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Evaluation of Early Oral Cavity Cancer Treatment Quality at a Single Institution

Steven Chang, MD; Ryan Sanii, MPH; Hamad Chaudhary, MD; Carol Lewis, MD; Michael Seidman, MD; Kathleen Yaremchuk, MD

Objective: To evaluate the adherence to oral cavity quality guidelines endorsed by the American Head and Neck Society (AHNS) at a large tertiary care hospital.

Methods: This retrospective study identified patients treated for early-stage oral tongue squamous cell carcinoma at a tertiary care hospital from 1992 to 2013. Patient charts were reviewed for 26 process quality measures and four key indicator process quality measures as endorsed by the AHNS. Patients were then grouped by diagnosis date either before (historical group, 1992–2007) or after (current treatment group, 2008–2013) the published process quality measures from the AHNS. Descriptive statistics were used to evaluate the rates of adherence for each process quality measure within the two groups.

Results: Of the 57 patients identified, 29 were female (51%). The mean age was 62.3 years. A majority of the oral cavity cancers were stage I (59.6%), followed by stage II (35.1%) and stage III (5.3%). Compliance with the process quality measures was in the acceptable range in both cohorts. However, several areas demonstrated lower adherence in both cohorts. Statistically significant improvements were noted between the two cohorts, which showed a measurable improvement in adherence to process quality measures in several key areas over time.

Conclusion: Using the process quality measures proposed by the AHNS, adherence to the process quality measures for early-stage oral cavity cancer care at a tertiary care center was successfully evaluated. In general, good compliance with the proposed process quality measures was found and several areas for improvement were identified.

Key Words: Quality measures, oral cavity cancer, guidelines.

Level of Evidence: 2c

INTRODUCTION

The United States spends approximately $4 trillion annually on health care, which amounts to 21% of the gross domestic product. Due to this enormous amount of healthcare expenditure, a significant effort has been focused on determining the value of care provided, defined as a ratio of quality over cost. This study focused on the quality component of the value ratio for head and neck cancer patients; however, because of the absence of a national benchmark for comparison, this study aimed to evaluate the quality of oral cavity cancer care at a single institution based on process quality measures published by the American Head and Neck Society (AHNS) in 2007. These process quality measures were evaluated in 2010 by Hessel et al., who proposed four key indicator process quality measures from the comprehensive list.

The quality measures of cancer care delivered by a provider or provider organization can be divided into three general categories: structure, process, and outcome. Structural quality measures refer to health system characteristics, such as whether the hospital is a secondary or tertiary care center. Process quality measures evaluate the health care provider's decisions in the care of the patient, such as whether a recommended intervention, test, or referral occurred. Outcome quality measures evaluate the actual results of the care provided. In oncology, typical outcome measures include overall survival, patient reported quality of life, or patient-reported satisfaction.

Understanding the quality of cancer care delivered by an institution or physician practice is important for two reasons. First, clinicians must know their current adherence to quality process measures of care before they can identify areas for improvement. Second, there has been a movement to link the quality of cancer care provided by a clinician or provider organization to payer reimbursement.

Value-based or performance-based reimbursement models have been developed by many insurers, incentivizing "high value" care and penalizing "low value" care. The Centers for Medicare and Medicaid Services (CMS) is the single largest payer for healthcare in the United States. Nearly 90 million Americans rely on CMS health care...
benefits through Medicare, Medicaid, and the State Children’s Health Insurance Program. CMS has three programs that incentivize high value care: the Oncology Care Model, Value-Based Purchasing, and Merit-based Incentive Payment System. The CMS Oncology Care Model is a program in which physician practices enter into payment arrangements that include financial and performance accountability for episodes of care surrounding chemotherapy administration to cancer patients. The CMS Value-Based Purchasing program rewards providers for their quality of care by adjusting payments to hospitals under the Inpatient Prospective Payment System based on the quality of care they deliver. The CMS Merit-based Incentive Payment System adjusts payment based on performance in four performance categories: quality, cost, advancing care information (known as meaningful use), and improvement activities.

In comparison, Canada, with its single payer system, has required the regionalization of head and neck cancer care in which patients must be referred away from local centers to the designated regional centers of excellence. Whether the United States retains the current multipayer model of healthcare or begins the movement toward regionalization of care, it is imperative to provide evidence regarding quality of care to either justify costs or potentially exclude physician practices from reimbursement.

Head and neck cancers only represent 3% to 6% of the solid tumors in the United States; however, the multidisciplinary treatment paradigms are complex and the cost of care significant. Historically, the quality of head and neck cancer treatment was evaluated by quality outcome measures (overall and disease-free survival of patients) based on the American Joint Committee on Cancer stage. From a treatment or research standpoint, these standard survival outcome measures should not be completely supplanted. However, these quality outcome measures are flawed when determining the quality of care because they are significantly confounded by patient comorbidity, socioeconomic status, and other patient-related factors. The AHNS quality measures for oral cavity cancer are process measures that focus on critical aspects of accepted standards and best practices rather than specific outcomes measures.

