

ABSTRACT

Objectives: Lymph node yields following neck dissection have been associated with differences in survival suggesting that lymph node yield LNY could be used as a marker of quality surgery. The objective of this study was to evaluate trends in LNY in neck dissections oral cavity carcinoma.

Methods: Data was obtained from the Surveillance, Epidemiology, and End Results (SEER 18) database. Inclusion criteria included diagnosis of malignant oral cavity cancer (tongue and floor of mouth) from January 1, 2006 – December 31, 2016. Cases from the Alaska registry were excluded due to inadequate county level information. Patients with AJCC 6th edition Stages 1-4a who underwent surgery were included.

Results: The median LNY among 8580 patients in the sample was 25 LNs (Interquartile range 14-39). Lymph node yield statistically increased over time from 22 LNs in 2004 to 27 in 2014 ($p < 0.0001$). In contrast, there was no change in the median number of positive LNs during the period (2 in 2004 and 2014). There was no significant difference in lymph node yield based on sex, region, insurance status, relative location to a metropolitan center. After adjusting for patient age, sex, race, marital status, regional income and percent current smokers, tumor site and TNM stage, LNY was associated with improved survival. Specifically, resection of >45 lymph nodes compared to <18 was associated with improved survival (hazard ratio 1.1, $p = 0.028$) independent of the aforementioned factors. Nevertheless, overall survival improvements were independent of LNYs during this period.

Conclusion: Over a decade, LNY of neck dissections for oral cavity carcinoma increased. While LNY is not associated with sex, age, insurance status, or relative location to a metropolitan center, it is associated with increased survival. The improved survival of oral cavity patients may be partially attributed to a change in surgical practice.

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INTRODUCTION

- Neck dissection (ND) is a highly effective diagnostic and therapeutic procedure to assess and treat metastases in regional lymph node basins.
 - Elective neck dissection (END) – performed for staging purposes in clinically negative necks (cN0) with oral cavity cancer has been shown to improve survival for oral cavity cancer
 - Therapeutic neck dissection – employed in the curative setting to remove metastatic disease to the neck. A lymph node (LN) count of at least 18 has been associated with improved survival, regardless of number of metastases. Lymph node yield (LNY) of 18 has been proposed as a quality metric in head and neck surgery.
 - While it is increasingly recognized that lymph node yields reflect the adequacy of neck dissection, trends in LNY over time have not been previously investigated.

- Objective: To evaluate trends in LNY neck dissections for oral cavity carcinoma in the US

METHODS

- Data obtained from Surveillance, Epidemiology, and End Results (SEER 18)
 - collects cancer incidence and survival data from 18 population based registries
 - de-identified, publically available database
- Included patients with Oral cavity SCC diagnosed between Jan 1, 2004 – Dec 31 2014
 - Data obtained – demographic, county attributes, adjacency to tertiary care center, pathologic cancer stage
- Analysis
 - Chi squared for clinical and non-clinical factors
 - Cox-regression for survival analysis

RESULTS

Table 1. Selection criteria: 22
Site and Morphology: ICD-O-3/WHO 2008 = 'Tongue', 'Floor of Mouth'
Histology – broad groupings = '8050-8089: squamous cell neoplasms'
Microscopically confirmed
Primary Site – C02.0-Dorsal surface of tongue, NOS, C02.1-Border of tongue, C02.2-Ventral surface of tongue, NOS, C02.3-Anterior 2/3 of tongue, NOS, C02.8-Overlapping lesion of tongue, C02.9-Tongue, NOS, C03.0-Upper gum, C03.1-Lower gum, C03.9-Gum, NOS, C04.0-Anterior floor of mouth, C04.1-Lateral floor of mouth, C04.8-Overlapping lesion of floor of mouth, C04.9-Floor of mouth, NOS, C06.0-Cheek mucosa, C06.2-Retroauricular area, C06.8-Overlapping lesion of other & unspecified mouth
2004-14
Exclude
No lymph nodes removed
Death certificate only cases

