

# Quality Indicators of Oropharyngeal Cancer Care in the Elderly

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## Abstract

**Objective:** To examine associations between quality of care, survival, and costs in elderly patients treated for oropharyngeal squamous cell cancer (SCCA).

**Study design:** Retrospective analysis of Surveillance, Epidemiology, and End Results (SEER)-Medicare data.

**Methods:** We evaluated 666 patients diagnosed with oropharyngeal SCCA from 2004-2007 using multivariate regression and survival analysis. Using quality indicators derived from guidelines for recommended care, summary measures of quality were calculated for diagnosis, initial treatment, surveillance, treatment for recurrence, end-of-life care, and performance, and an overall summary measure of quality.

**Results:** High-quality care was associated with significant differences in survival for initial treatment (HR=0.55 [0.41-0.73]), surveillance (HR=0.32 [0.22-0.48]), treatment of recurrence (HR=2.37 [1.56-3.60]), performance measures (HR=0.50 [0.36-0.69]), and the overall summary measure of quality (HR=0.53 [0.39-0.71]). High-quality salvage surgery was associated with improved survival (HR=0.16 [0.04-0.54]) while high-quality chemotherapy given for recurrence was associated with worse survival (HR=5.70 [1.92-16.94]). High-quality care was associated with significantly lower mean incremental costs for treatment of recurrence and end-of-life care, and higher costs for diagnosis and surveillance.

**Conclusions:** High-quality oropharynx cancer care in elderly patients was associated with improved survival; however, high-quality care for treatment of recurrence was associated with poorer survival, primarily due to poorer survival in patients treated with chemotherapy. These data suggest a need to reexamine the application of oropharyngeal cancer treatment guidelines in the elderly, and to develop sensitive and valid quality indicators of head and neck cancer care in this population.

## Introduction

Quality in health care has been identified as a major target for health care reform following a series of landmark reports by the Institute of Medicine (IOM) that documented a large gap between ideal health care and the reality of the care that many Americans receive. There is a lack of readily available data on quality of care for patients with head and neck cancer, which is a barrier to improving decision-making for patients and clinicians.

We undertook the present study to determine if differences in quality of care were associated with differences in survival, using quality indicators derived from the National Comprehensive Cancer Network (NCCN) guidelines for oropharynx cancer care and established quality indicators for end-of-life care and performance to derive a set of summary quality measures that span the spectrum of cancer care.

## Methods and Materials

A cross-sectional analysis of patients diagnosed with oropharyngeal cancer in 2004-2007 was performed using discharge data from the Surveillance, Epidemiology and End-Results (SEER)-Medicare linked database. Patients with oropharynx squamous cell cancer without a previous diagnosis of head and neck cancer or lymphoma comprised the study population. The SEER site code for tongue does not distinguish between oral tongue and base of tongue and was excluded as a result. Patients with in situ disease, distant metastatic disease at presentation, diagnosis by autopsy or death certificate, and less than one year of continuous claims were excluded from analysis, as were patients enrolled in Medicare health maintenance organizations, because health maintenance organizations do not generate claims for their care. Patients were followed through December 2009 until the end of data (ineligibility or end of claims) or death.

Quality indicators were derived from NCCN guidelines for oropharynx cancer for diagnosis, treatment, surveillance, and management of recurrence, with additional indicators derived for end-of-life care and performance, based on previously defined markers for quality care.<sup>1</sup> We calculated a summary measure of quality by phase of cancer care (diagnosis, initial treatment, surveillance, treatment of recurrence, end-of-life care, and performance), and an overall summary measure of quality. Each score was then dichotomized at the median, indicating lower-quality and higher-quality of care.

Overall survival, defined as time from diagnosis to either last claim date or death, was analyzed using the Kaplan-Meier method and multivariate Cox proportional hazard analysis. Multivariate generalized linear regression modeling with a log link was used to analyze incremental differences in costs by quality, as costs were not normally distributed.

