



# Post-Treatment Surveillance for Head and Neck Cancer

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Making Cancer History®

# Head and Neck Cancer

- Head and neck cancers account for about 3% of all cancers
- In 2013:
  - 41,380 new oral cavity and pharyngeal cancers
    - 7890 deaths
  - 12,260 new laryngeal cancers
    - 3630 deaths

# Head & Neck Subsites

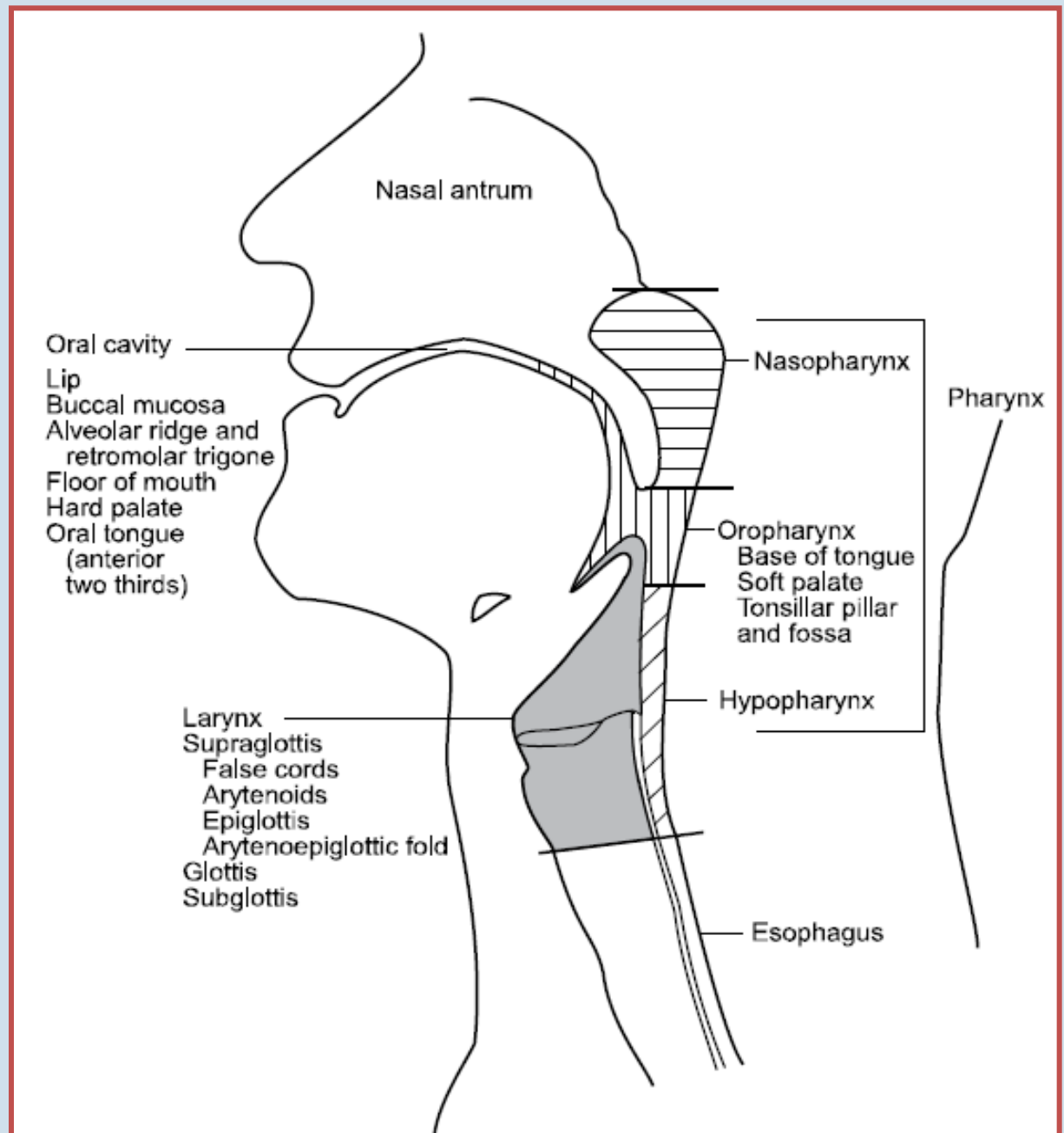
**Nasopharynx:** posterior to the nasal cavity, between the skull base and the hard palate

**Oral Cavity:** from the lips to the soft palate

**Oropharynx:** includes the soft palate, lies between the hard palate and hyoid bone

**Hypopharynx:** hyoid bone to cricoid bone

**Larynx:** from the epiglottis to one centimeter below the true vocal cords



# Head and Neck Cancer

- Incidence increases with increasing age
- Male predominance
- Major risk factors: alcohol and tobacco
  - Account for 75% of cases
  - Synergistic effect: 30x increased risk
- Possible genetic predisposition
- Viral infection
  - EBV-associated with non-keratinizing nasopharyngeal cancer
  - HPV-associated with oropharyngeal cancer
    - Increasing incidence in the white population

# Head and Neck Cancer

- Overall survival across sub-sites and stages:
  - 1-year: 84%
  - 5-year: 61%
  - 10-year: 50%
- Mainstays of treatment:
  - Subsite-dependent
  - Surgery is curative or palliative
  - Radiation is curative/definitive, adjuvant, or palliative
  - Chemotherapy boosts curative measures or palliates

# Post-Treatment Surveillance

- Reasons for surveillance:
  - Early detection of recurrence
  - Early detection of second primary tumors
  - Management of functional rehabilitation
- No consensus in literature as to whether/when to follow and with what studies to follow up

# Recurrence

- Occur in 15-30% of patients
  - Roughly 50% local, 25-30% regional, 15-20% distant metastases
  - Approximately 50-90% detected in year 1
  - Nearly all detected by year 3
  - Subsite-dependent
- On-going debate in the literature as to whether established follow-up is necessary
  - Roughly 60-85% of recurrences are un-scheduled follow-ups by symptomatic patients

# Second Primary Tumors

- Due to major risk factors of alcohol and tobacco abuse
- Estimated at 2-6% per year
  - Roughly 35% at 20 years
  - Rate and most common sites dependent on site of index tumor
    - Hypopharynx has highest rate, larynx has lowest
    - Oral cavity/oropharynx index tumors associated with head and neck second primary
    - Larynx index tumor associated with lung/bronchus second primary



# Post-Treatment Surveillance Guidelines

- British Academy of Otolaryngology-Head and Neck Surgery (1998):
  - Follow-up visit at 2-4 weeks post-radiotherapy
  - Year 1: every 1-3 months
  - Year 2: every 2-4 months
  - Year 3 and 4: every 6 months
  - Discharge at the end of year 5

# Post-Treatment Surveillance Guidelines

- Scottish Intercollegiate Guidelines Network:
  - Patients to be seen frequently and regularly for the first 3 years post-treatment
  - Follow-up should be limited to those patients still eligible for treatment options
- National Institute for Health and Clinical Excellence:
  - Regular examinations in the first 2 years post-treatment with periods increased between visits
  - Consider discharge at year 5

# Post-Treatment Surveillance Guidelines

- Most National Comprehensive Cancer Network recommendations have category 2A level of evidence
  - 2A: based on lower-level evidence with uniform panel consensus
  - 2B: based on lower-level evidence with non-uniform panel consensus but no major disagreements

# Post-Treatment Surveillance Guidelines

- National Comprehensive Cancer Network recommends:
  - History and physical exam:
    - Year 1: every 1-3 months
    - Year 2: every 2-3 months
    - Years 3-5, every 4-6 months
    - > 5 years, every 6-12 months

# Post-Treatment Surveillance Guidelines

- National Comprehensive Cancer Network recommends:
  - Post-treatment baseline imaging of primary (and neck if treated) recommended within 6 months of treatment completion (category 2B)
    - Further imaging based only on signs/symptoms
  - Chest imaging as clinically indicated
  - TSH every 6-12 months if neck has been irradiated

# Post-Treatment Surveillance Guidelines

- National Comprehensive Cancer Network recommends:
  - Dental evaluation recommended for oral cavity
  - As clinically indicated:
    - Speech/hearing and swallowing evaluations
    - Dental for other oropharynx, hypopharynx, nasopharynx, not for other sites

# Post-Treatment Surveillance in Practice

- Based on survey study published in 1993:
  - Surveillance visits are scheduled irrespective of tumor stage
  - 73% follow patients every month in year 1
  - 90% follow patients every 2-3 months in year 2
  - 97% follow patients every 4-6 months in years 3-5
  - 100% follow patients every 6-12 months for life
  - 60% obtained yearly CXRs

# Goals

- Utilizing the Texas Cancer Registry and Medicare data, determine:
  - Current patterns of head and neck cancer treatment and recent trends
  - Current patterns of post-treatment surveillance
    - Effect of previous treatment
    - Effect of tumor subsite/stage
    - Prevalence of NCCN guideline-adherence
  - Whether specific patterns of post-treatment surveillance affect patient outcomes



# Sample Identification

- Year of first cancer diagnosis 2000-2007 to allow for at least 2 years' follow up
  - First primary cancer only
  - Histologic confirmation codes for head and neck cancer
  - ICD-O-3 codes for head and neck cancer
- Texas residence
- Age  $\geq$  66 years
- Continuous enrollment in Medicare part A & B without HMO 12 months before to 24 months after diagnosis or until death, whichever occurred sooner

# Sample Identification

	<b>Inclusion/exclusion criteria</b>	<b>Cohort size</b>
<b>1</b>	Cancer site for Head & Neck Cancer(01-10,38) and *histology code for head & neck squamous cell carcinoma	N=21,251
<b>2</b>	First Primary Cancer only	N=19,907
<b>3</b>	Year of first cancer diagnosis in 2000-2007	N=11,732
<b>4</b>	Age >= 66 at the first diagnosis	N=6,864
<b>5</b>	Histology confirmation (not on autopsy or death certificate)	N=6,864
<b>6</b>	Exclude patients on Medicare for ESRD	N=6,858
<b>7</b>	Texas Residence	N=6,254
<b>8</b>	Exclude the missing diagnosis date (MODX1=13)	N=6,199
<b>9</b>	Continuous enrollment in Medicare without HMO and with Part A&B from 12-month before to 24-month or until death after diagnosis	N=4,783

# Cohort Demographics

- Sample size: 4783 patients
- Male 67.7%
- Age distribution: 24.8% between 66-69 years  
28.3% between 70-74 years  
21.7% between 75-79 years  
25.2% over 80 years
- Race: White 86.0%  
Black 7.7%  
Hispanic 5.0%  
Other 1.3%

# Cohort Demographics

- Geographic variation:
  - Big metropolitan areas 46.7%
  - Metropolitan/urban areas 28.6%
  - Less urban/rural areas 7.3%
- Charlson comorbidities:
  - None 57.4%
  - One 23.5%
  - Two 10.5%
  - Three or more 8.6%

# Cohort Demographics

- Disease Stage:
  - Localized tumor 44.2%
  - Regional spread 33%
  - Distant metastases 11.5%
- Subsite of disease:
  - Oral cavity 41.6%
  - Larynx/hypopharynx 37.9%
  - Oropharynx 8.8%
  - Salivary gland 8.1%
  - Nasopharynx 2.0%