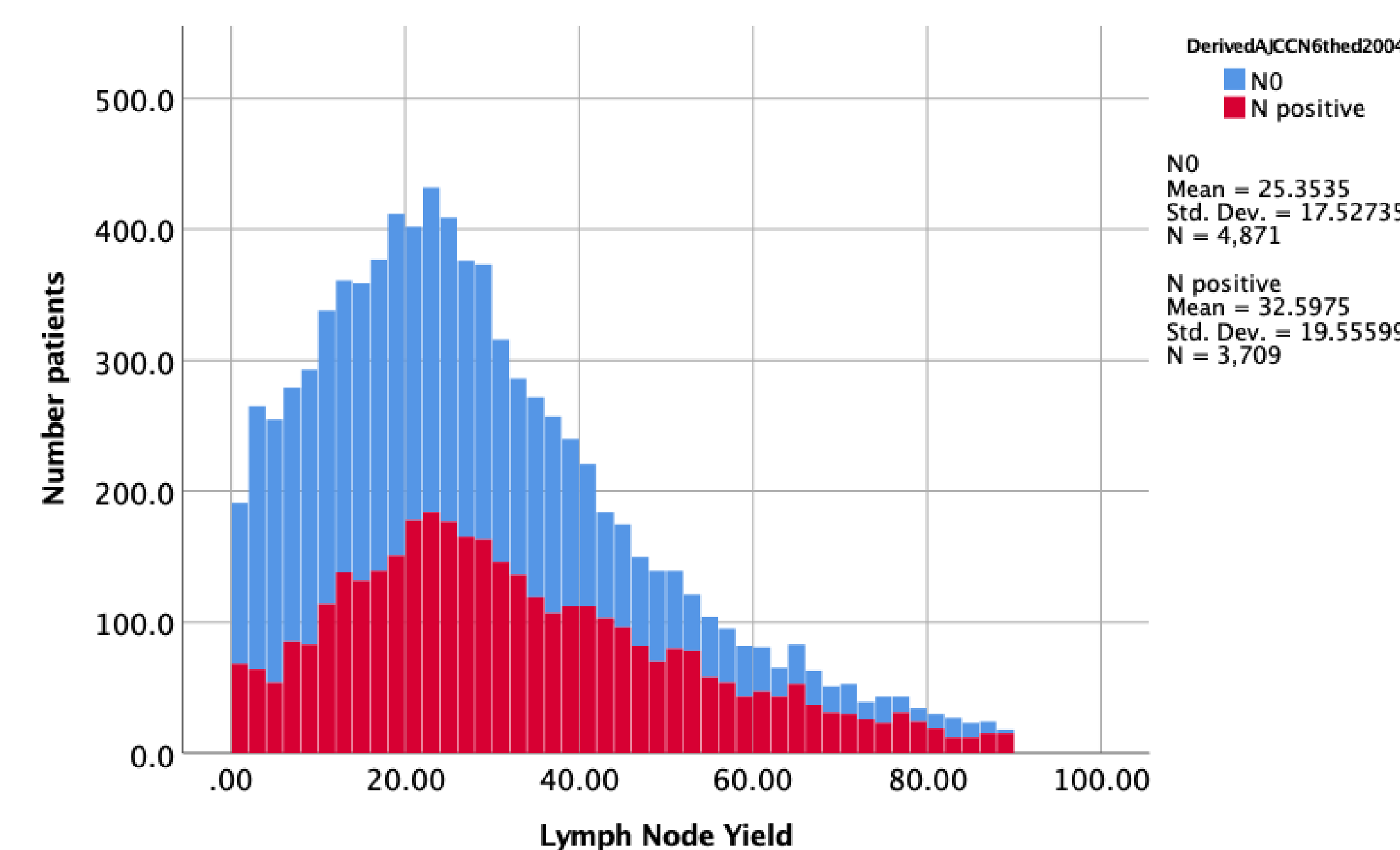


Figure 1. The median LNY among 8580 patients in the sample was 25 LNs (Interquartile range 14-39).

