Predicting Patient-Reported Outcomes for Oropharyngeal Cancer Patients Treated With Radiotherapy: Evaluating the Efficacy of AUCsymptom

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Background

Patients with head and neck cancer (HNC) undergoing radiotherapy (RT) may experience chronic side effects, such as xerostomia and dysphagia, which can have a severe negative impact on quality of life (QoL). Predicting these symptoms in HNC patients is thus of clinical interest, and recent quantitative approaches have provided insight into these symptom trajectories.

Our lab recently developed a measure of symptom burden over time, the area under the symptom trajectory curve (AUCsymptom or AUC), which condenses symptom data over the course of treatment and beyond into a single point while maintaining its temporal nature (Fig 1). Previous studies have indicated that acute symptoms, particularly xerostomia and dysphagia, strongly predict late symptoms1, but this relationship for the AUC, has not been established. Further, the ability of the AUC to independently impact the incidence of specific symptoms on QoL is currently unknown. Consequently, our objectives for this study are to expand upon our lab’s previous work to derive the predictive value of the acute AUC for late AUC, and to use AUC data to identify symptoms associated with lower patient-reported QoL.

Methods

AUC, data from 336 patients from a registry at MD Anderson Cancer Center of patients evaluated for a suspected or confirmed diagnosis of oropharyngeal cancer (OPC), previously calculated by our lab2, was used in the present study. AUC data were originally derived from patient responses to the MDASI-HN, a validated, head and neck specific, 28-item symptom reporting tool in which patients rate symptoms from 0 (none) to 10 (worst imaginable). MDASI items are split into core symptoms and interference items; which patients use to rate the severity of their symptoms and estimate how much their symptoms interfere with normal life activities (Fig 2).

Results

So far, correlations between acute and late AUC have been initially calculated. At this early stage, acute AUC does appear to be significantly correlated with late AUC, for several locoregional symptoms, most notably dry mouth (Spearman’s rho 0.40, p <0.0001) and taste (Spearman’s rho 0.40, p <0.0001) (Fig 3). The relationships between acute and late AUC, were also graphed as scatter plots and linear regressions were calculated; the plot for dry mouth is shown below (R² = 0.24, Fig 4). The next steps are to calculate composite interference scores, to calculate correlations between these scores and late symptom AUC, and finally to assess the effects of treatment, stage, age, and gender on these relationships.

Discussion

Although this project is still in progress, preliminary evidence suggests the AUCsymptom measure may have utility in identifying HNC patients who may benefit from individualized RT adaptation, at least for preventing chronic locoregional symptoms such as dry mouth, taste, and in dry, these symptoms have been shown to have a profound negative impact on patient QoL, especially as they relate to nutrition3; malignation is commonplace in HNC patients and is associated with lower overall survival4. While several acute and late symptoms, such as dry mouth, were relatively well correlated via Spearman’s rho (0.47), their linear relationship was much weaker (R² = 0.24), suggesting that clinical variables such as treatment, stage, or age are more important to the development of chronic late symptoms. We expect that our final results including these variables, as well as our interference item analysis, will provide a more complete picture.

Conclusions

While it is premature to draw strong conclusions from our work so far, we anticipate that this project will demonstrate the validity of the AUCsymptom measure and encourage further study of its potential for understanding treatment side effects that are most important to HNC patients. With further validation, AUCsymptom may present an opportunity for clinicians to utilize data-driven or algorithmic approaches to provide individualized care proactively rather than reactively. In addition, while this measure was developed for HNC patients, it could easily be adapted for other cancers, and could be used to monitor and prevent any number of treatment side effects, especially those with well-known trajectories. Perhaps the AUCsymptom may one day become an integral part of the clinician’s toolbox in delivering individually personalized, highly effective cancer treatment.

References


Figure 1. Sample illustration of the area under the symptom trajectory curve (AUCsymptom) for several symptom trajectories, adapted from Van Dijk et al2. The AUCsymptom represents the percentage of area covered by the symptom score for a specific interval divided by the maximum potential area.

Figure 2. Sample form depicting core and interference items for the M.D. Anderson Symptom Inventory (MDASI).1

Figure 3. Heatmap of Spearman’s rho correlations between acute AUC, and late AUC, for each item on the MDASI-HN. P-values < 0.0001 are reported as extremely significant (****).

Figure 4. Scatter plot and linear regression of acute AUC for a single symptom vs. late AUC for dry mouth. AUC values are reported as percentages.

Figure 3 (right): Heatmap of Spearman’s rho correlations between acute AUC and late AUC, for each item on the MDASI-HN. Values < 0.0001 are reported as extremely significant (****).

Figure 2. Sample form depicting core and interference items for the M.D. Anderson Symptom Inventory (MDASI).1

Figure 4. Scatter plot and linear regression of acute AUC for a single symptom vs. late AUC for dry mouth. AUC values are reported as percentages.