# Identification of Treatment

- Surgery of the primary site defined by ICD-9 codes
- Radiation or chemotherapy deemed adjuvant if within 4 months of having surgery
- Radiation before surgery or without surgery deemed definitive
- Radiation course defined as first to last day of radiation with <1 month gap between doses

# Cohort Treatment Problem

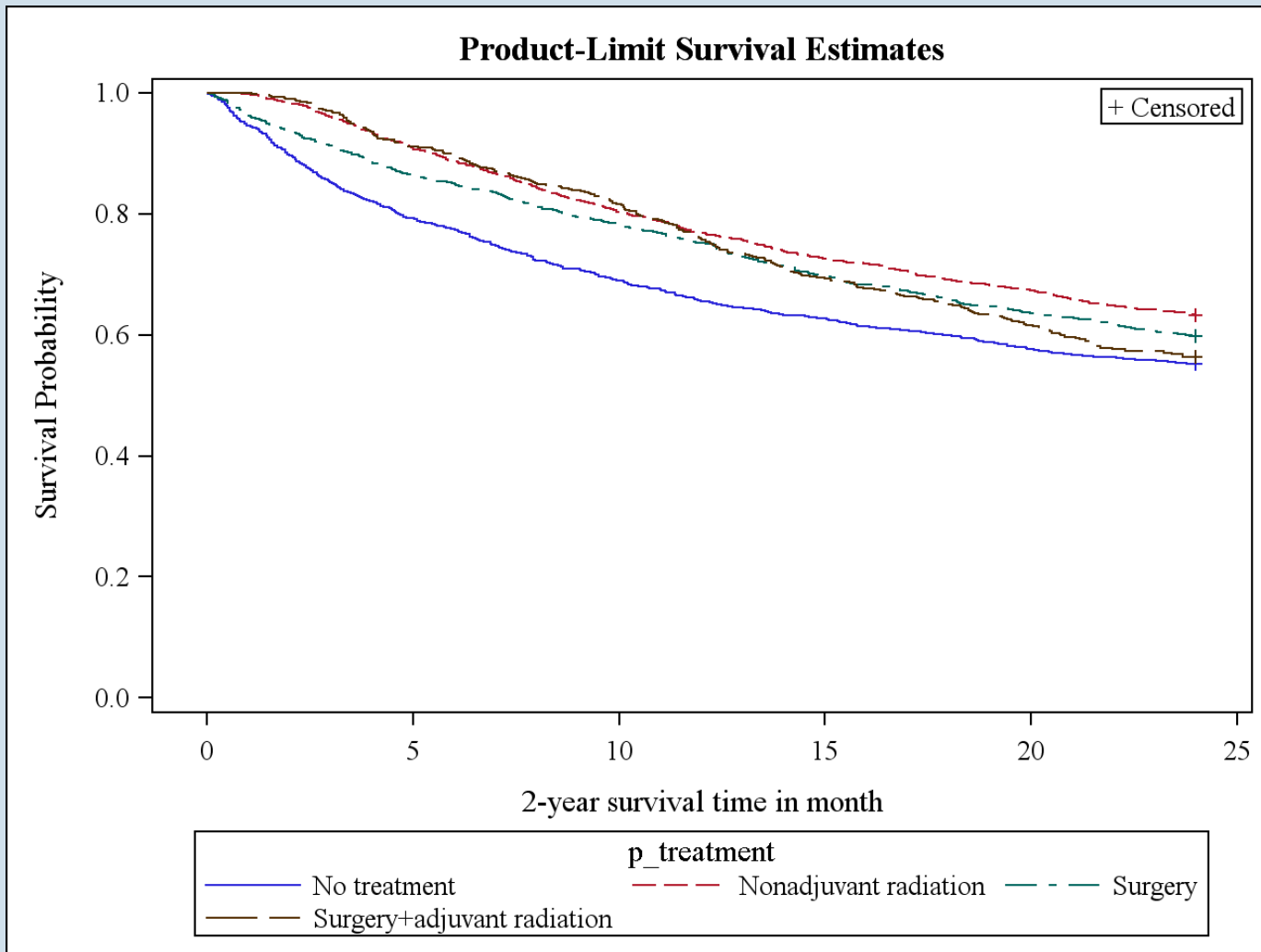
Primary Course of Treatment	Frequency	Percent
No treatment	1373	28.7
Definitive radiation	1528	32.0
Surgery	1275	26.7
Surgery+adjuvant radiation	607	12.7

# Cohort Treatment Problem

	No treatment	Definitive radiation	Surgery	Surgery+adjuvant radiation
2000	20.5	38.2	19.8	21.6
2001	21.7	37.0	24.4	17.0
2002	22.8	34.3	25.6	17.3
2003	23.4	37.4	25.9	13.4
2004	28.9	34.7	26.5	10.0
2005	37.2	28.5	26.4	7.9
2006	34.9	25.2	32.4	7.5
2007	41.7	19.1	32.4	6.7
Total	28.7	32.0	26.7	12.7



# Cohort Treatment Problem

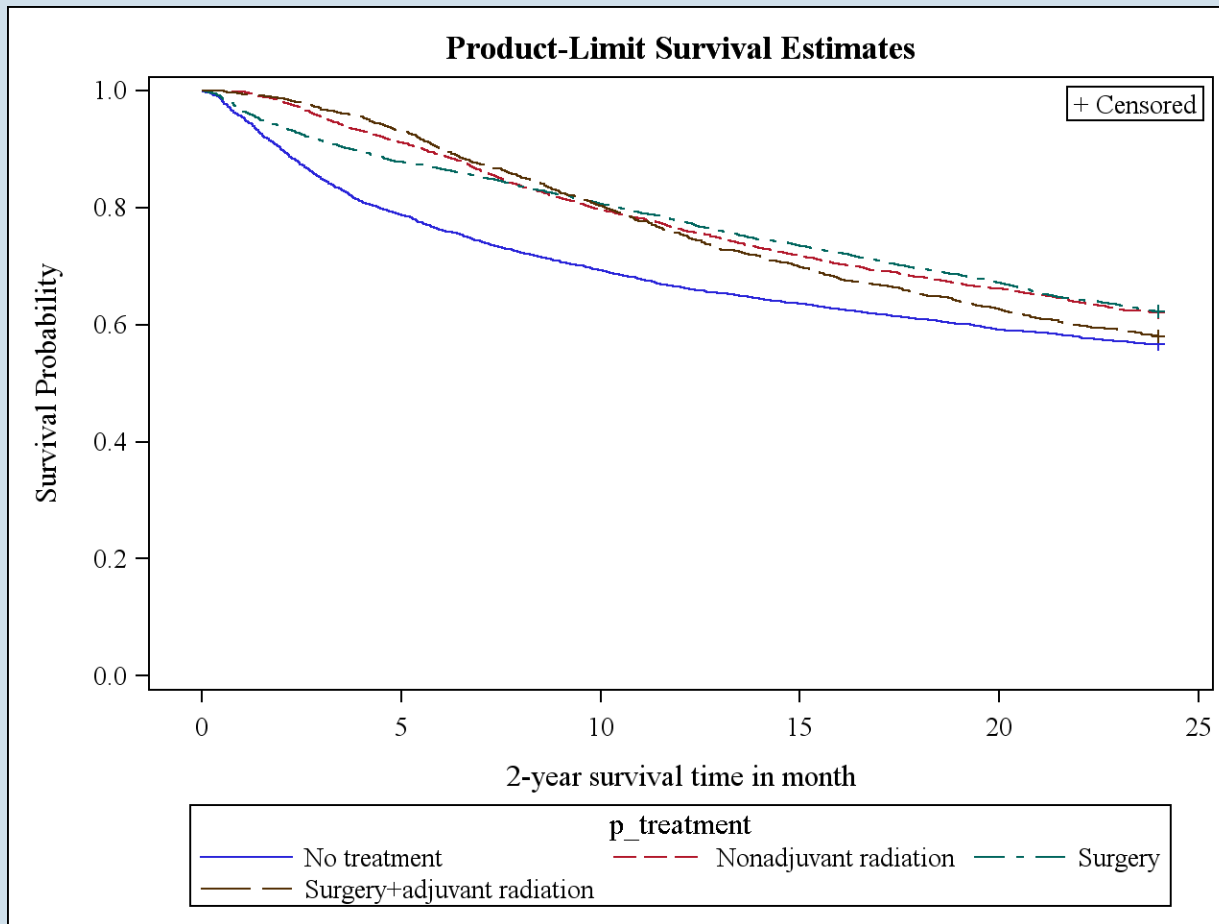


# Cohort Treatment Problem

SEER-Medicare Data		
Primary course of treatment	Frequency	Percent
No treatment	4336	29.5
Definitive radiation	4472	30.4
Surgery	3981	27.1
Surgery+adjuvant radiation	1918	13.0

# Cohort Treatment Problem

## SEER-Medicare Data



# Cohort Treatment Solution

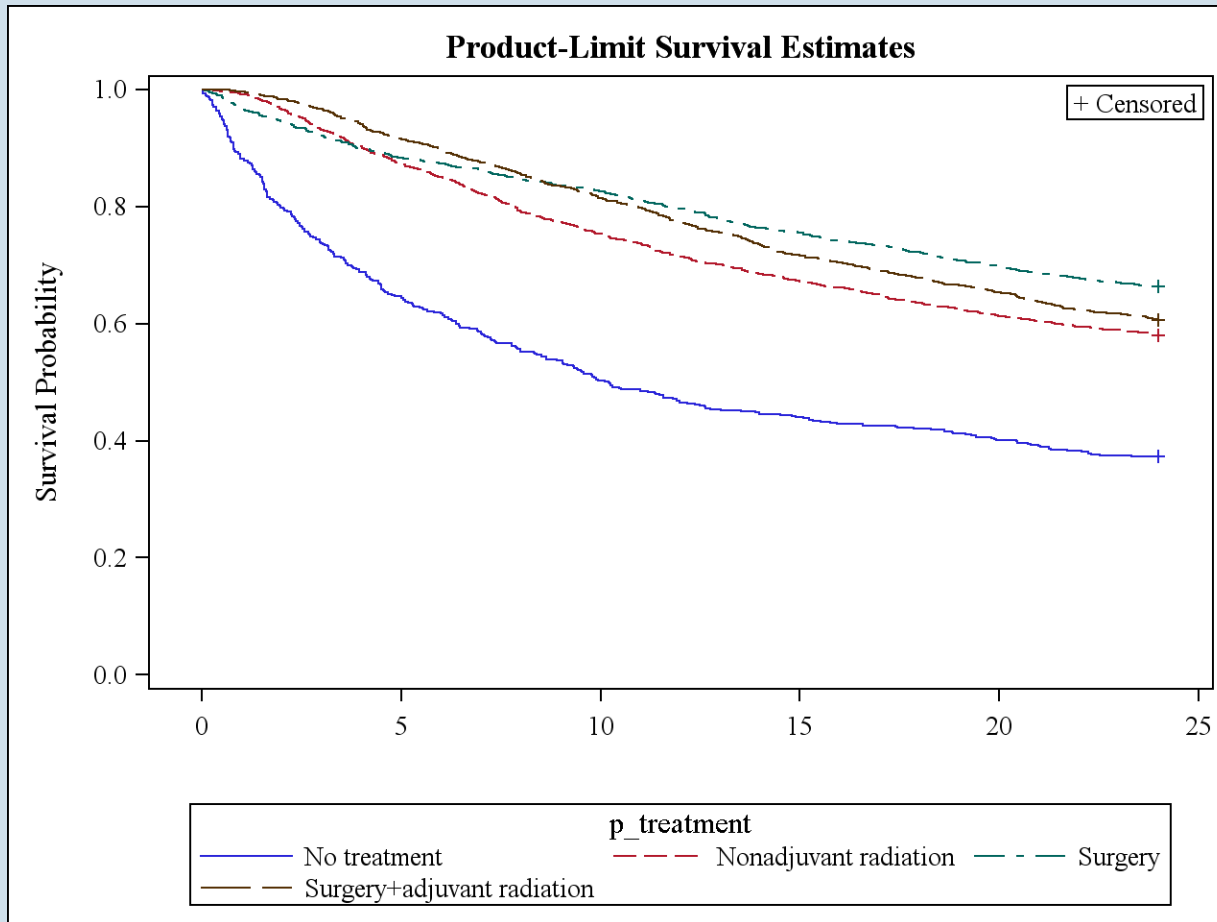
- Confirmed histology codes to include only malignancy, not carcinoma *in situ*
- Re-evaluated radiation codes, added additional codes for head and neck radiation
- Utilized surgery CPT codes

