess zeroes, requiring nonparametric tests for univariate analysis. For multivariate testing, we determined that the most appropriate model was a zero-inflated, negative binomial regression. This 2-part model simultaneously estimates the probability of a nonzero TTI and the expected TTI based on a negative binomial regression, which yields both an odds ratio and a ratio of the means, respectively. Rather than presenting individual regression parameters as 2 sets of ratios, for ease of interpretation, we summarized these results as the model-fitted, expected TTI measured in days, in which each covariate was varied separately while holding all other variables constant (at their observed values). The calculated expected TTI represents both the combined odds ratio and the ratio of the means expressed in days, such that a higher TTI would correspond to a higher ratio of risk from each part of the model. The results can then be interpreted as the expected TTI across the population if every individual had the same given covariate value and every other variable for each patient remained unchanged (eg, the expected TTI if every patient underwent surgery alone). We tested the significance of each covariate using the Vuong test.[15]

RESULTS

Table 1 provides demographic information, including the median TTI according to each variable. In total, 274,630

TABLE 1. Patient Characteristics and Time to Treatment Initiation

Patient Characteristic	No. of Patients (%)	Median	Mean	P^a
Total no.	274,630 (100)	—	—	
Age, y				< .0001
Median [range]	—	61 [18-90]	—	
≤30	1456 (1)	22	28.5	
31-40	6875 (2)	23	28.8	
41-50	40,208 (15)	27	31.5	
51-60	82,028 (30)	27	32.6	
61-70	77,173 (28)	26	30.9	
>70	66,890 (24)	24	27.9	
Sex				< .0001
Men	208,113 (76)	26	30.8	
Women	66,517 (24)	26	30.4	
Race				< .0001
Caucasian	235,892 (83)	26	30.1	
African American	30,110 (11)	29	35.7	
Asian	3586 (1)	26	30.9	
Other	5042 (2)	26	31.4	
Ethnicity				< .0001
Non-Hispanic	243,591 (86)	29	35.8	
Hispanic	10,197 (4)	26	30.6	
Unknown	20,842 (7)	25	29.2	
Insurance status				< .0001
Private insurance	116,474 (41)	25	29.3	
Medicare	105,243 (37)	25	29	
Uninsured	13,729 (5)	29	35.1	
Medicaid	23,257 (8)	31	37.8	
Other government	4804 (2)	33	38.8	
Unknown	11,123 (4)	28	34	
Facility type				< .0001
Community	27,927 (10)	23	28.3	
Comprehensive community	132,119 (47)	23	28.1	
Academic	108,125 (38)	29	34.6	
Other	6459 (2)	19	24.8	
Distance from treatment facility, miles				< .0001
≤10	50,236 (18)	25	30.2	
10-20	48,641 (17)	26	30	
21-50	19,042 (7)	26	30.7	
51-100	143,793 (51)	28	32.4	
>100	12,918 (5)	29	34.5	
Charlson comorbidity score				.0229
0	148,234 (53)	28	32.3	
1	28,376 (10)	28	32.3	
≥2	8168 (3)	28	33.2	
Unknown	89,852 (32)	21	26.9	
Cancer primary site				< .0001
Oral tongue	80,971 (29)	28	32.8	
Oropharynx, tonsil	48,899 (17)	26	30	
Oropharynx, nontonsil	11,429 (4)	29	35.6	
Larynx	114,144 (40)	23	28	
Hypopharynx	19,124 (7)	29	35.1	
Overall AJCC stage group				< .0001
In situ	8125 (3)	13	23.1	
I	59,245 (21)	20	23.4	
II	37,514 (13)	25	29.2	
III	49,650 (18)	28	32.7	
IV	101,106 (36)	29	34.7	
Unknown	39 (7)			
Treatment				< .0001
S alone	57,319 (20)	17	23.2	
RT alone	59,839 (21)	29	36.3	
CRT	80,622 (28)	35	40.5	
S + RT	45,501 (16)	11	19.2	
S + CRT	25,014 (9)	14	20.5	
Adjuvant chemotherapy	1545 (1)	14	24.1	
RT + S	1151 (<1)	27	33.1	
CRT + S	3178 (1)	29	33.7	