Increase in Lymph Node yield over time

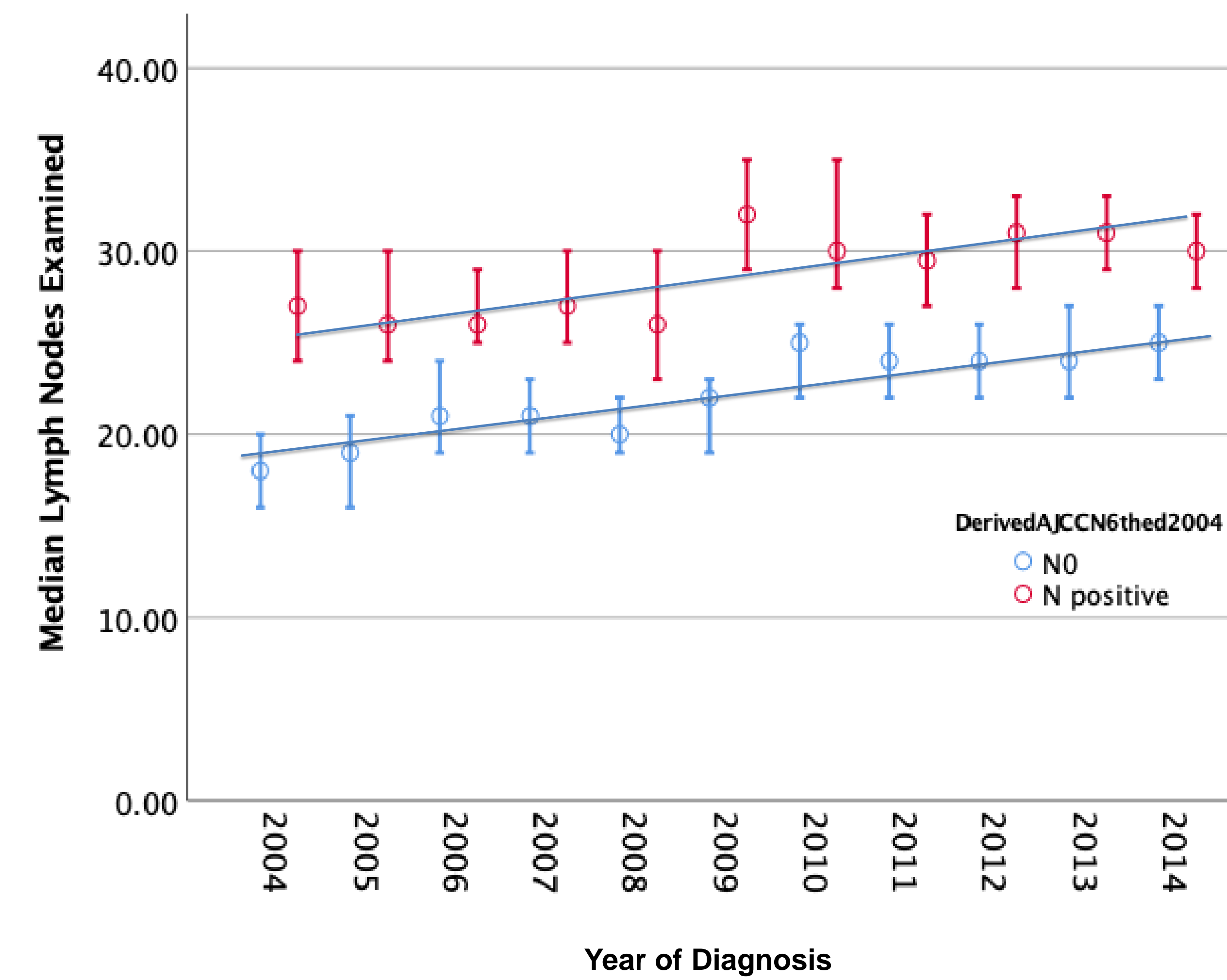


Figure 2: Lymph node yield by year of diagnosis for N0 and N1-3. There is a significant increase in the average LNY from 2004 to 2014. 22 LNs in 2004 to 27 in 2014 ($p < 0.0001$)