# Cohort Treatment Solution

Primary Course of Treatment	Frequency	Percent
No treatment	507	10.6
Definitive radiation	1458	30.5
Surgery	1493	31.2
Surgery+adjuvant radiation	1325	27.7

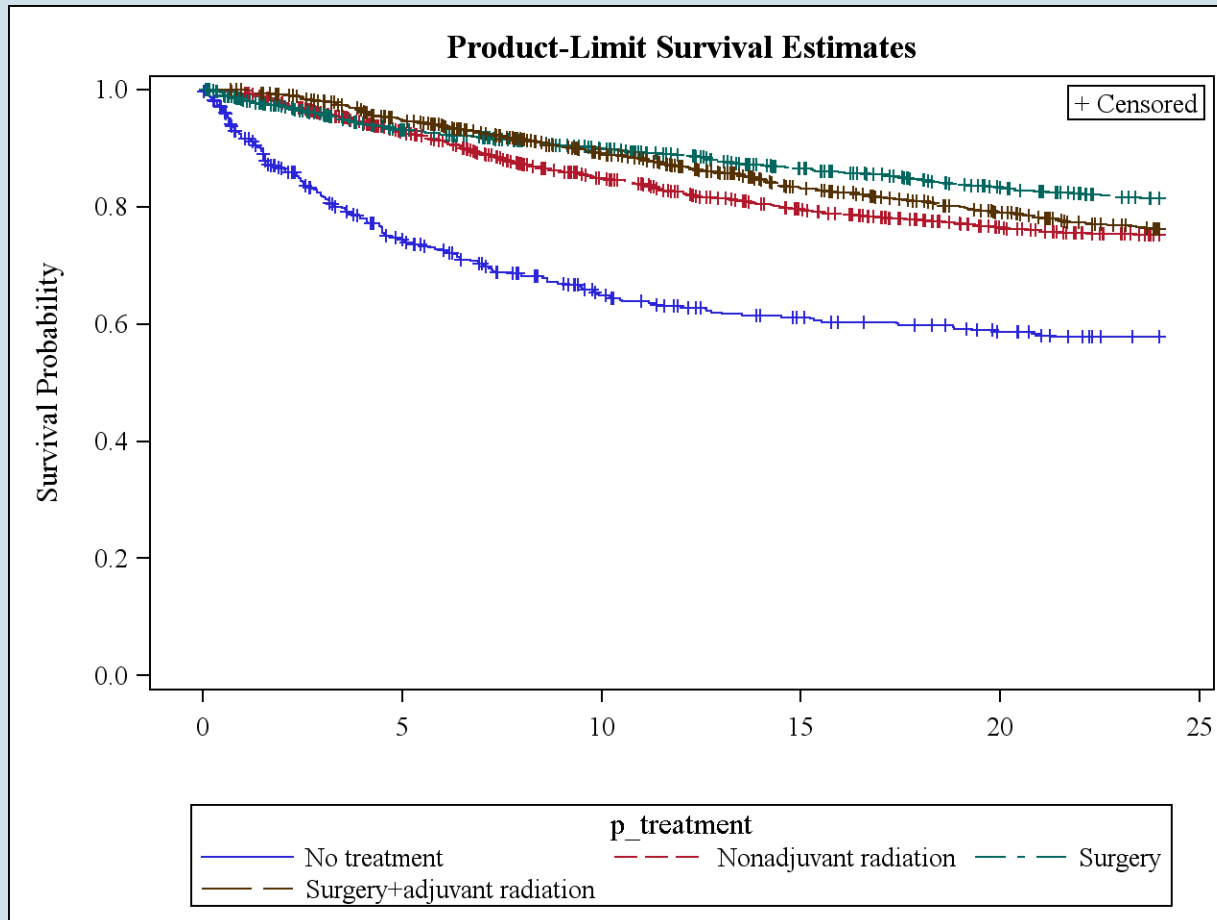
# Cohort Treatment Solution

## 2-year Overall Survival



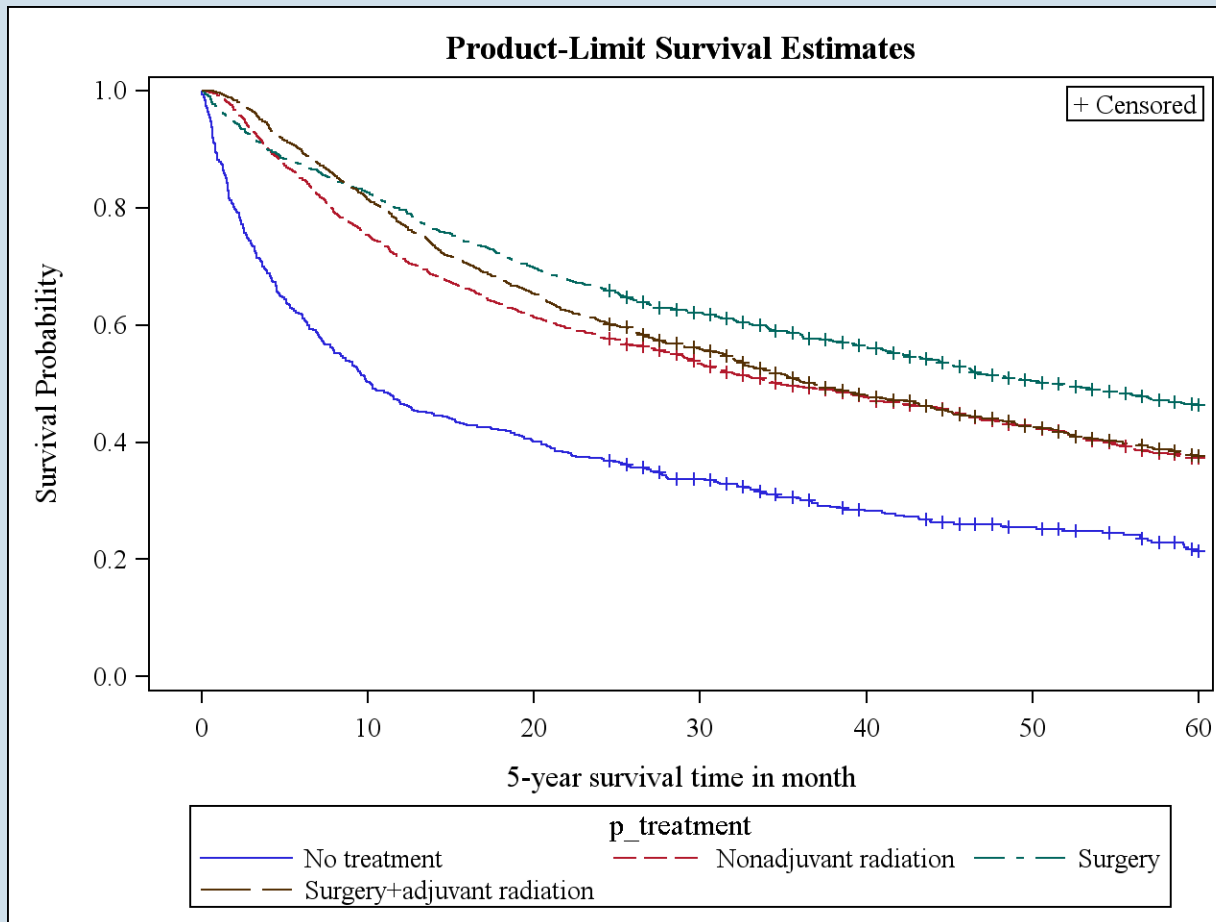
# Cohort Treatment Solution

## 2-year Disease-Specific Survival



# Cohort Treatment Solution

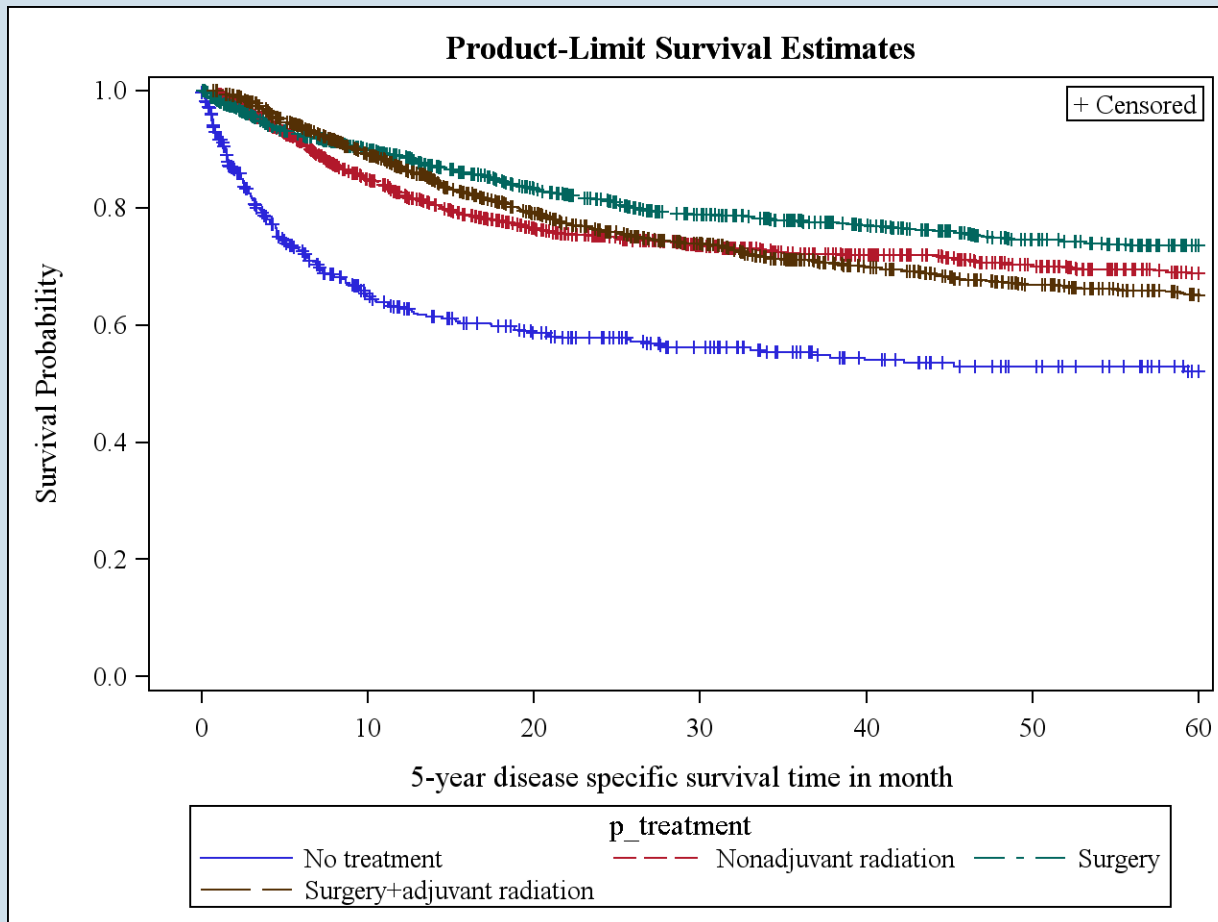
## 5-year Overall Survival





# Cohort Treatment Solution

## 5-year Disease-Specific Survival



# Treatment Groups by Age & Sex

Age range (years)	Definitive radiation	Surgery	Surgery + Post-op RT	No treatment
66-69	24.9	23.0	28.0	21.5
70-74	27.4	27.5	30.3	28.2
75-79	21.1	23.2	21.1	20.1
80-84	16.1	14.0	13.3	16.6
>85	10.6	12.3	7.3	13.6

Sex	Definitive radiation	Surgery	Surgery + Post-op RT	No treatment
Male	73.9	61.1	67.1	71.2
Female	26.1	38.9	32.9	28.8

# Treatment Groups by Race & Comorbidity

Race	Definitive radiation	Surgery	Surgery + Post-op RT	No treatment
White	84.6	89.3	85.9	80.8
Black	8.6	5.2	7.6	12.3
Hispanic	5.5	4.3	5.1	5.7
Other	1.3	1.1	1.4	1.2

Comorbidity	Definitive radiation	Surgery	Surgery + Post-op RT	No treatment
0	54.1	59.1	58.8	58.9
1	24.1	23.3	24.8	19.6
2	11.1	9.5	10.3	11.9
>3	10.8	8.2	6.1	9.6

# Treatment Groups by Location

	<b>Definitive radiation</b>	<b>Surgery</b>	<b>Surgery + Post-op RT</b>	<b>No treatment</b>
Metropolitan	74.3	75.6	75.6	75.9
Urban	24.1	22.0	21.6	22.1
Rural	1.7	2.4	2.6	2.0

# Treatment Group by Subsite

Subsite	Total	No treatment
Oral cavity	41.6	46.0
Salivary	8.1	3.2
Nasopharynx	2.0	2.6
Oropharynx	8.8	9.9
Hypopharynx	6.0	5.1
Larynx	31.9	30.0
Other	1.7	3.4

# Treatment Groups by Extent of Disease

	Definitive radiation	Surgery	Surgery + Post-op RT	No treatment
Localized	46.2	56.5	32.2	33.7
Regional	31.0	24.9	46.5	27.0
Distant	11.5	7.6	13.8	17.2
Unknown	11.3	11.1	7.5	22.1

- Within the no treatment group, 15.8% received only chemotherapy (presumably palliative)

# No Treatment Group: Tube Status

Tube	Percent
Tracheostomy	13.6
Feeding tube	25.6

- Within the no treatment group, 15.8% received only chemotherapy (presumably palliative)