TABLE 1. *Continued*

Patient Characteristic	No. of Patients (%)	Median	Mean	P^a
C + S	461 (<1)	24	31.4	
Treatment year				
1998	18,127 (6.6)	19	24.5	< .0001
1999	17,980 (6.5)	20	25.7	
2000	17,905 (6.5)	21	26.8	
2001	17,777 (6.5)	22	28.1	
2002	18,063 (6.6)	24	29.3	
2003	18,736 (6.8)	24	28.7	
2004	18,860 (6.9)	25	29.2	
2005	19,130 (7)	26	30.1	
2006	19,813 (7.2)	27	31.7	
2007	20,696 (7.6)	28	33.1	
2008	21,204 (7.7)	29	34.1	
2009	21,814 (7.9)	29	34	
2010	21,996 (8)	30	34.5	
2011	22,529 (8.2)	30	34.1	
Zip code-level education				< .0001
≥29%	51,564 (18)	27	32.8	
20%-28.9%	66,103 (23)	26	31.2	
14%-19.9%	61,870 (22)	26	29.9	
<14%	80,276 (28)	25	29.2	
Unknown	14,817	26	30.6	
Income				< .0001
<$30,000	44,146 (16)	27	32.6	
$30,000-$35,000	52,203 (19)	26	30.5	
$35,000-$45,999	74,281 (26)	26	30.2	
≥$46,000	89,210 (32)	26	30	
Unknown	14,790	26	30.6	

Abbreviations: AJCC, American Joint Committee on Cancer; CRT, chemoradiation; RT, radiation; S, surgery.
[a] *P* values are for differences in the median time to treatment initiation for each variable and were calculated using the Kruskal-Wallis test.

patients were included in the analytic cohort. The overall median TTI was 26 days. For the entire cohort, the TTI was 19 days in 1998 and rose to 30 days by 2011, for a 58% increase ($P < .0001$). Increasing TTI transcended cancer stage, facility type, and treatment modality. The overall distribution of TTI by center and modality is illustrated in Figure 1.

Trends in TTI by Stage

The trend for TTI by disease stage is illustrated in Figure 2A. The upward trend in the median TTI from 1998 to 2011 was significant within each stage ($P_{trend} < .0001$). The median TTI grew significantly across each increase in stage over time ($P < .0001$), with the greatest increase observed for patients with stage IV disease (an increase from 21 days to 33 days; $P < .0001$). Patients with stage I disease had a lesser increase in median TTI from 14 days to 24 days ($P < .0001$).

Trends in TTI and Patient Volume by Facility Type

The number of centers reporting to the NCDB changed from 1998 to 2011 as follows: community facilities increased from 315 to 377 centers (20% increase), comprehensive community facilities increased from 595 to 629 centers (6% increase), and academic facilities increased from 219 to 228 centers (4% increase). Patient volumes according to facility changed from 1998 to 2011 as follows: the proportion of patients treated at both community facilities (10.1% in 1998 vs 9.5% in 2011) and comprehensive community facilities (47.4% in 1998 vs 46.6% in 2011) remained stable. The percentage of patients treated at "other" facilities was 7.5% in 1998 versus 0.1% in 2011. Conversely, the proportion of patients treated at academic facilities increased from 35% in 1998 to 43.7% in 2011 ($P < .0001$).

The median TTI varied significantly by facility type ($P < .0001$) (Fig. 2B). All facilities witnessed significant increases in TTI. Community facilities had a relative increase in median TTI of 87% from 15 days in 1998 to 28 days in 2011 ($P_{trend} < .0001$). Comprehensive community facilities had a relative increase in median TTI of 65% from 17 days to 28 days ($P_{trend} < .0001$). Although academic centers had the smallest relative increase in median TTI of 62% ($P_{trend} < .0001$), their absolute median TTI remained greatest, rising from 21 days to 34 days.

