

Scientific Article

Peer Review of Head and Neck Cancer Planning Target Volumes in Radiation Oncology



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Abstract

Purpose: Radiation treatment plans undergo peer review during chart rounds, but changes to treatment volumes would require replanning. Our group implemented weekly head and neck cancer “volume rounds” to peer review all target volumes for head and neck cancer before radiation therapy (RT) planning and chart rounds.

Methods and Materials: We analyzed modifications made to planning target volumes (PTVs) at volume rounds for consecutive nonproton head and neck cancer cases from May 2020 to May 2021. Nine head and neck radiation oncologists participated in weekly volume rounds during this time. Recommendations were categorized as no changes, minor changes, major changes, additional workup (eg, biopsy or imaging), and consultation or tumor board discussion needed before the start of RT. Minor changes to PTVs generally did not require a second review before treatment planning while major changes did.

Results: PTVs for 511 cases involving 432 patients underwent peer review and 298 (58.3%) of these cases did not require any modifications before treatment planning. Minor and major changes were recommended in 75 (14.7%) and 86 (16.8%) cases, respectively. Forty-five (8.8%) cases were recommended to have additional workup and 23 (4.5%) required additional consultation with nonradiation surgeons or medical oncologists. Of the 45 cases that were recommended for additional workup, 40 underwent biopsy or imaging. Positive findings on imaging or biopsy occurred in 13 patients, leading to a significant change in management, including 4 patients who underwent additional surgery after positive findings before the start of RT.

Conclusions: Prospective peer review during head and neck cancer volume rounds led to frequent minor and major alterations to PTVs. Significant changes in the overall treatment plan, such as additional surgery before start of RT, occurred in a minority of patients. © 2022 The Authors. Published by Elsevier Inc. on behalf of American Society for Radiation Oncology. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Quality assurance programs are an essential part of radiation oncology. Multiple organizations, including the Royal College of Radiologists, the World Health Organization, and the American College of Radiation Oncology, have advocated for the need for quality assurance programs for treatment planning in radiation oncology, recommending peer review as one of the most effective means.¹⁻⁴ In radiation oncology, peer review of treatment

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All data generated and analyzed during this study are included in this published article.

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plans is common practice and is carried out in the form of “chart rounds,” in which members of the treatment team, including the radiation oncologists, medical physicists, and dosimetrists, review each case.^{2,5}

A 2016 systematic review of peer review practices found that the mean rate of change for treatment plans was 10.8%. For the studies that enumerated the types of changes made, 45.2% of changes included changes in target volume delineation and 7.5% of changes included changes in nontarget volume delineation or normal tissue sparing. The remaining changes were dose prescription or written directives (24.4%), changes related to treatment intent or indication (2.2%), selection of treatment modality (2.0%), and other unspecified changes (18.7%).⁶ A second notable finding of this systematic review was that 4 of the 11 studies were site-specific and included head and neck (1), breast (1), and lung (2) cancers. Of these 4 studies, head and neck cancer had the highest rate of modifications at 65.7% compared with 45.1% for lung cancer and 4.5% for breast cancer. This suggests the need for a supplemental review process aimed at improving volumes and contours before treatment planning.

Cox et al⁷ conducted a preliminary study of the implementation of daily “contour rounds,” focused solely on reviewing contours and fields before treatment planning for all disease sites. They found that 36% of cases needed revision due to changes in target volume (9%), inconsistencies in prescription or written directive (9%), incomplete volumes (11%), and other nontarget volume modifications or other miscellaneous reasons (7%).⁷ A follow-up study conducted by Riegel et al⁸ at this same institution found that daily contour rounds resulted in volume modifications in 9.7% of cases. They also found that head and neck represented the largest percentage of planning target volume (PTV) modifications out of all disease sites at 28.8%.⁸ Zairis et al⁹ found that changes were recommended in 46.7% of head and neck cases, which included changes to contours, dose/fractionation, chemotherapy, and additional imaging studies. These studies highlight the importance of reviewing volumes for head and neck cancer specifically before treatment planning.

Our institution implemented weekly “volume rounds” focused on peer reviewing volumes for head and neck radiation therapy cases in addition to weekly chart rounds, in which treatment plans are peer reviewed by the treatment team. We analyzed modifications made to proposed contours at head and neck cancer volume rounds to assess the effect of this supplemental peer review process.