Other tumor systems, such as breast and colon cancer, already have established process quality measures to evaluate the quality of cancer care delivery and ensure that treating institutions meet a minimum standard. These quality process measures are independent of patient comorbidity and seek to evaluate physician adherence to quality process measures and hospital interventions. Reporting of these quality process measures and achieving a level set by the American College of Surgeons are essential to maintain cancer center accreditation. For otolaryngology—head and neck surgery as a specialty, it is important to benchmark and validate process quality measures specific to head and neck cancers.

The objective of this study was to evaluate the quality of oral cavity cancer care at a tertiary hospital by using the AHNS oral cavity cancer quality process measures.

MATERIALS AND METHODS
This retrospective cohort study used the AHNS 26 oral cavity quality process measures and the four key quality process measures as proposed by Hessel et al. to compare one institution’s quality of oral cavity cancer care before and after publication of the guidelines. Since the AHNS quality measures were approved in 2007, the year 2008 was used as an arbitrary cutoff date collection to allow time for implementation and adoption.

Early-stage oral cavity cancer patients were identified via the institution’s tumor registry using International Classification of Diseases for Oncology codes. Patients surgically treated from January 1992 to October 2013 were eligible for inclusion in the study. Only patients who had a final diagnosis of tumor (T)1-2, node (N)0-1 oral tongue squamous cell carcinoma prior to definitive treatment were included. Those diagnosed from January 1992 to December 2007 were the pre-guidelines group (historical cohort), and those diagnosed from January 2008 to October 2013 were the post-guidelines group. This study was approved by the hospital’s institutional review board.

Chart abstraction was performed to determine adherence to the oral cavity cancer quality process measures. Information collected included patient demographics, date of diagnosis, pathology reports, referral and consultation information, surgical treatment, adjuvant therapy, imaging studies, patient notes, tumor board reports, surveillance information, appropriate staging at diagnosis, documentation of histopathological margin status, appropriate referral to radiation therapy, and appropriate elective neck dissection in patients with greater than 4 mm depth of invasion.

The AHNS 26 quality process measures evaluating pretreatment, treatment, and follow-up assessment were also abstracted. The key quality process measures as refined by Hessel et al. were determined as follows.

Staging
The staging criteria used in the study followed the recommendations of the sixth edition tumor-node-metastasis (TNM) staging system developed by the American Joint Committee on Cancer. Staging at diagnosis qualified if there was documentation of staging at the initial visit or after imaging studies were performed. Staging documented after surgery was not included given that appropriate assessment prior to surgery would include proper staging to evaluate possible treatment options and risk stratification.

Postoperative Radiation Therapy
Following the AHNS recommendations and the National Comprehensive Cancer Network’s guidelines, patients should be referred for adjuvant radiotherapy if signs of positive margin status or perineural or lymphovascular invasion were identified. Proper referral of patients to radiotherapy included patients who were given the option but chose to forgo radiotherapy. Patients who did not have documentation of any of the listed variables were documented as being nonadherent to appropriate referral to radiotherapy.

Selective Neck Dissection
Patients with undocumented depths of invasion or patients with documented depths of invasion greater than or equal to 4 mm but no documented neck dissection were all classified as not receiving appropriate treatment.
**Statistical Analysis**

Standard descriptive statistics were used to characterize the data. Correlations were assessed by the Pearson chi-square test or by the two-tailed Fisher exact test when there were fewer than 10 subjects. All statistics were done using SAS Version 9.3 (SAS Institute Inc, Cary, NC).

**RESULTS**

Of the 57 patients included in the study, 29 were female (51%) and the mean age was 62.3 years. Patients were treated by nine clinicians over the study period. The two cohorts are detailed in Table I. No statistical differences were noted between the two groups. Although the historical cohort had a trend toward earlier cancer stages and a lower incidence of cases, neither were statistically significant.

The two populations were evaluated for adherence to the four key indicator process quality measures proposed by Hessel et al. (Table II). The documentation of clinical stage at diagnosis was statistically significant ($P$ value = 0.032). Although the other process quality measures did not achieve statistical significance ($P$ value = 0.188 and $P$ value = 0.184), whether a patient had an appropriate neck dissection approached statistical significance ($P$ value = 0.075).

Pretreatment process quality measures compliance were also evaluated. These quality process measures pertain to the quality of the assessment of cancer patients prior to the initiation of treatment. Implicit in these quality process measures is that a comprehensive assessment would lead to a more complete treatment plan. Table III illustrates that, over time, a statistically significant improvement occurred in pretreatment assessment of patients. The overall adherence to the AHNS process quality measures was generally above 90%, except for three key measures: tobacco cessation counseling, preoperative speech language pathology evaluation, and preoperative dental examination.