Transitions in care resulted in a significantly longer median TTI for all reporting centers, particularly for those

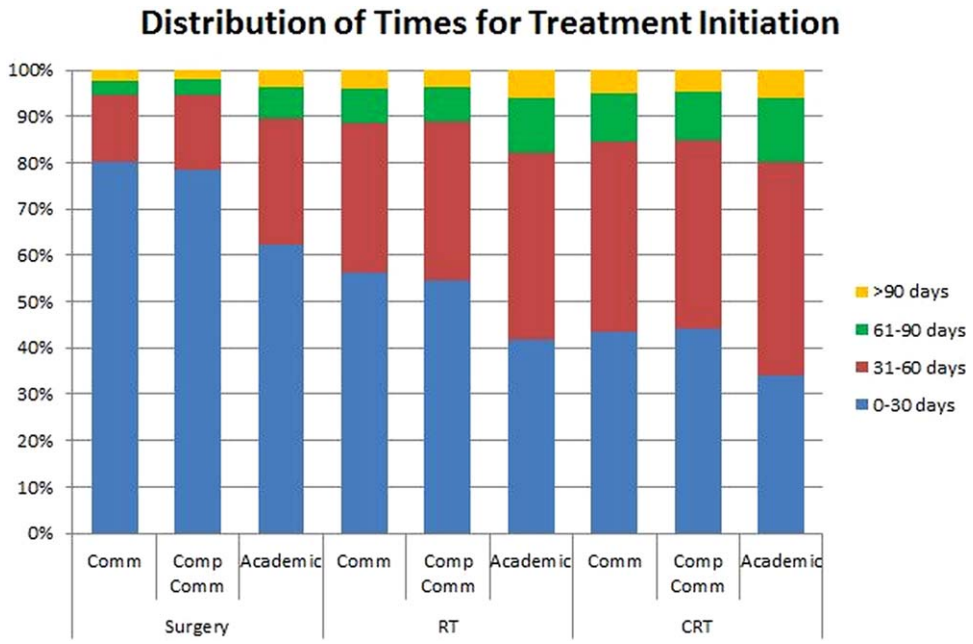

Figure 1. Distribution of the time to treatment initiation (TTI) is illustrated according to facility type and treatment modality. Comm indicates community facility; Comp Comm, comprehensive community facility; RT, radiotherapy therapy; CRT, chemoradiation.

patients who transitioned into an academic facility (Fig. 3). There was an almost 2-week increase in the median TTI for patients who transitioned to an academic facility versus those who initiated care at 1 facility (36 days vs 23 days, respectively; $P < .0001$). Forty-eight percent of all patients who received treatment at academic facilities transitioned care from elsewhere, compared with only 33% and 30% of patients at comprehensive community centers and community centers, respectively. Over time, an increasing proportion of patients transitioned their care, from 34% in 1998 to 41% in 2011 ($P < .0001$).

Trends in TTI by Treatment Modality

Trends in the median TTI according to treatment modality are illustrated in Figure 2C. The upward trend in TTI was statistically significant within each modality ($P_{trend} < .0001$) and also was significant when comparing across modalities ($P < .0001$). Surgery alone had the greatest relative increase in median TTI, from 9 days in 1998 to 24 days in 2011 (167% increase). Relative increases also were appreciated for definitive RT (from 25 days to 34 days; 36% increase) and CRT (from 28 days to 38 days; 36% increase). Figure 2D illustrates the TTI according to treatment modality and facility type. Treatment with primary CRT at academic facilities had the longest median TTI of 42 days in 2011. The use of CRT increased from 2755 reported cases in 1998 to 8298 cases in 2011, an increase of 201% ($P_{trend} < .0001$), compared with an increase of only 24% in the total number of reported cases over the same time (Table 1). The median TTI was shorter when chemotherapy was used as a single modality in the neoadjuvant or adjuvant setting compared with multimodality therapy concurrent with RT (Table 1).