## Results

The summary measures of quality by phase of cancer care and the overall summary measure of quality are shown in **Table 1**. Cox proportional survival analysis demonstrated that high-quality care was associated with improved survival for each of the summary measures for initial treatment, surveillance, performance outcomes, and the overall summary measure of quality. (**Table 2**) High-quality care for diagnosis and end-of-life care were not associated with survival, and high-quality care for recurrent disease was associated with poorer survival. After adjusting for type of salvage treatment and time to salvage treatment, high-quality surgical care for recurrence, defined as no surgery for distant metastatic disease, was associated with improved survival (HR 0.16 [0.04-0.54], P=0.004), while high-quality additional cancer-directed treatment with chemotherapy was associated with worse survival (HR 5.70 [1.92-16.94], P=0.002), suggesting that the poorer survival associated with high-quality care for recurrent disease was related to the use of chemotherapy. High-quality care was associated with significantly lower mean incremental costs for treatment of recurrent disease and the end-of-life care, after controlling for stage, age at diagnosis, site, sex, race, marital status, comorbidities, SEER region, initial treatment, and hospital volume, compared to the reference group of low-quality care. (**Figure 1**)

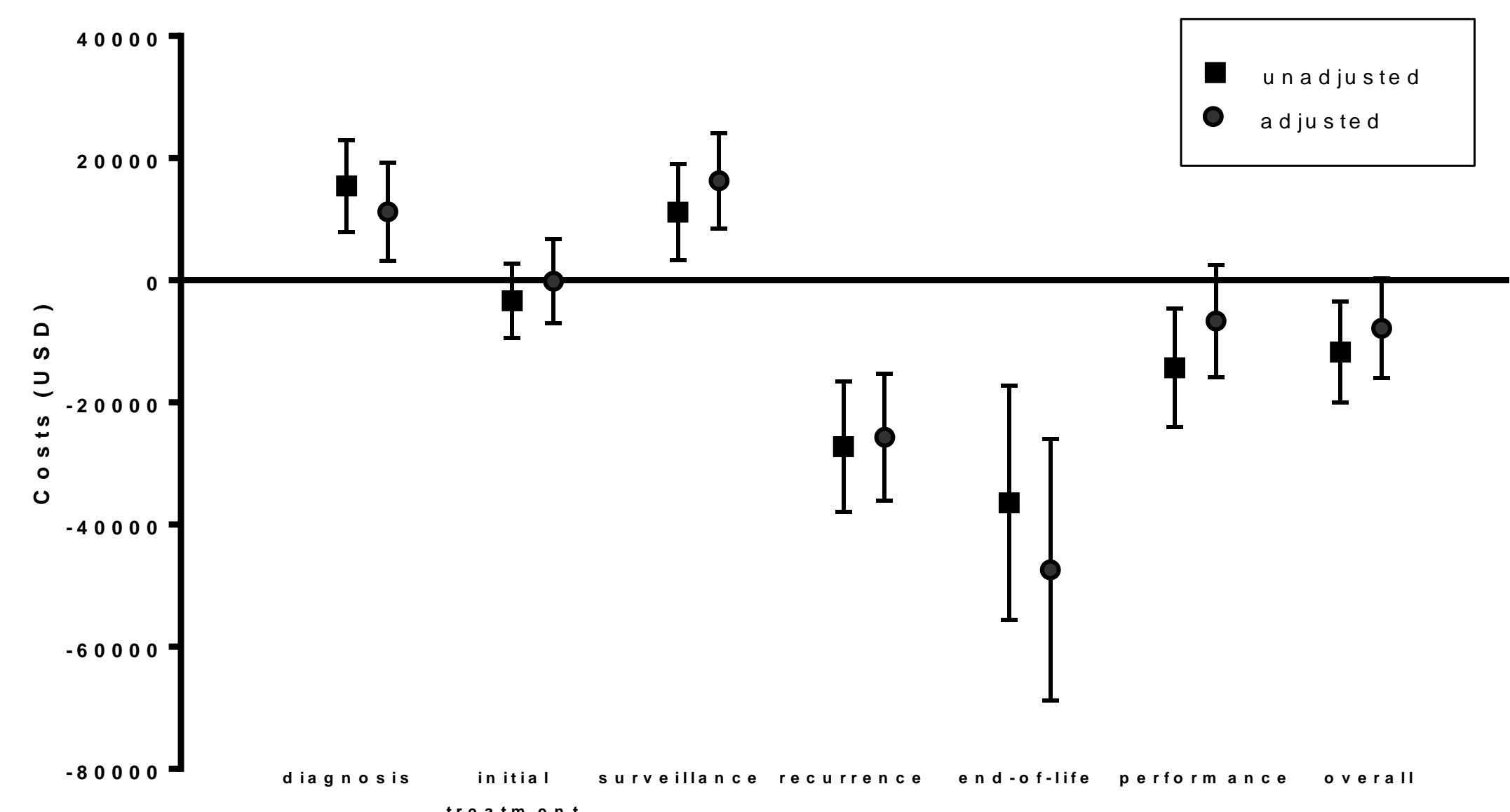
**Table 1. Descriptive statistics summarizing quality scores.**