# Treatment Groups by Cause of Death

	<b>Definitive radiation</b>	<b>Surgery</b>	<b>Surgery + Post-op RT</b>	<b>No treatment</b>
Dead	60.5	56.1	64.3	75.7
Head & Neck Cancer	35.8	25.6	35.9	41.4
Other Cancer	20.3	20.1	26.6	24.5
Heart Disease	1.0	1.1	1.1	1.0
CVD	1.6	1.9	1.9	2.1
COPD	6.9	2.7	3.3	3.6
Other/no code	15.9	13.3	13.0	11.5



# No Treatment Group

- No treatment rendered
  - Evaluating by disease stage, no treatment group comprises 8.1% of local disease, 8.7% of regional disease, and 15.8% of distant disease
  - Recent study evaluating the natural history of head and neck cancer
    - Reported 9% of patients received no treatment, just supportive care
    - Reasons: multiple sites of distant disease (47%), severe co-morbidity/organ failure (41%), patient refusal (12%)

# No Treatment Group

- Possible by-product of claims data registries
  - Two recent studies using claims data had groups with confirmed malignancy and no consequent treatment
    - One used California Medicaid claims (67.1%)
    - One used commercial insurance, Medicare and Medicaid (24.5%)
  - Physicians may code for suspicion of malignancy
  - Patient may have had a lengthy work-up with no malignancy
  - Treatment code list is incomplete

# Treated Patients: Treatment by Subsite

	Definitive radiation	Surgery	Surgery with adjuvant RT
Oral Cavity	19.4	51.6	29.1
Oropharynx	51.0	25.2	23.9
Nasopharynx	51.2	11.0	37.8
Hypopharynx	43.1	18.9	38.1
Larynx	53.0	22.3	24.8
Salivary gland	7.0	31.6	61.4
Other	33.9	24.5	44.6

# Post-Treatment Surveillance: Imaging

- National Comprehensive Cancer Network recommends:
  - Post-treatment baseline imaging of primary (and neck if treated) recommended within 6 months of treatment completion (category 2B)
    - Further imaging based only on signs/symptoms
  - Chest imaging as clinically indicated

# Post-Treatment Surveillance: Imaging

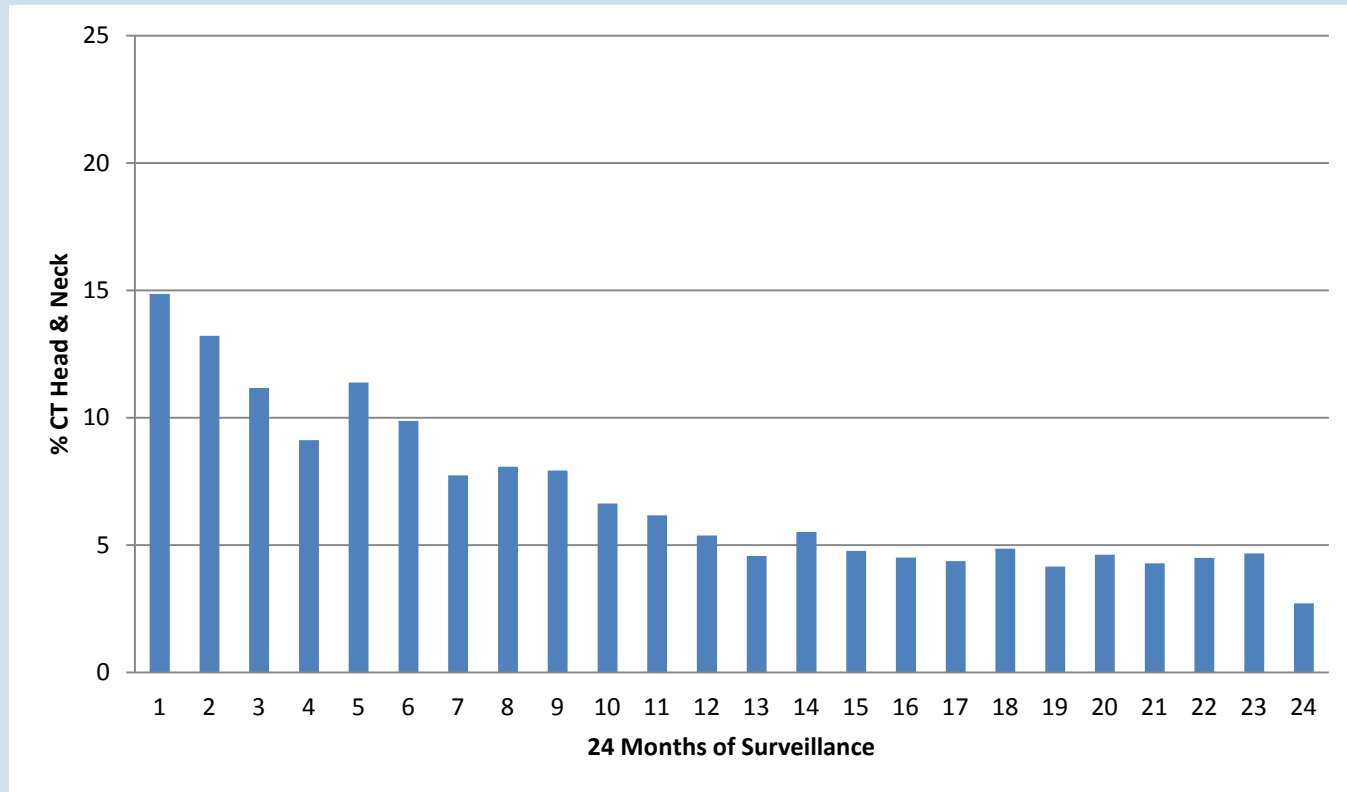
- Defining the end of treatment:
  - For patients undergoing only surgery: the date of surgery
  - For surgery with adjuvant radiation: last date of post-operative radiation
  - For definitive radiation: last date of radiation

