



# Symptom Profiles in Head and Neck Cancer Patients treated with Radiation Therapy: A Prospective Study

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## Abstract

- Most head and neck cancer (HNC) patients will experience significant toxicity burden during and after radiation therapy (RT).
- Understanding symptom trajectories or profiles over time can be informative to clinicians and researchers seeking to personalize cancer care.
- Using data from an electronic patient-reported outcomes (ePRO) implementation study, we developed data curation algorithms to be able to describe patient characteristics and identify progressive severity patterns in 6 commonly occurring symptoms during RT.
- Patients treated with surgery had significant differences in mean pain, fatigue, swallow, and dry mouth compared to non-surgical patients.

## Introduction

- HNCs affect more than 75,000 individuals in the United States. [1]
- RT is standard of care for most cases (i.e., locally advanced) and is associated with several moderate-severe symptoms including xerostomia, dysphagia, and acute pain. [2]
- ePROs present a unique opportunity for prospective symptom monitoring, increased treatment compliance, early toxicity management, and improved quality of life (QOL). [3]
- Analyzing ePRO data along with electronic clinical data requires careful data cleaning, merging, and analysis.
- The objective was to develop data pipelines for electronic data curation and to analyze 6 symptom profiles during RT, stratified by nonsurgical and surgical patients.

## Methods

- ePRO tool: The MD Anderson Symptom Inventory – Head and Neck (MDASI-HN) which includes 13 core items, 9 HN - specific items, and 6 interference items. Questions are rated on a numeric 0-to-10 scale.
- ePROs were linked to all visit types (new patient/consult, weekly see visits [WSV], and follow-ups).
- ePRO and other clinical data on all HNC patients seen in the Head and Neck Radiation Oncology clinic was extracted from 1/01/2021-1/30/2024.
- A Python script was developed with functions for describing, recoding, merging, and analyzing ePRO data.
- Descriptive statistics and chi-square tests performed to identify differences between surgical and non-surgical groups.
- Time series analysis performed on mean symptom severity over 7 weeks of RT.

Table 1. Patient Characteristics of Responders

Characteristics	Total (N=2922)	Head-Neck Surgery	
		Yes (N=940)	No (N=1982)
<b>Age</b>	<b>P-value: 0.35</b>		
<60	1073 (36.7 %)	336 (35.74 %)	737 (37.18 %)
>=60	1849 (63.3 %)	604 (64.26 %)	1245 (62.82 %)
<b>Gender</b>	<b>P-value: 0.23</b>		
Male	2074 (71.0 %)	653 (69.47 %)	1421 (71.70 %)
Female	848 (29.0 %)	287 (30.53 %)	561 (28.30 %)
<b>Ethnic Group</b>	<b>P-value: 0.39</b>		
Hispanic	276 (9.4 %)	99 (10.53 %)	177 (8.93 %)
Non-Hispanic	2581 (88.3 %)	819 (87.02 %)	1763 (88.95 %)
Declined Answer	59 (2.0 %)	20 (2.13 %)	39 (1.97 %)
Unknown	6 (0.2 %)	3 (0.32 %)	3 (0.15 %)
<b>Employment Status</b>	<b>P-value: 0.92</b>		
Full Time	1025 (35.1 %)	326 (34.68 %)	699 (35.27 %)
Retired	1175 (40.2 %)	374 (39.79 %)	801 (40.41 %)
Unknown	269 (9.2 %)	91 (9.68 %)	178 (8.98 %)
Not Employed	147 (5.0 %)	49 (5.21 %)	98 (4.94 %)
Other	215 (7.4 %)	68 (7.23 %)	147 (7.42 %)
Disabled	91 (3.1 %)	32 (3.40 %)	59 (2.98 %)
<b>Patient Status</b>	<b>P-value: 0.82</b>		
Alive	2594 (88.8 %)	833 (88.62 %)	1761 (88.85 %)
Deceased	319 (10.9 %)	105 (11.17 %)	214 (10.80 %)
Not Available	9 (0.3 %)	2 (0.21 %)	7 (0.35 %)