Trends in TTI by Preclinical Factors

The median TTI varied according to race, ethnicity, insurance status, education level, and distance from the treating facility (Table 1). African American race and Hispanic ethnicity were associated with a significantly longer TTI compared with Caucasian race (TTI, 29 days vs 26 days; $P < .0001$). Uninsured patients (TTI, 29 days) and patients with Medicaid coverage (TTI, 31 days) and other government health insurance (TTI, 33 days) had a longer TTI compared with those who had private insurance (TTI, 25 days; $P < .0001$). Primary residence within closer proximity ($\leq$10 miles; TTI, 25 days) to the treating facility predicted for a significantly shorter TTI than living >100 miles from the center (TTI, 29 days; $P < .0001$).

Multivariate Analysis and Predictors of TTI

Results from the multivariate analysis are provided in Table 2. The strongest independent predictors of

TABLE 2. Multivariate Analysis[a]

Risk Factor	Predicted TTI, d	P[b]
Age, y		< .0001
≤30	30.1	
31-40	30.1	
41-50	31	
51-60	31.5	
61-70	30.8	
>70	29.5	
Sex		.038
Men	30.6	
Women	31.1	
Race		< .0001
Caucasian	30.4	
African American	33.5	
Asian	30.7	
Other	30.4	
Ethnicity		< .0001
Hispanic	34.8	
Non-Hispanic	30.6	
Insurance status		< .0001
Private insurance	29.8	
Medicare	30.5	
Medicaid	34.5	
Other government	32.3	
Facility type		< .0001
Community	29.3	
Comprehensive community	28.9	
Academic	33.2	
Transition in care		< .0001
Yes	36.8	
No	27.1	
Distance from treatment facility, miles		< .0001
≤10	31	
10-20	30.5	
21-50	30.1	
51-100	30.4	
>100	30.9	
Cancer primary site		< .0001
Oral tongue	33.3	
Oropharynx, tonsil	29.4	
Oropharynx, nontonsil	31.6	
Larynx	28.9	
Hypopharynx	31.9	
Overall AJCC stage group		< .0001
In situ	30.2	
I	25.9	
II	30.4	
III	33.1	
IV	33.9	
Treatment		< .0001
Surgery (S) alone	25.1	
Radiation (RT) alone	39.4	
Concurrent chemoradiation (CRT)	38.9	
S + RT	21.0	
S + CRT	16.3	
Adjuvant chemotherapy	22.0	
RT + S	28.3	
CRT + S	31.0	
Chemotherapy (C) + S	28.3	
Treatment year		< .0001
1998	26.3	
1999	27.2	
2000	28	
2001	29	
2002	30.1	
2003	29	
2004	29.4	
2005	30.1	
2006	31.3	
2007	32.9	
2008	33.4	
2009	33.1	
2010	33.7	
2011	33.2	
Zip code-level education		< .0001
≥29%	30.2	
20%-28.9%	31.1	
14%-19.9%	31.7	
<14%	32	
Income		< .0001
<$30,000	29.9	
$30,000-$35,000	29.8	
$35,000-$45,999	30.3	
≥$46,000	31.1	

Abbreviations: AJCC, American Joint Committee on Cancer; CRT, chemoradiation; RT, radiation; S, surgery; TTI, time to treatment initiation.
[a] The predicted numbers of days are indicated according to each covariate, and the expected TTI is indicated across the population if every individual had the given covariate value, assuming every other variable remained constant.
[b] P values were calculated using the Vuong likelihood ratio test.

increased TTI included: treatment with primary RT (TTI, 39 days) or CRT (TTI, 39 days), transitions in care (TTI, 37 days), Hispanic ethnicity (TTI, 35 days), advanced disease stage (TTI, 33 days for stage IV), and treatment at an academic facility (TTI, 33 days).

DISCUSSION

The TTI for patients with HNSCC in the United States is increasing for all tumor stages, facility types, and treatment modalities. Furthermore, pursuit of care at a different facility from the one that assigned the diagnosis is becoming more common, chiefly by transitioning to an academic center.

The trend in rising TTI for HNSCC in the United States has 3 possible sources: increases in sophistication and the number of pretreatment radiologic/pathologic investigations, increases in the use and complexity of multimodality therapies, and increased transitions in care.