# Post-Treatment Surveillance: Imaging

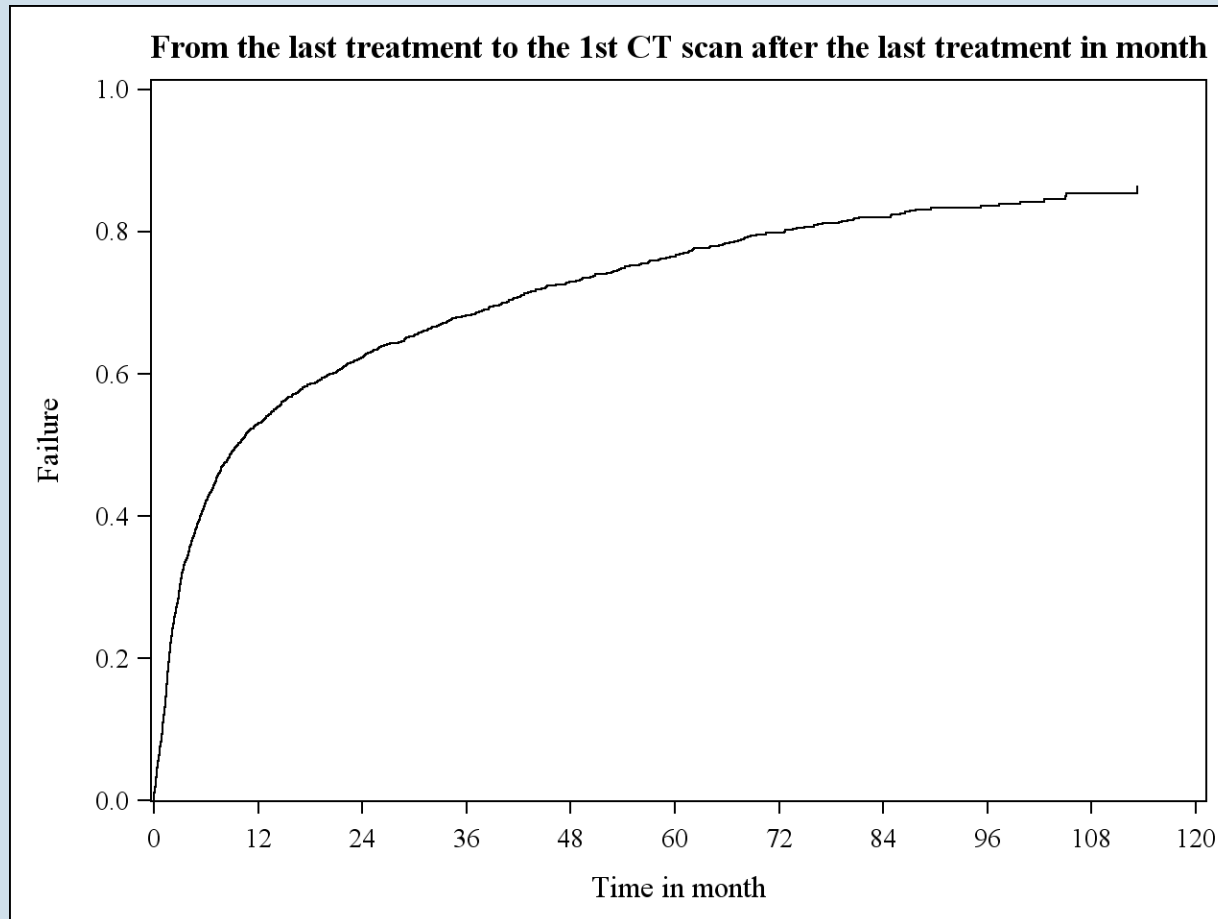
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- Percent of patients who received imaging within 6 months of completing treatment:
  - PET or CT: 10%
  - CT: 7.3%
  - PET: 3.9%

# Post-Treatment Surveillance: Imaging



# Post-Treatment Surveillance: Imaging





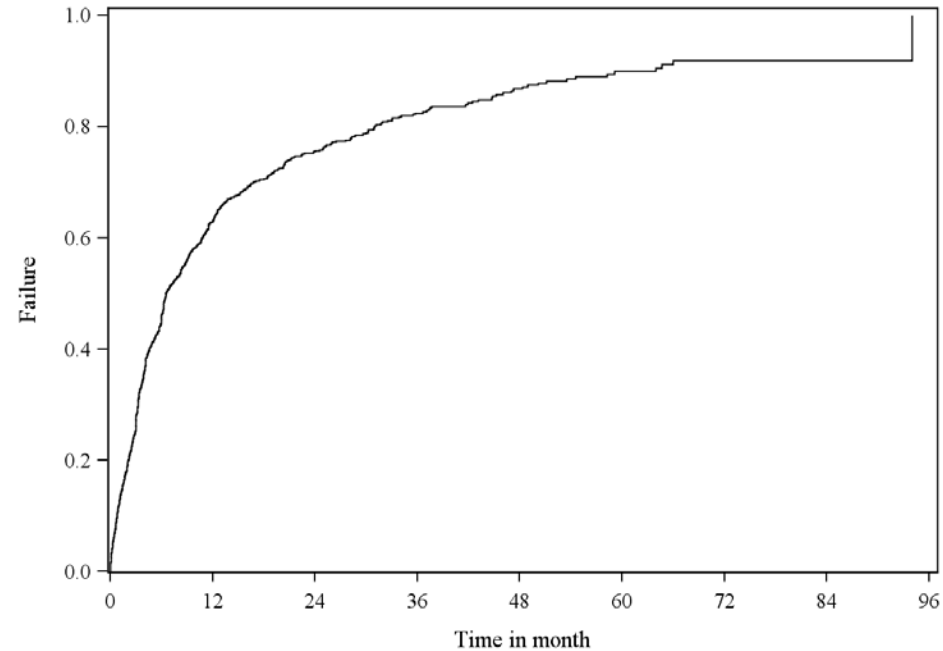
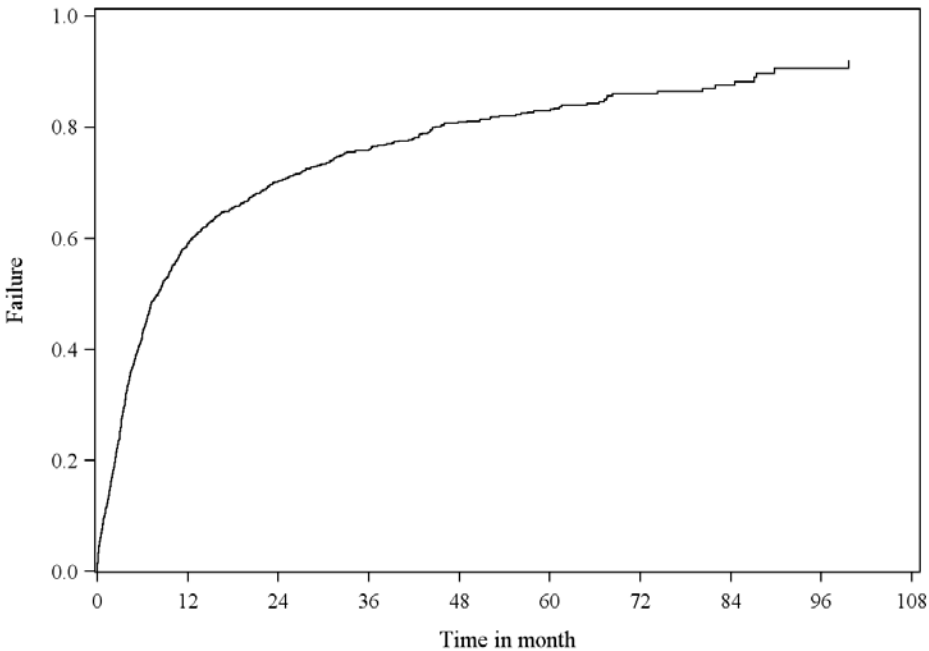
# Post-Treatment Surveillance: Imaging

Time from 1<sup>st</sup> CT to 2<sup>nd</sup> CT (months)

Time from 2<sup>nd</sup> CT to 3<sup>rd</sup> CT (months)

From the 1st CT scan to the 2nd CT scan in month

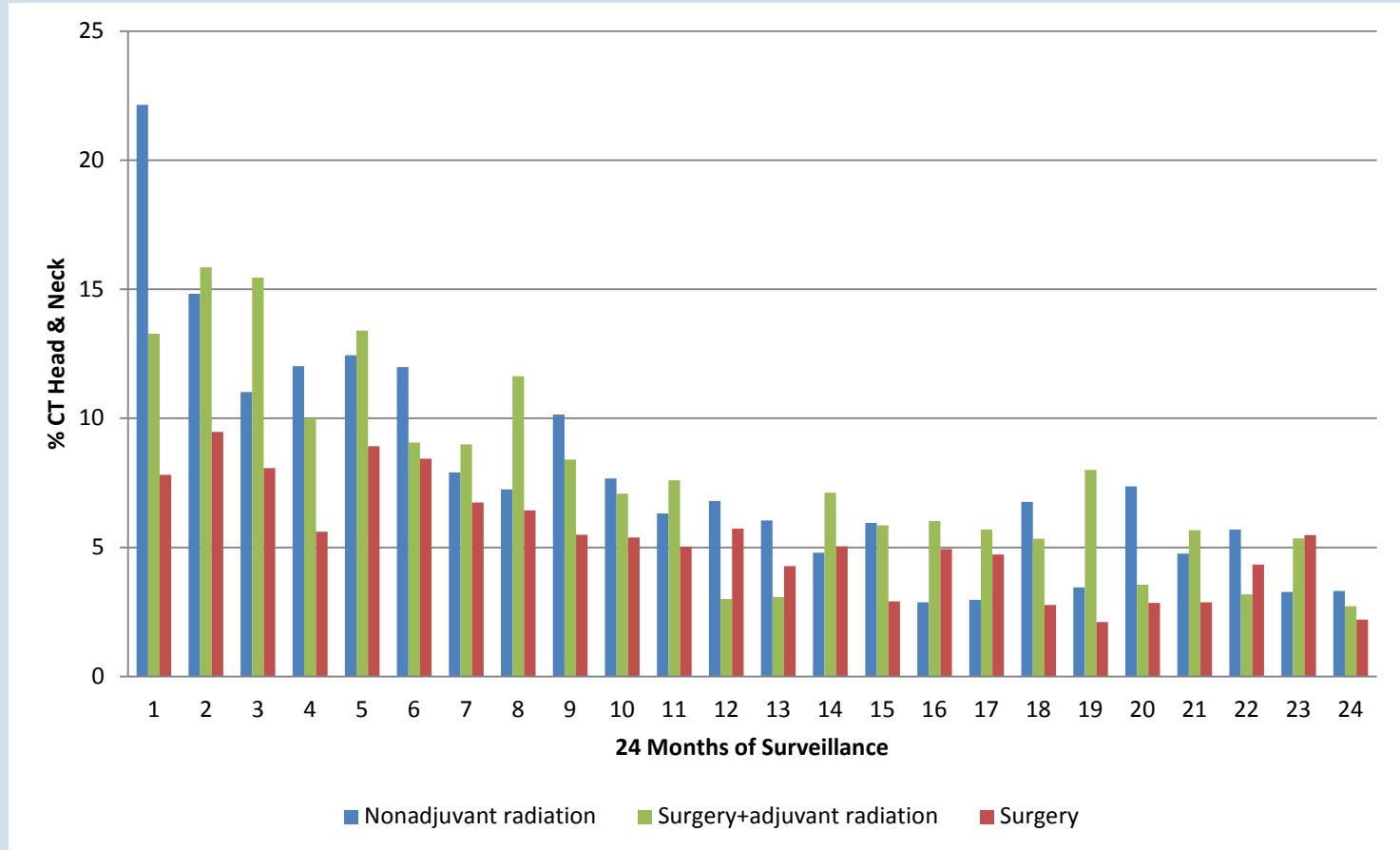
From the 2nd CT scan to the 3rd CT scan in month