Table 1: Demographics and Cox Proportional Hazard, Overall Survival

Demographics	N (%)	Univariate		Multivariate	
		Hazard Ratio (95% CI)	P value	Hazard Ratio (95% CI)	P value
Age (years)					
<30	164 (1.9)	Reference	N/A	Reference	N/A
30-45	794 (9.3)	1.14 (0.86-1.50)	0.35	1.32 (0.94-1.84)	0.11
45-59	3214 (37.5)	1.63 (1.25-2.12)	<0.001	1.58 (1.15-2.17)	0.0048
60-74	3179 (37.1)	2.11 (1.62-2.74)	<0.001	2.14 (1.55-2.94)	<0.001
>75	1229 (14.3)	3.77 (2.90-4.90)	<0.001	3.62 (2.61-5.00)	<0.001
Sex					
M	5344 (62.3)	Reference	N/A	Reference	N/A
F	3236 (37.7)	0.83 (0.80-0.87)	<0.001	0.80 (0.74-0.86)	<0.001
Yearly Income (\$)					
<50,000	687 (8.0)	Reference	N/A	Reference	N/A
50,000-75,000	4651 (54.2)	0.83 (0.78-0.90)	<0.001	0.90 (0.78-1.04)	0.14
>75,000	3239 (37.8)	0.72 (0.67-0.78)	<0.001	0.84 (0.73-0.98)	0.020
Adjacency to metropolitan area					
Metropolitan	7519 (87.8)	Reference	N/A	Reference	N/A
Adjacent	613 (7.2)	1.02 (0.94-1.11)	0.56	0.95 (0.82-1.10)	0.49
Far	436 (5.0)	1.10 (1.00-1.20)	0.04	1.00 (0.85-1.18)	0.98
Lymph Node Yield					
1-18	2899 (33.8)	Reference	N/A	Reference	N/A
19-45	4174 (48.7)	0.91 (0.84-0.98)	0.013	0.78 (0.72-0.84)	<0.001
>45	1507 (17.6)	1.13 (1.02-1.24)	0.016	0.75 (0.68-0.84)	<0.001
T stage					
T0, T1 and Tx	3797 (44.2)	Reference	N/A	Reference	N/A
T2	2788 (32.5)	1.66 (1.58-1.75)	<0.001	1.48 (1.36-1.61)	<0.001
T3 and T4	1995 (23.2)	3.23 (3.07-3.40)	<0.001	2.32 (2.12-2.54)	<0.001
N stage					
N0 and Nx	4871 (57.2)	Reference	N/A	Reference	N/A
N1, N2a, N2b, N2NOS	3217 (37.5)	2.22 (2.11-2.32)	<0.001	1.54 (0.94-2.36)	0.065
N2c and N3	492 (5.7)	3.82 (3.55-4.11)	<0.001	2.32 (1.47-3.67)	0.0030
M Stage					
M0 or Mx	8510 (99.2)	Reference	N/A	Reference	N/A
M1	70 (0.8)	5.39 (4.76-6.08)	<0.001	1.9 (1.43-2.53)	<0.001
Year of Diagnosis					
2004-2008	3389 (39.4)	Reference	N/A	Reference	N/A
2009-2014	5191 (60.6)	0.93 (0.89-0.98)	0.0028	0.92 (0.84-1.01)	0.089
Positive Lymph Nodes					
N0	4871 (56.8)	Reference	N/A	Reference	N/A
N+ (unit risk ratio per positive LN)	3709 (43.2)	0.99 (0.98-1.00)	0.1	1.07 (1.06-1.08)	<0.001

- Total patients 8580
- Median LNY 25 (interquartile range 14-39)
- Lymph node yield statistically increased over time from 22 LNs in 2004 to 27 in 2014 ($p < 0.0001$)
 - Median number of positive LNs during this period constant (2 in 2004 and 2014)
- No significant difference in lymph node yield based on sex, region, insurance status, relative location to a metropolitan center
- LNY associated with improved survival
 - Resection of >45 lymph nodes compared to <18 was associated with improved survival (hazard ratio 0.75, $p < 0.001$)
 - LNY still significant while accounting for patient age, sex, race, marital status, regional income, percent current smokers, tumor site and TNM stage