Increased Pretreatment Radiologic/Pathologic Investigations

The NCDB does not contain information surrounding diagnostic imaging or pathologic testing. Therefore, it is impossible to directly determine the impact of pretherapy diagnostic testing on this patient population. However, data suggest that pretreatment imaging became more common between 1998 and 2011. In 2001, Medicare covered ^{18F}fluorodeoxyglucose/positron emission tomography (FDG/PET) when used for the diagnosis,

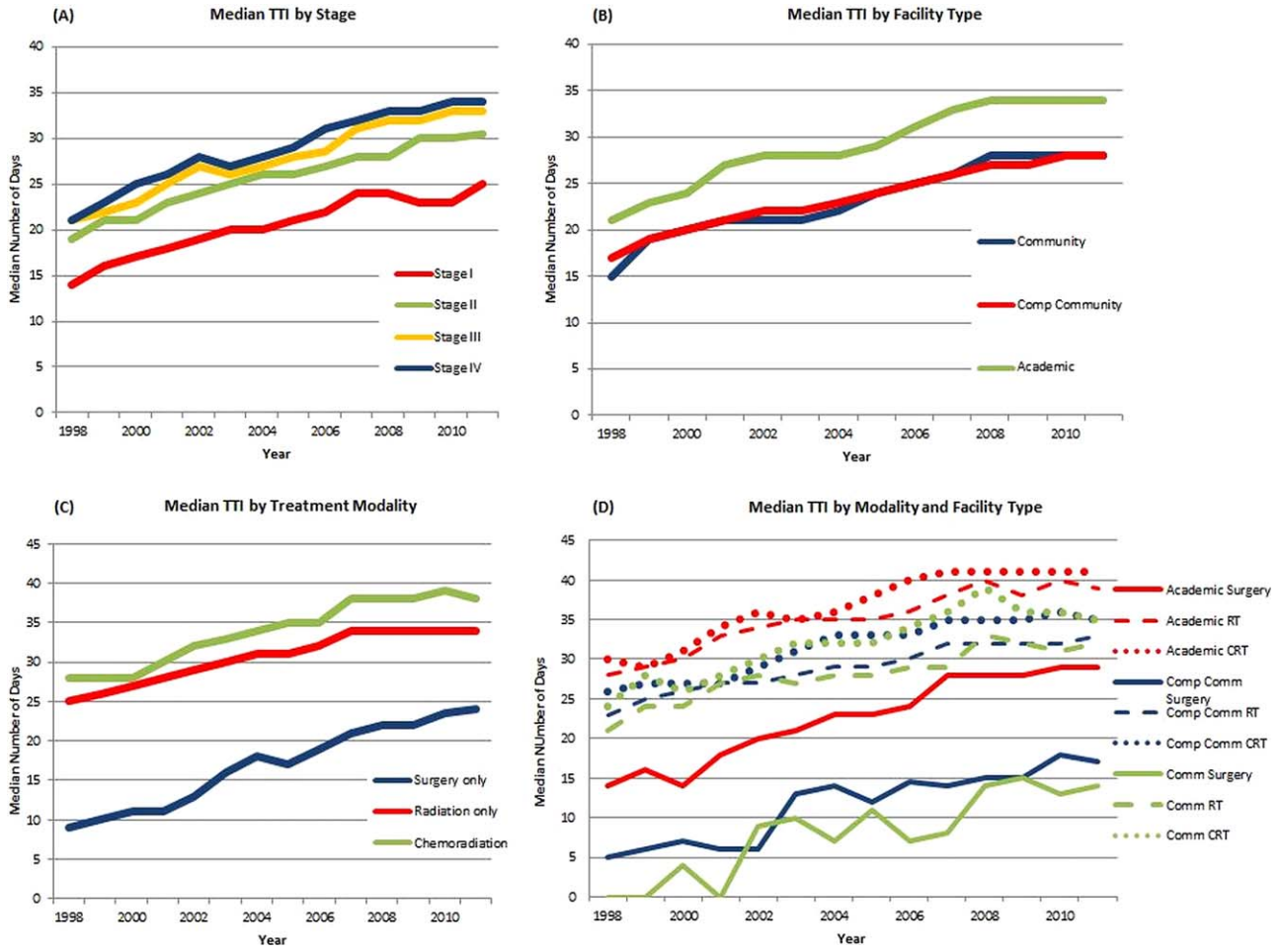

Figure 2. Trends in the time to treatment initiation (TTI) are illustrated according to (A) disease stage, (B) facility type, (C) treatment modality, and (D) facility type plus treatment modality. The Spearman test for trend was significant within each trend line in A through D ($P_{trend} < .0001$), and the Kruskal-Wallis test was used to compare differences across (A) stage, (B) facility type, (C) treatment modality, and (D) facility plus treatment modality (all significant at $P < .0001$). RT indicates radiotherapy; CRT, chemoradiation; Comm, community facility; Comp Comm, comprehensive community facility.

staging, and restaging of head and neck cancers.[16] Subsequent prospective investigations demonstrated that pretherapy PET/computed tomography (CT) imaging could alter the planned management of head and neck cancer.[17] Clinicians responded by ordering more PET/CT scans for the management of head and neck cancer.