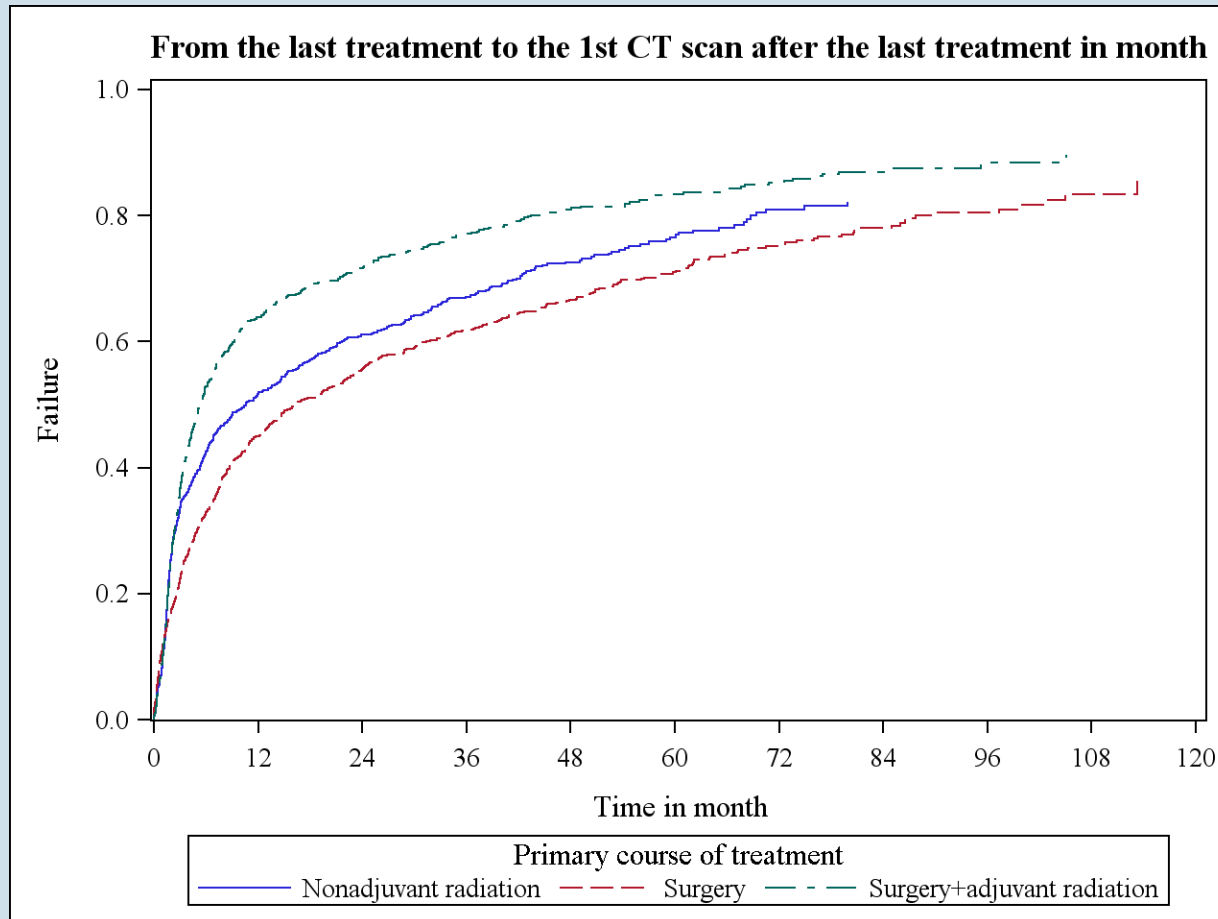
# Post-Treatment Surveillance: Imaging

- Median time:
  - To first CT after completing treatment: 9.6 months
    - Surgery alone: 16.1 months
    - Radiation alone: 10.6 months
    - Surgery with post-operative radiation: 5.3 months
  - To 2<sup>nd</sup> CT after first CT: 8.1 months
  - To 3<sup>rd</sup> CT after 2<sup>nd</sup> CT: 6.5 months

# Post-Treatment Surveillance: Imaging

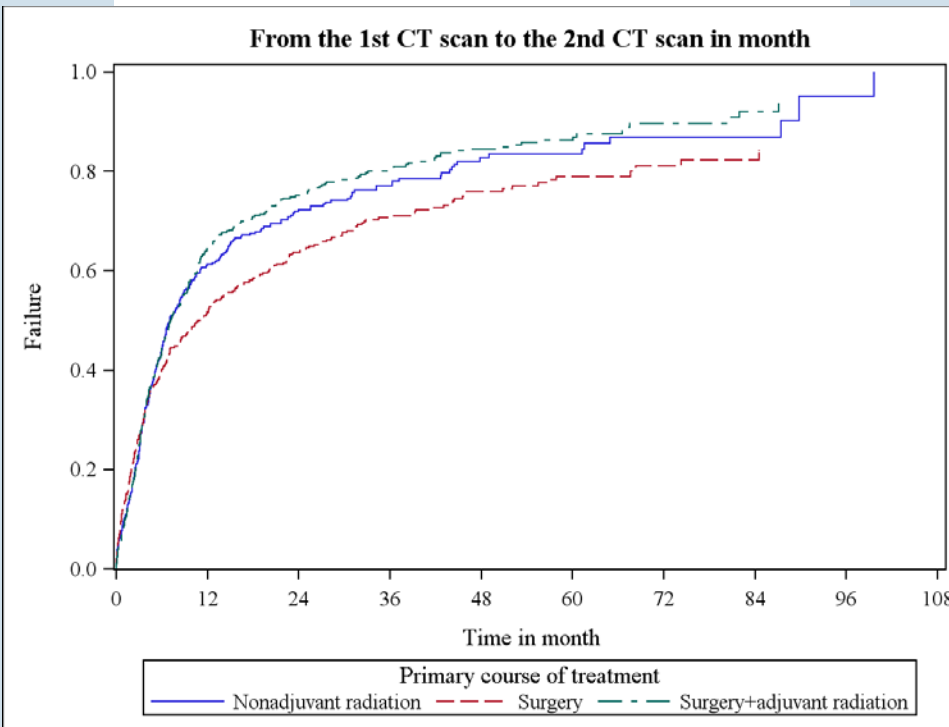


# Post-Treatment Surveillance: Imaging

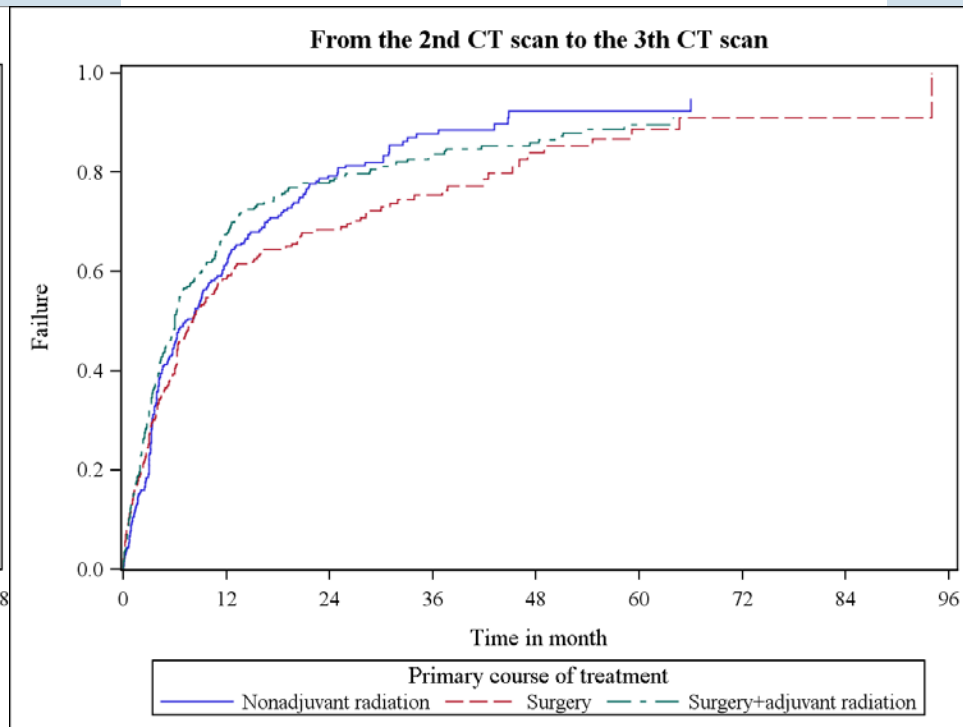


# Post-Treatment Surveillance: Imaging

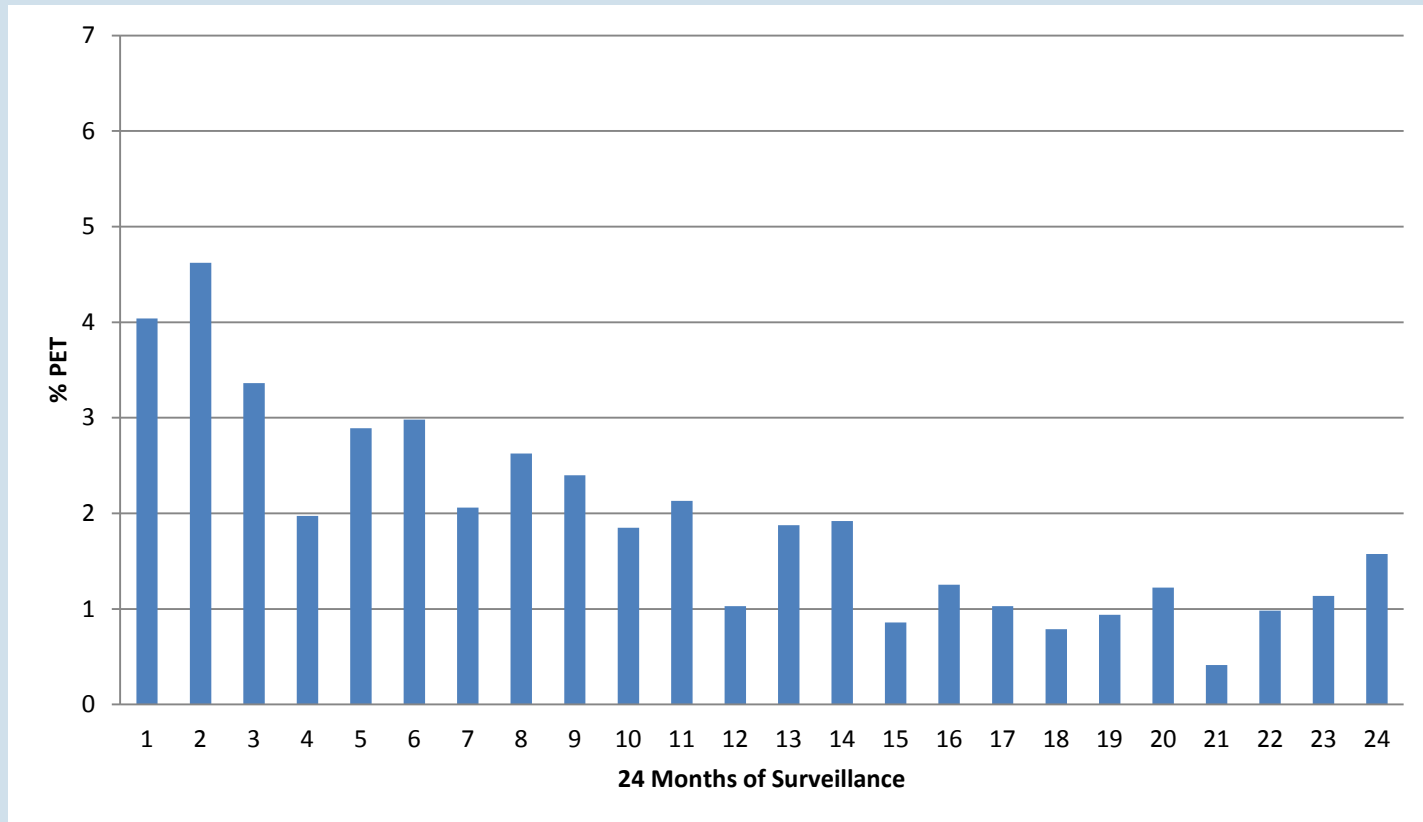
Time from 1<sup>st</sup> CT to 2<sup>nd</sup> CT (months)