	N	Mean (SD)	Median (range)	Quartile Ranking, N (%)			
				0-25%	25-50%	50-75%	75-100%
Overall	666	0.65 (0.21)	0.67 (0,1)	44 (7)	174 (26)	242 (36)	206 (31)
Diagnosis	666	0.63 (0.20)	0.75 (0,1)	86 (13)	155 (23)	391 (59)	34 (5)
Initial treatment	642	0.46 (0.40)	0.50 (0,1)	260 (41)	168 (26)	34 (5)	180 (28)
Surveillance	600	0.33 (0.20)	0.38 (0,1)	194 (32)	332 (56)	63 (11)	8 (1)
Treatment of recurrent disease	340	0.55 (0.37)	0.50 (0,1)	*	151 (44)	*	106 (31)
End of life	70	0.63 (0.29)	0.60 (0,1)	12 (17)	13 (19)	13 (19)	32 (45)
Performance	666	0.90 (0.19)	1 (0,1)	*	*	106 (16)	555 (83)

**Table 2. Overall survival (OS) estimates, by categories of receipt of quality indicators.**

	N	1 yr OS	2 yr OS	5 yr OS	Hazard Ratio
All patients	666	73 (70, 76)	59 (55, 62)	41 (35, 46)	
<b>Diagnosis</b>					
Low	98	70 (60, 78)	57 (47, 66)	48 (34, 61)	
High	568	74 (70, 77)	59 (55, 63)	39 (33, 45)	0.83 (0.58, 1.19)
<b>Initial treatment</b>					
Low	269	62 (56, 67)	48 (42, 54)	31 (23, 39)	
High	373	83 (79, 86)	68 (63, 73)	50 (43, 57)	<b>0.55 (0.41, 0.73)</b>
<b>Surveillance</b>					
Low	456	75 (70, 78)	58 (53, 62)	41 (35, 47)	
High	144	99 (95, 99)	87 (80, 91)	52 (28, 71)	<b>0.32 (0.22, 0.48)</b>
<b>Treatment of Recurrence</b>					
Low	104	91 (84, 95)	75 (66, 83)	54 (40, 67)	
High	236	78 (72, 83)	57 (50, 63)	32 (23, 42)	<b>2.37 (1.56, 3.60)</b>
<b>End-of-Life</b>					
Low	25	32 (15, 50)	14 (4, 31)	0	
High	45	29 (17, 42)	11 (4, 22)	0	0.55 (0.24, 1.29)
<b>Performance</b>					
Low	86	44 (33, 54)	35 (25, 46)	29 (18, 40)	
High	580	77 (74, 81)	62 (58, 66)	42 (36, 48)	<b>0.50 (0.36, 0.69)</b>
<b>Overall</b>					
Low	120	53 (44, 62)	39 (30, 48)	28 (18, 39)	
High	546	78 (74, 81)	63 (59, 67)	43 (37, 49)	<b>0.53 (0.39, 0.71)</b>

**Figure 1. Generalized linear regression of mean incremental costs of oropharynx cancer care for patients receiving high-quality compared to the reference group of low-quality care.**



## Conclusions

High-quality oropharynx cancer care in elderly patients was associated with improved survival; however, high-quality care for treatment of recurrence was associated with poorer survival, primarily due to poorer survival in patients treated with chemotherapy. Cost of high-quality care varied by stage of care with higher costs for high-quality diagnostic care and surveillance, but lower costs for high-quality care for recurrent disease and end-of-life care. These data suggest a need to reexamine the application of oropharyngeal cancer treatment guidelines in the elderly, and to develop sensitive and valid quality indicators of head and neck cancer care in this population.

1. Gourin CG, Frick KD, Blackford AL, Herbert RJ, Quon H, Forastiere AA, Eisele DW, Dy SM. Quality indicators of laryngeal cancer care in the elderly. *Laryngoscope*, 2014; 124:2049-2056