[18] In the middle Atlantic states, approval to reimburse for a PET/CT scan ranges from same day (Medicare claims submitted for an accepted indication) to 5 days (private insurance coverage requiring a peer-to-peer review before authorization). Increased application of diagnostic imaging crosses cancer diagnoses.[19] Time waiting for approval, scheduling, performance, and interpretation of sophisticated diagnostic imaging increases the TTI and has been identified as an independent predictor of treatment delay for breast cancer.[20]

Increasingly sophisticated diagnostic testing of biopsy specimens before assigning a diagnosis is not captured by the NCDB. At our facility, p16 staining for oropharyngeal tumors, which comprise a rapidly increasing patient population,[21] became standard in 2010. This process typically takes an additional 1 or 2 days. In addition, immunohistochemical analysis typically requires more tissue than can be acquired by office fine-needle aspiration. Additional procedures may be required, or specimens may be requested from referring facilities. Thus, obtaining and analyzing additional pathologic material increases the TTI.

Increased Sophistication of Therapy

Surveys indicate that, in 1998, <10% of responding radiation oncologists adopted intensity-modulated RT

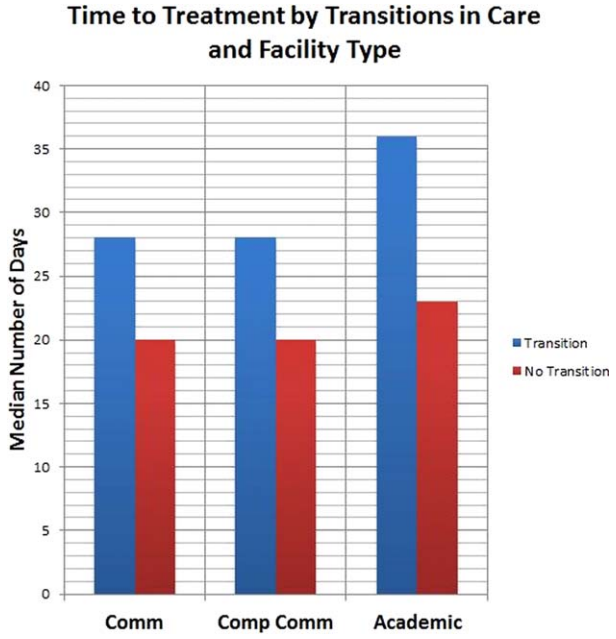

Figure 3. Transitions in care are illustrated according to facility type. The Kruskal-Wallis test was used to compare the time to treatment initiation (TTI) across facility types by transition status for comprehensive community (Comp Comm) facilities ($P = .0004$) and academic centers ($P < .0001$). Community facilities (Comm) were used as the reference category.