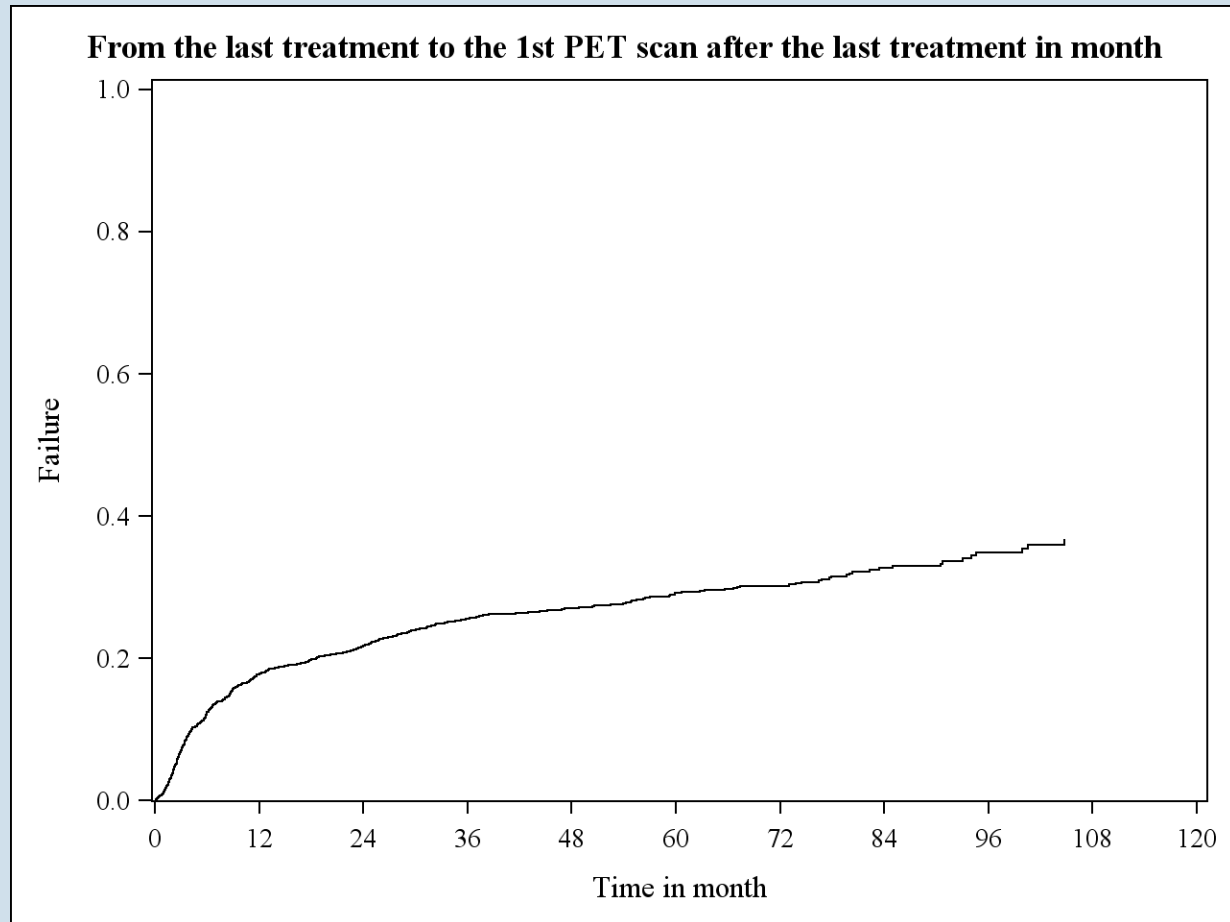
Time from 2<sup>nd</sup> CT to 3<sup>rd</sup> CT (months)



# Post-Treatment Surveillance: Imaging



# Post-Treatment Surveillance: Imaging

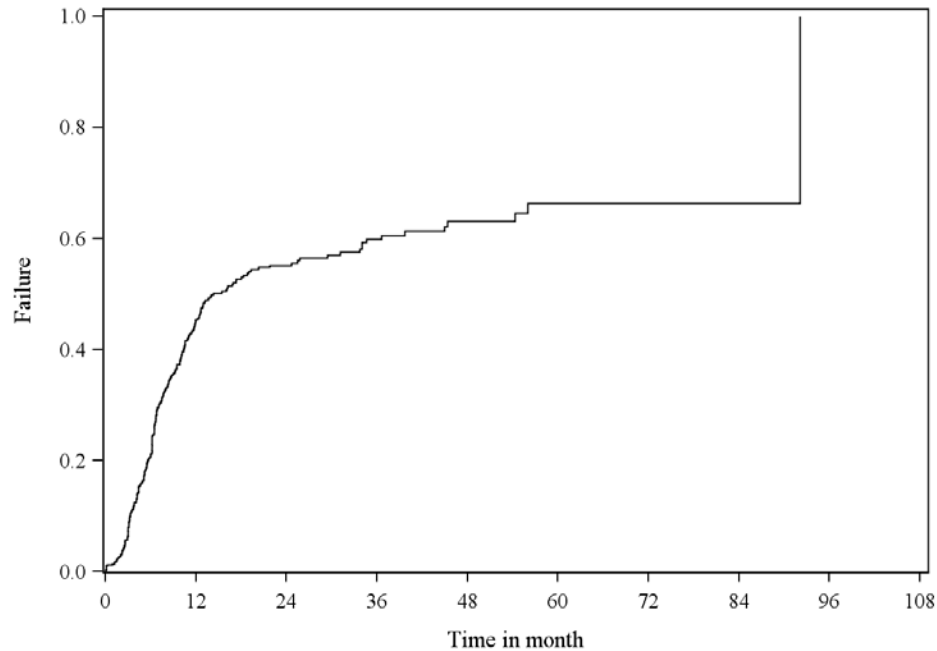


# Post-Treatment Surveillance: Imaging

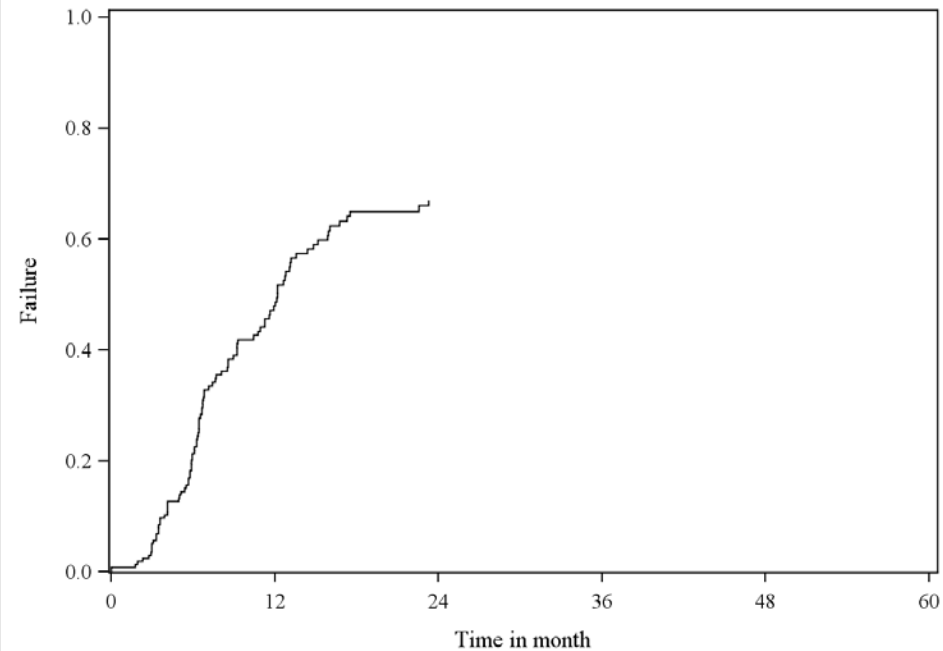
Time from 1<sup>st</sup> PET to 2<sup>nd</sup> PET (months)

Time from 2<sup>nd</sup> PET to 3<sup>rd</sup> PET (months)