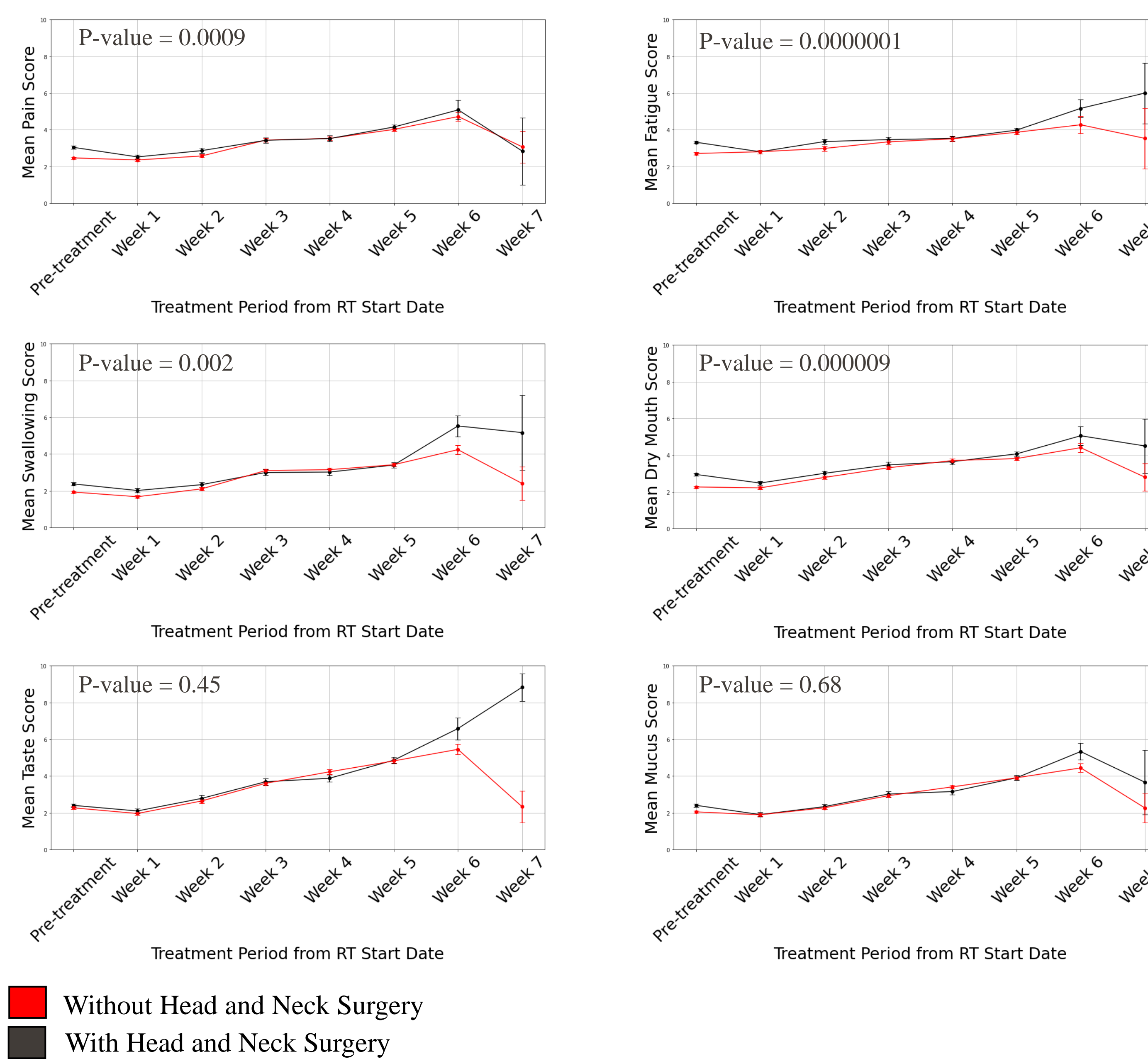


Figure 1. Mean Individual Symptom Severity Differences for the HN surgery history groups (Surgery vs. No Surgery) for the total sample period.

## Results

- A total of 19,155 ePROs were delivered to patients to complete out of which **10,118 (53%) were completed.**
- Unique patients: 4,297 out of which **2,922 (responders = 68%)** completed at least 1 ePRO.
- Visit types with ePRO data included 1669 (17%) new patient, **5,386 (53%) WSV**, and 3063 (30%) Follow-ups. 307 (3%) were video visits.
- **No significant difference** observed for characteristics distributions between surgical and nonsurgical groups (p-value > 0.05) (Table 1).
- Mean severity scores **increased** overtime across both groups during 6 weeks of RT and decreased after week 6 (Fig 1).
- Independent t-tests revealed significant differences in symptom severity between surgical and nonsurgical groups for **Pain, Fatigue, Dry Mouth and Swallowing (p-value < 0.05)** with higher severity in the surgical groups.
- **No significant differences** were found for taste alterations and mucus production (P-value > 0.05).

## Discussion

- This is a large-scale ePRO analysis on 2,922 HNC patients. Our findings indicate that during RT, patients with head and neck surgery experience worse issues with Pain, Fatigue, dry mouth, and swallowing compared to those without surgery. This may be due to surgery causing inflammation and disruption in normal tissues, which can be exacerbated by radiation therapy. [4]
- Additional work is needed to analyze ePRO trajectories based on tumor location, cancer stage, and receipt of systemic therapy. This will allow for a more comprehensive understanding of treatment effects on symptom severity and QOL.
- Moreover, the data curation pipelines built during this study can be used to prepare ePRO/clinical data for toxicity prediction models that can aid in developing personalized treatment plans that account for the impact of multimodal therapy on symptom severity, leading to better patient management and outcomes.

## References

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