(IMRT); and, by 2004, >70% of responders were using IMRT regularly.[22] Although prospective data supporting the toxicity reduction[23] and cost effectiveness[24] of head and neck IMRT had not yet been published, head and neck tumors were among the earliest to be targeted with IMRT.[25,26] Two-dimensional RT could be initiated the day after consultation. Three-dimensional conformal radiotherapy, the most common planning technique in 1998, typically took 2 to 4 days to initiate therapy. By contrast, the added complexity and quality-assurance aspects of IMRT involve more personnel and take more time.[27] The time frame of this analysis coincides with the widespread adoption of CRT regimens for patients with advanced HNSCC. Although some questions persist,[28] data from the late 1990s up to today suggest that concurrent CRT is the most efficacious mechanism of combined-modality therapy.[29] The current analysis demonstrates that the use of CRT increased by >200% between 1998 and 2011. CRT typically requires referral to a medical oncologist, referral for port placement, and a hearing evaluation before the initiation of therapy. The increase in TTI, as expected, was greatest for patients with stage III and IV disease, who were likely recommended multimodality therapy, which required coordination among providers.[30]

Surgical advances also are increasing the sophistication of care. Many head and neck cancer operations currently include complex reconstructions[31] by plastic/reconstructive surgeons performed on the day of the definitive oncologic procedure. Even with preoperative, computer-guided reconstruction planning,[32] operative times are long. Six-hour to 10-hour procedures often take longer to reach the operating room because of the complexity of coordinating the schedule of 2 separate surgical teams. Specialized surgical tools now permit resections of many pharyngeal tumors through the open mouth, an approach that can reduce the morbidity of surgical exposure.[33] Head and neck surgeons at major medical centers may compete with other specialties[34-37] for the use of scarce resources, engendering longer times to schedule less morbid operations.

It is possible that the time required to reach treatment and management decisions is increasing with the growing number of available treatment options. Pursuit of a second opinion, evaluation by other disciplines, and tumor board presentations may extend TTI.

Increased Transitions in Care

This patient population frequently requires multidisciplinary care by a team of speech pathologists, dentists, oral surgeons, plastic surgeons, and nutritionists. Despite a growing number of comprehensive community centers, the current analysis demonstrates that academic institutions are treating an increasing proportion of patients over time without a commensurate increase in the number of academic centers. Academic facilities also have the highest proportion of patients transitioning their care, which we identified as one of the strongest independent predictors of longer TTI. Thus, as the supply of academic centers remains relatively fixed and the demand for their services rises, the limited number of head and neck specialist providers may contribute to prolonged TTI. We anticipate that the data provided in this analysis can serve as a benchmark to determine whether resource availability is prolonging TTI at individual institutions.

Other factors associated with increased TTI include African American race, Hispanic ethnicity, lack of insurance or Medicaid coverage, lower education levels, and distance of primary residence from the treatment facility. The influence of these socioeconomic factors on TTI is not unique to patients with head and neck cancer but, rather, is indicative of larger issues that act as potential barriers to care across many disease sites.[38-40]

Does increased TTI result in worse oncologic outcomes? Should a rising TTI be considered a "delay?" In

this study, we could not ascertain the effect of TTI on cancer-specific outcomes (ie, locoregional control and disease-free survival). The NCDB does not record such endpoints and simply includes overall survival, which is recorded only for patients who were treated before 2005. Additional limitations include those surrounding tumor registry data, like selection bias, incomplete data, and coding errors. The data presented here are restricted to hospitals reporting to the NCDB and may not reflect practice patterns in outpatient community practices, because these cases are not reported to the NCDB. For obvious ethical reasons, randomized trials will never assess TTI. Some retrospective reports have identified delay in the initiation of therapy for HNSCC as a risk factor for inferior outcomes[5-7]; however, others have observed no measurable impact.[41,42] Although, in the current analysis, we could not measure the clinical impact of TTI, in light of a rising nationwide TTI, the safest conclusion is that a patient should begin treatment as soon as reasonably possible.

Conclusion

The TTI is increasing for patients with HNSCC in the United States. Potentially intractable problems surround reductions in the time required to initiate RT or CRT, to execute surgical procedures, and to facilitate transitions from one institution to another. The rise in TTI is concerning and warrants investigation regarding the effect on oncologic outcomes. However, the appropriate management of patients with complex problems should permit the timely delivery of oncologically sophisticated care. The trend in rising TTI should not be reversed in haste at the risk of delivering suboptimal care.

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