From the 1st PET scan to the 2nd PET scan in month



From the 2nd PET scan to the 3th PET scan in month

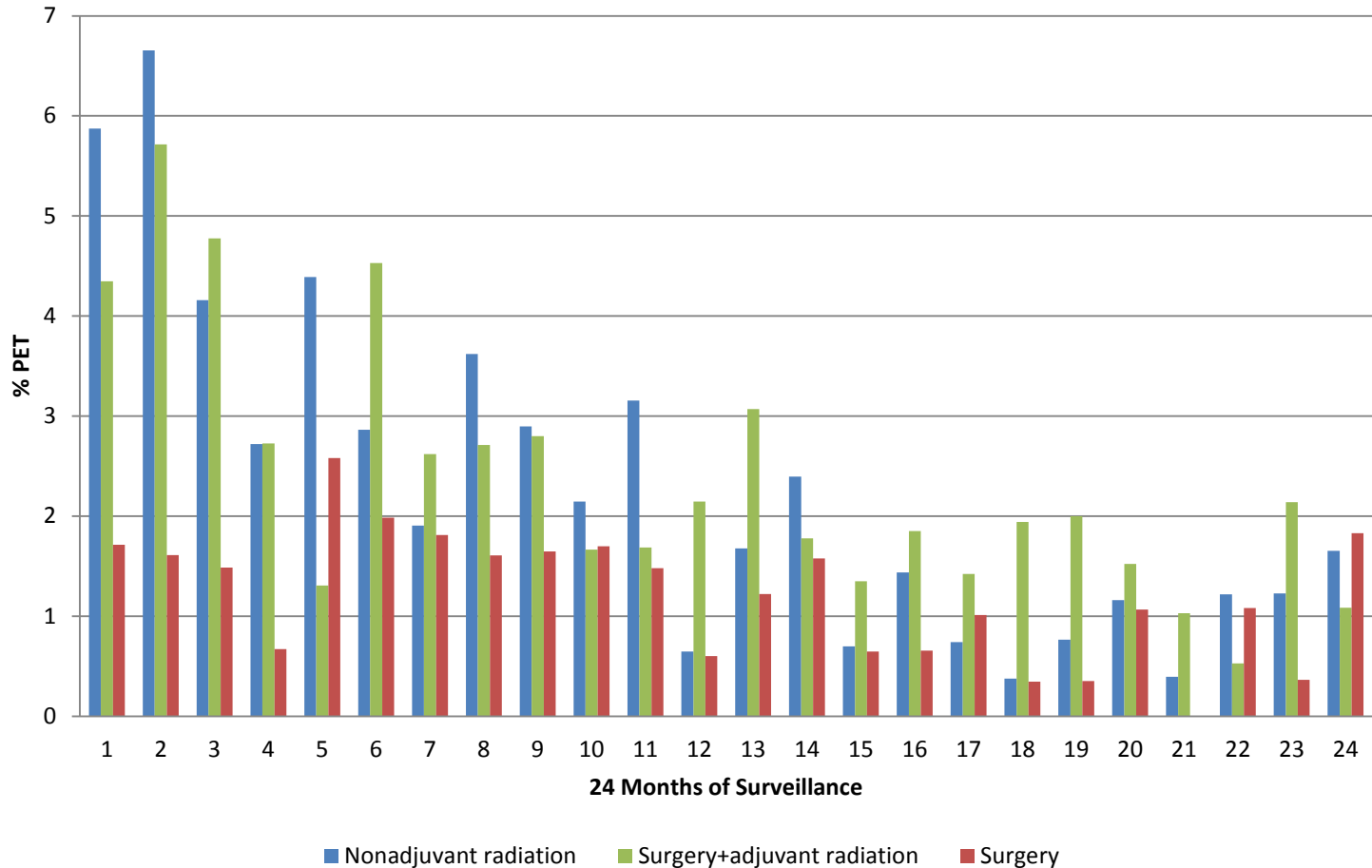




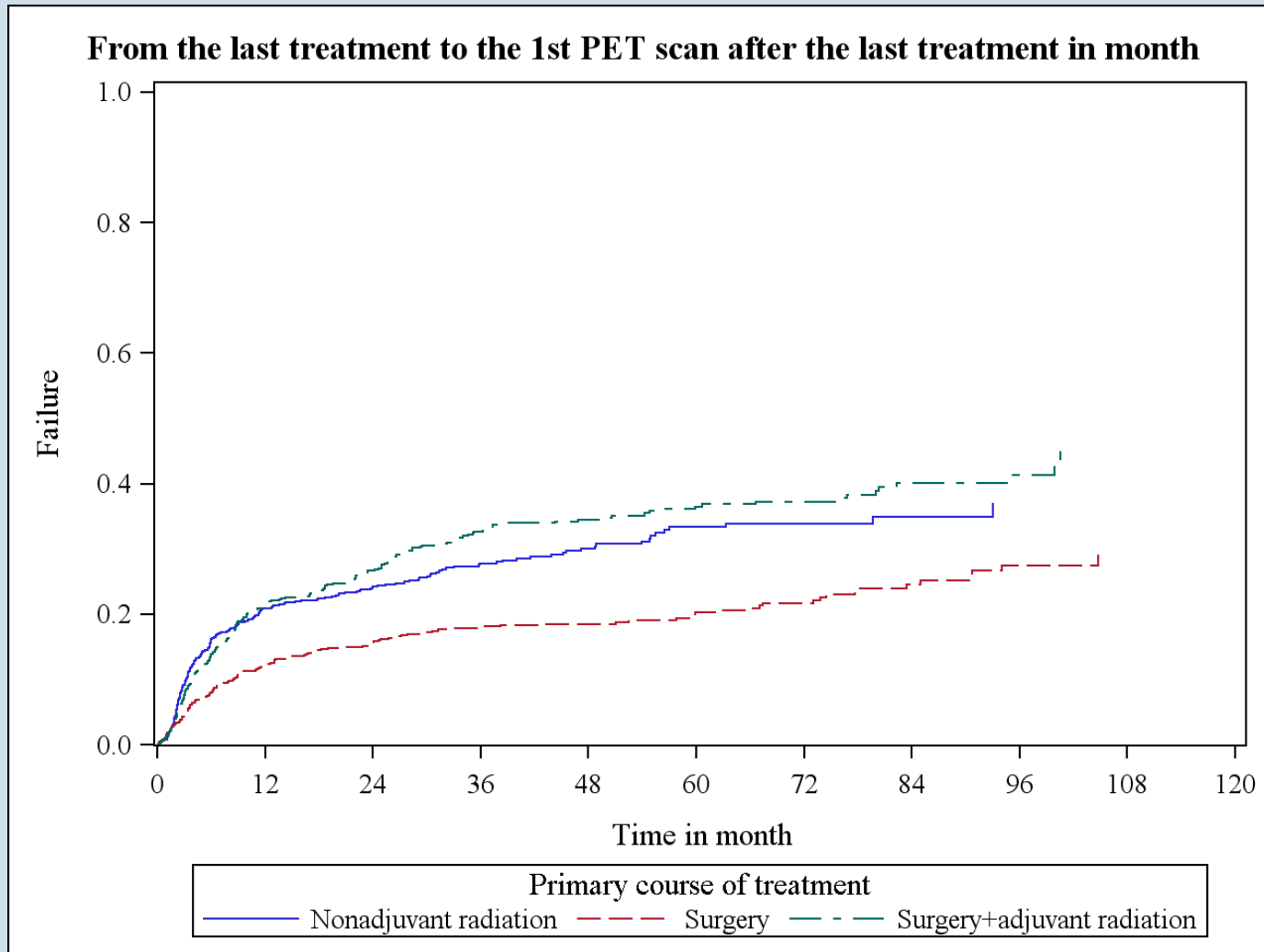
# Post-Treatment Surveillance: Imaging

- Median time:
  - To first PET after completing treatment: fewer than 50% of patients had a PET
  - To 2<sup>nd</sup> PET after first PET: 14.3 months
  - To 3<sup>rd</sup> PET after 2<sup>nd</sup> PET: 12.2 months

# Post-Treatment Surveillance: Imaging



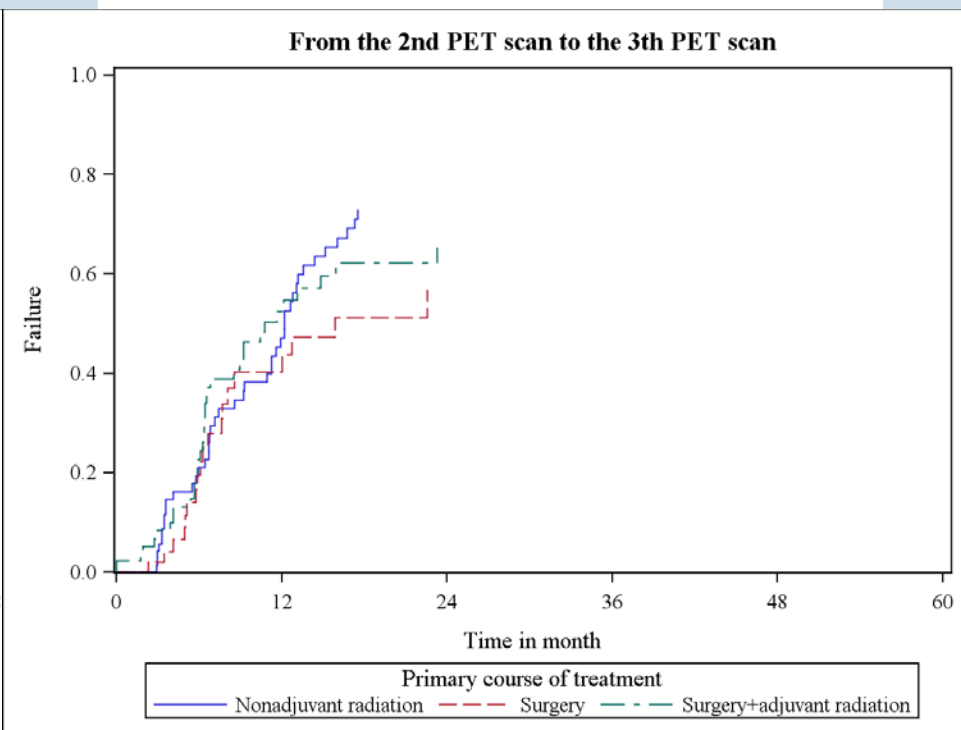
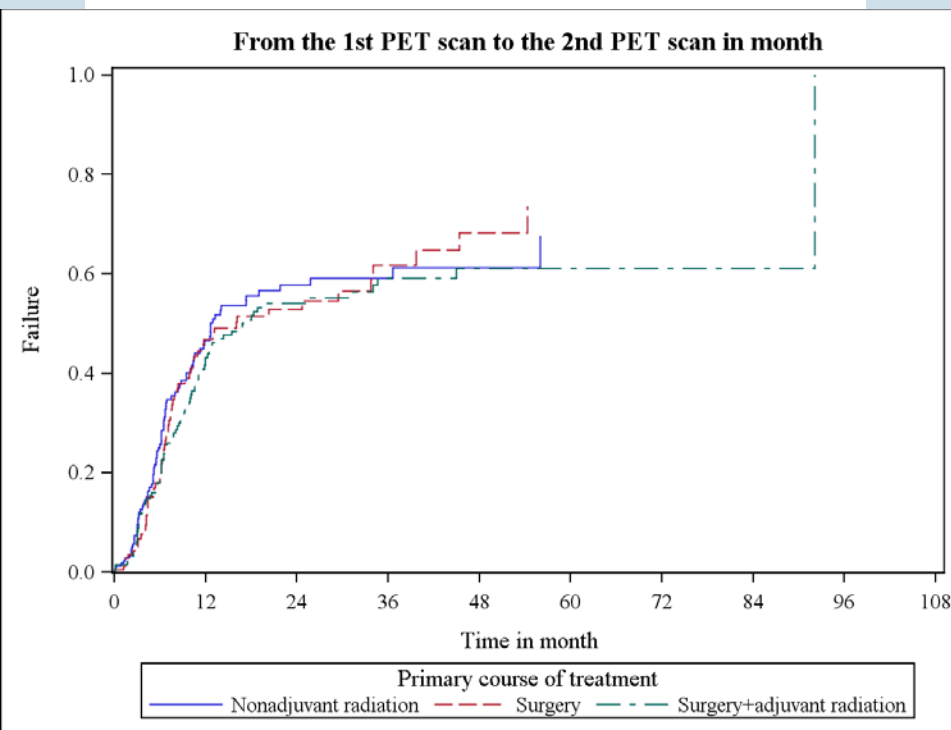
# Post-Treatment Surveillance: Imaging



# Post-Treatment Surveillance: Imaging

Time from 1<sup>st</sup> PET to 2<sup>nd</sup> PET (months)

Time from 2<sup>nd</sup> PET to 3<sup>rd</sup> PET (months)



# Post-treatment Ancillary Service Use

	From Diagnosis to Ever	From Last Treatment to 3 months after treatment	
		% Total Pts	% Pts Receiving Service Ever
Speech therapy	16.4	4.8	29.0
Swallowing therapy	20.0	6.0	30.1
Lymphedema therapy	22.1	3.0	13.4
Audiology	17.6	2.9	16.5

# Summary

- Medicare patients with head and neck cancer in Texas from 2000-2007 have mostly oral cavity or larynx cancers
  - 44% with local disease, 33% with regional disease, 12% with distant metastases
  - Of treated patients, roughly 1/3 are treated with surgery alone, 1/3 with definitive radiation, and 1/3 with surgery and adjuvant radiation
  - A probable 11% are not receiving any treatment

# Summary

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- 2-year disease-specific survival is around 80-85% regardless of treatment
- Only 10% of patients are having post-treatment imaging within the recommended timeframe
  - Roughly 50% of patients have a CT and 20% have a PET in the first post-treatment year
- Ancillary services are underutilized

# Future Directions

- Evaluate current patterns of post-treatment surveillance
  - Frequency of physician visits (and type of physician following patients), whether TSH is checked every 6-12 months for irradiated patients
    - Effect of previous treatment
    - Effect of tumor subsite/stage
    - Prevalence of NCCN guideline-adherence
  - Patterns of ancillary service use (treatment type, etc.)