An essential component of ensuring quality treatment of oral cavity cancers is the pathological evaluation. Pathology drives the need for adjuvant treatment, pathology staging, and prognosis. The quality process measures proposed by the AHNS pertain to the completeness of the pathologic evaluation intraoperatively as well as on final pathology. The quality of the pathologic evaluation and documentation did not have significant changes over time and appears to have improved overall (Table IV). One area of statistical significance ($P$ value = 0.003) was the reporting of the depth of invasion.

The process quality measures of follow-up after treatment were evaluated. After the AHNS oral cavity quality process measures were published, there was statistically significant improvement in the presentation of the surgical pathology to the tumor board ($P$ value = 0.003) and speech language pathology follow-up ($P$ value = 0.001). The other process quality measures also improved; however, the overall percentages of patients receiving follow-up assessments were still low (Table V).

As a result of this evaluation, several alterations to the patient care pathway were implemented to improve adherence to quality process measures for all aerodigestive malignancies (larynx, pharynx, and oral cavity). Figure 1 depicts the clinical pathway for an early oral cavity cancer. Of note, this clinical pathway was implemented after the study period. Figure 1A depicts the previous clinical care pathway for patients at our institution, which also represents the standard of care. In this pathway, once a patient is diagnosed with a cancer, the patient is referred for evaluation by a head and neck surgeon. The patient’s subsequent treatment recommendation may or may not be presented to a multidisciplinary tumor conference prior to surgical treatment. After surgery, the patient was only referred to a speech language pathologist (SLP) if the patient reported speech or swallowing difficulty. If the patient did not report any difficulties and there were no objective clinical findings of aspiration or unintelligible speech, then no referral is given to the patient. The patient then transitions to survivorship.

Figure 1B depicts the significant alterations to the patient experience to improve compliance with quality

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**TABLE I.**

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Age at diagnosis (years)</td>
<td>63.3 ± 16.5</td>
<td>60.9 ± 13.3</td>
<td>0.542</td>
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<tr>
<td>Gender</td>
<td></td>
<td></td>
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<tr>
<td>Female</td>
<td>48.0%</td>
<td>53.1%</td>
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</tr>
<tr>
<td>Male</td>
<td>52.0%</td>
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<tr>
<td>Race</td>
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<tr>
<td>White</td>
<td>88.0%</td>
<td>75.0%</td>
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<td>Black</td>
<td>8.0%</td>
<td>21.9%</td>
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<tr>
<td>Other</td>
<td>4.0%</td>
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<td>AJCC stage</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Stage I</td>
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<td>14</td>
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<tr>
<td>Stage II</td>
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<tr>
<td>Stage III</td>
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<td></td>
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<tr>
<td>Stage IV</td>
<td>0</td>
<td>3</td>
<td></td>
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</tbody>
</table>

*AJCC = American Joint Committee on Cancer.*

**TABLE II.**

<table>
<thead>
<tr>
<th>Four Key Indicators of Quality Measures.</th>
<th>Before Guidelines</th>
<th>After Guidelines</th>
<th>$P$ Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documentation of stage at diagnosis</td>
<td>69.9%</td>
<td>88.0%</td>
<td>0.032</td>
</tr>
<tr>
<td>Margin status documented</td>
<td>92.0%</td>
<td>100.0%</td>
<td>0.188</td>
</tr>
<tr>
<td>Appropriate referral for external beam radiation therapy</td>
<td>16.0%</td>
<td>31.3%</td>
<td>0.184</td>
</tr>
<tr>
<td>Appropriate neck dissection performed</td>
<td>56.0%</td>
<td>78.1%</td>
<td>0.075</td>
</tr>
</tbody>
</table>

*All significant $P$ values are bold and italicized.*
process measures. Our current care pathway starts with the referral to the head and neck surgeon. During the initial visit, a nurse navigator is assigned to the patient who is responsible for arranging appointments and moving the patient through the clinical pathway. Next, all patients are evaluated by a head and neck-specific SLP, dietician, psychologist, and dentist. The purpose of this visit is to introduce the patient to the rehabilitative team to counsel the patient on expectation for treatment and anticipated treatment-related effects. The SLP and dietician focus on swallowing, speech, and nutritional alterations that occur with surgery. The psychologist addresses/identifies any psychosocial issues for the patient and performs a detailed social history and cognitive assessment of the patient in preparation for treatment. Next, all patients are presented to the multidisciplinary head and neck tumor board for discussion. During the conference, a checklist is reviewed after discussion to ensure that proper referrals and workup are completed. An example of the checklist is displayed in Figure 1B. The inclusion of the checklist in patient evaluations significantly increased adherence to process quality metrics and enrollment into clinical trials at our institution.

