INTRODUCTION

- Head and neck cancer (HNC) care has become increasingly regionalized to academic medical centers (AMCs) as it is a resource-intensive condition requiring multidisciplinary approaches to deliver comprehensive and personalized cancer care.1-3
- Cancer care often requires at least weekly visits, and a time and financially consuming commute may preclude patients from fully engaging in care.4
- Factors such as race and insurance status have been well-correlated to stage at presentation and mortality,5,6 but the burden of travel distance has been less-studied in HNC.
- In this study, we aimed to determine whether proximity to AMCs correlates with survival in oropharyngeal cancer (OPC), and discuss the implications of such proximity on clinical outcomes.

RESULTS

Table I. Total number of OPC cases stratified by stage.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Number of OPC cases</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>960 (5.6%)</td>
</tr>
<tr>
<td>II</td>
<td>1,349 (7.9%)</td>
</tr>
<tr>
<td>III</td>
<td>2,987 (17.5%)</td>
</tr>
<tr>
<td>IV</td>
<td>11,725 (68.9%)</td>
</tr>
<tr>
<td>Total</td>
<td>17,021</td>
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</table>

AMCs, including affiliate teaching hospital sites, were found in 161 counties of the mainland USA.

For the time period under analysis, 17,021 cases of OPC were identified. After selecting for those cases with known FIPS code and T-stage, 17,019 cases were identified, of which distance to nearest AMC was <55 miles for 12,787 (75.1%) cases, and ≥55 miles for 4,232 (24.9%) cases.

The mean age at diagnosis was 59.0 years with a male preponderance of 81.5%. TNM staging revealed a >85% majority of advanced stage disease (Table I).

Median distance to an AMC for OPC patients was 32.6 miles (25th-75th percentiles, 15.5-54.7 miles), with a minimum of 5.3 miles and a maximum of 352.4 miles.

There was statistically significant benefit in OS (Figure 2A, median survival, 101 versus 86 months, p=0.037) and DSS (Figure 2B, p=0.017) among Stage IV cases diagnosed <55 miles of an AMC.

Other stages did not demonstrate significant survival benefit from closer proximity to an AMC (OS; stage III, p=0.405; stage II, p=0.181 and stage I, p=0.932).

METHODS

- OPC cases diagnosed between 2004-2012 were extracted from the SEER database for which detailed staging and patient county code data were available.
- Locations of patients and AMCs were analyzed using Federal Information Processing Standard (FIPS) codes-five digit codes that uniquely identify US counties and county equivalents.
- Exclusion criteria included cases without a recorded T stage or FIPS code, or patients with FIPS codes outside the mainland USA.
- For each case, sex, year of diagnosis, FIPS code, tumor histopathology, extent of disease, survival time and vital status were extracted and tabulated. Standard demographic data were computed. T-stage was individually computed from the extent of disease SEER variables to correspond to the American Joint Committee on Cancer (AJCC) staging system.
- The Association of American Medical Colleges (AAMC) member directory was utilized to generate a list of AMCs in the mainland USA and their respective FIPS codes.
- Distances between patients and AMCs were tabulated in a matrix using the Center for Transportation Analysis County-to-County distance skim tree. Specifically, distances were measured between each pair of county centroids using shortest highway route, and shortest distance to AMC was extracted for each patient, as depicted in Figure 1.
- Overall survival (OS) was computed, stratified by stage, with respect to AMC proximity (within versus beyond 55 miles [75th percentile]) using the Kaplan-Meier (KM) method and compared using the log-rank test. Similarly, disease-specific survival (DSS) was computed and compared. Statistical significance was set at p<0.05.

CONCLUSIONS

- There is improved survival in Stage IV OPC cases diagnosed with closer proximity to an AMC.
- Given that the majority of OPCs are HPV associated and present as advanced stage, the potential for improved survival may warrant further regionalization of OPC care to AMCs or outreach programs for those lacking such proximity.
- Increased distance from an AMC may be an additional risk factor for advanced stage OPC patients. Further study is needed to delineate the specific reasons that increased proximity to an AMC improves survival in this population.

Figure 1. Depiction of county centroid distance mapping. (Cross = AMC; bullet points= patient FIPS codes; solid lines indicate distances as highway miles; dotted line indicates 55 mile perimeter)

Figure 2. Kaplan-Meier curves in T4 OPC patients according to proximity from AMC. A) OS, (p=0.037); B) DSS, (p=0.017).

References