Overall Survival by Lymph Node Yield

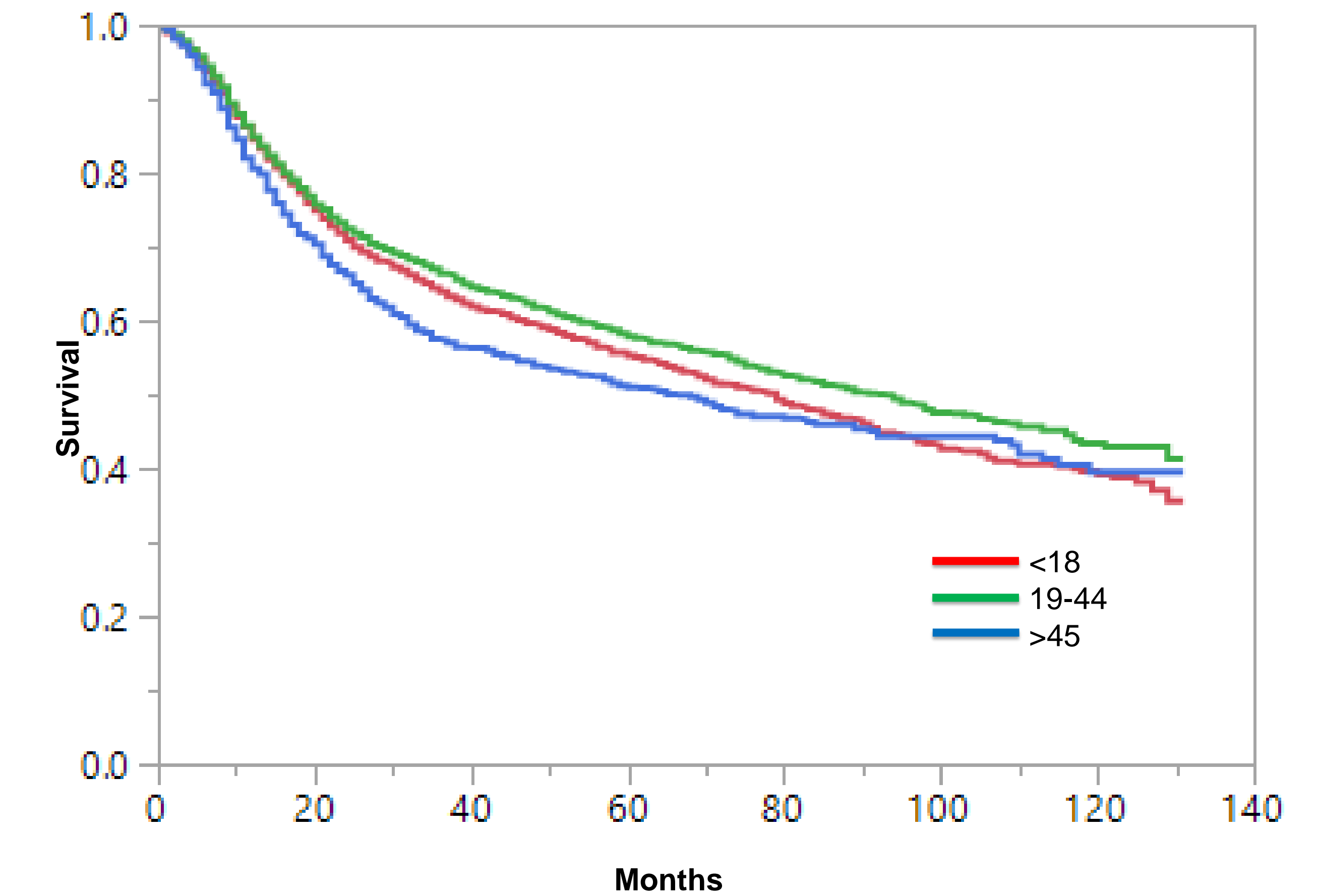


Figure 2: Kaplan-Meier Survival stratified by Lymph node yield. Red group is LNY <18, Green group is LNY 19-45, Blue group is LNY > 45.

DISCUSSION

- Lymph Node Yield of neck dissections for oral cavity carcinoma has increased from 2004-2014
- Increased Lymph node yield is associated with a survival benefit
 - Perhaps improved survival due to removal of micrometastases
- Other forms of treatment not assessed which may contribute to survival
 - Chemotherapy, radiation
- Unclear contribution of various neck levels
 - Seer data does not stratify by level or unilateral vs bilateral
 - Many oral cavity tumors invade midline and thus may need bilateral neck dissections. This may falsely elevate lymph node yield

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