After surgery, all surgical pathology is reviewed again in the multidisciplinary head and neck tumor board to ensure that surgical quality process measures are met and that proper adjuvant treatment referrals are made for the patient. Additionally, all patients are referred to the posttreatment evaluation by the SLP, dietician, and psychologist. This provides a smoother transition to survivorship for the patient and allows the team to address any treatment-related issues proactively. Of note, if any patient requires radiation in the postoperative setting, the same team of the SLP, dietician, and psychologist will follow the patient in the radiation oncology clinic.

**DISCUSSION**

Adherence to the AHNS-endorsed quality process measures for the treatment of early oral cavity cancer at a tertiary care facility was successfully evaluated over time. This study also demonstrated that over time the adherence to the quality process measures improved in several areas. The reasons for the improvement are likely a result of several factors, including an improved...
electronic medical record system that allows for ease of documentation and reporting, an effort to template pathology reporting, an increase in the number of fellowship-trained head and neck surgeons in the department, and an increase in the volume of cases. Many of the absolute percentages after 2008 were comparable to those published by Hessel et al.2

Despite these improvements, there were some areas of persistent concern, such as the low rate of appropriate referral to external beam radiation and pretreatment evaluation by a SLP and dentist. To address this gap, several changes were made to the clinical practice that are depicted in Figure 1. What is not discussed in the figure is that a head and neck-focused SLP, psychologist, and dentist were added to the multidisciplinary team. This greatly improved the adherence and logistics of standardizing the patient care pathway.

This data also highlights a significant challenge in contemporary cancer care: the adoption of best practices by practitioners. A study by Lewis et al.14 found that 43.0% of patients referred to their institution had prereferral care that was noncompliant with National Comprehensive Cancer Network (NCCN) guidelines (quality process measures defined by the AHNS are derived from many of the NCCN recommendations). A large study by Huang et al. showed that physicians generally felt favorably about the NCCN guidelines and concordant with the care they provided.15 However, 30% of surgeons did not use the guidelines to guide cancer management decisions. Furthermore, 17% of the physicians did not inform patients that the care recommended was not adherent to NCCN guidelines.10 Most clinicians agree on the importance and the content of the guidelines; however, very few feel the need to comply with them or discuss deviation from the guidelines with patients.

The primary shortcoming of this study was the lack of power for advanced statistical analysis. This study does demonstrate the feasibility of collection of the data, and it is hoped that this may start a conversation to identify key measures of quality and link these process measures to outcomes measures. This would allow for the establishment of national benchmarks for head and neck cancer care. Of note, it may not be necessary to develop measures for each subtype and subsite of head and neck cancer. A few key quality process measures that have been properly validated would be sufficient to serve as surrogate markers of the overall quality of head and neck cancer care.

Achieving these benchmarks may not be under the surgeon’s control. For instance, although a surgeon may have the surgical expertise to care for a patient, the surgeon’s hospital system may not provide the services necessary to achieve these benchmarks. Because these are very sensitive issues with significant implications, these process quality measures need to be developed by clinicians with sustained engagement to ensure that the measures developed lead to high value care without being exclusionary. Process quality measures are not meant to be static. The quality measures need to evolve to reflect contemporary practices, which is again why sustained clinician engagement is essential to the process. Once a process quality measure achieves 100% adherence, it should
be retired and new ones developed to allow for continual improvement of the care provided to patients. At a minimum, practices must evaluate their own outcomes and compliance with quality-process measures to understand if they are providing high-value care and whether they have the resources to achieve best practices.

Many practices do evaluate their performance through retrospective chart review. Graboyes et al. evaluated their practice with head and neck cancer patients. They evaluated their compliance with quality process measures and demonstrated improved survival. The quality process measures that were used were very similar to those proposed by the AHNS. However, their quality process measures did not entirely overlap with the guidelines. To validate national measures of quality in an attempt to improve the value of cancer care, there must be consensus on which quality process measures should be adopted. Professional societies, such as the AHNS and its membership, can serve as the appropriate source to determine which measures should be chosen for validation, regardless of the origin of the quality process measures.

CONCLUSION

The quality initiative that was started by the establishment of the AHNS-endorsed quality measures in 2007 required a collaborative multi-institutional effort and the continued support of professional societies. The Accreditation Council for Graduate Medical Education, professional societies, and specialty boards have adopted practice-based learning and improvement as an important aspect of medical practice. They recognize the benefit of looking at clinician performance against guidelines in a rapidly changing medical environment. As stated previously, the value of care is of increasing importance and will affect the financial success for both academic and private physicians and result in better care for patients.

BIBLIOGRAPHY