Methods and Materials

This retrospective study analyzed modifications proposed for consecutive nonproton head and neck cancer

cases during weekly volume rounds between May 2020 and May 2021. Nine radiation oncologists who specialize in head and neck radiation oncology were present at these meetings. Notes of modifications were logged manually into Excel by alternating members of the HNC team. Cases that were discussed offline, outside of volume rounds, were omitted from this study.

Modifications were stratified into 5 different categories: no changes, minor changes, major changes, additional workup needed, and consultation needed. Cases that required no changes were cleared for treatment planning. Minor changes were defined as small changes to PTVs and contours, such as minor extension or reduction of coverage. These cases did not require re-review before treatment planning. Major changes included significant changes to PTVs or to radiation doses, such as coverage of the contralateral neck. These changes required re-review at subsequent volume rounds before treatment planning. Cases that required workup included those that needed additional biopsies or imaging studies before radiation treatment. Lastly, cases that needed consultation included those that needed to be presented at disease management meetings or discussed with surgeons or medical oncologists before treatment planning. Record keeping of discussions with surgeons or medical oncologists was not obtained, so it was not possible to determine how these consultations affected the treatment plan.

Cases could be classified into more than one category depending on whether they needed a minor or major change in addition to needing further workup or consultation. For example, a single case might require both major changes and an additional imaging study. For data analysis, percentages reflect how many cases fell into a given category out of the total number of cases reviewed. Because cases can fall into more than one category, percentages do not add to 100%. All data analysis was performed in Excel (Microsoft Corporation).

Results

PTVs for 511 cases, involving 432 patients, were peer reviewed by a team of 9 head and neck radiation oncologists and recommendations were classified into the 5 categories described above. Of these, 298 (58.3%) did not require any modifications before treatment planning (Fig. 1). Minor changes were recommended in 75 (14.7%) cases and major changes were recommended in 86 (16.8%) cases. Together, minor or major changes were recommended in 161 cases (31.5%).

Quad shots¹⁰ and resimulations (eg, adaptive planning) composed 137 of the total 511 cases. With the omission of these cases, the percentage of cases that required no changes decreased from 58.3% to 47.9%. Furthermore, the percentage of cases requiring minor or major changes

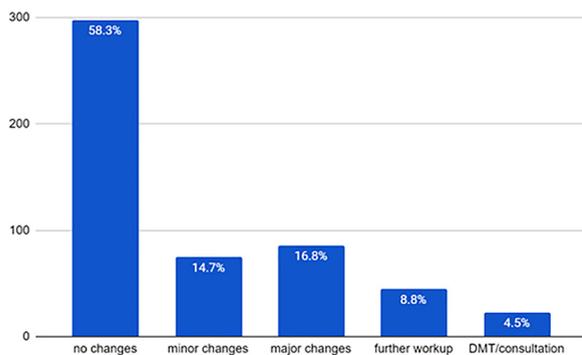


Figure 1 Recommendations from Volume Rounds.

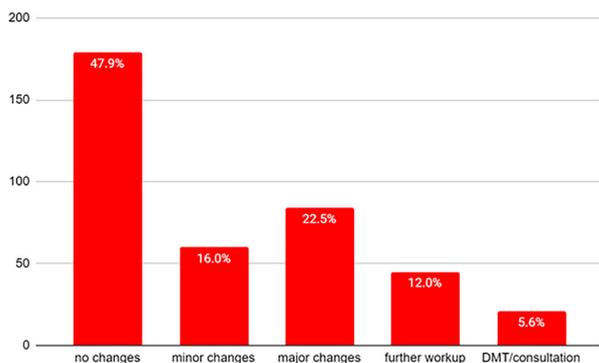


Figure 2 Recommendations from Volume Rounds excluding Quad Shot and re-simulation cases.

increased from 14.7% to 16.0% and 16.8% to 22.5%, respectively (Fig. 2).

The last 2 categories include additional workup and consultation recommendations. Additional workup, including additional biopsies, imaging studies, or surgery before treatment planning, was recommended for 45 (8.8%) of the total 511 cases, 40 of which obtained the recommended studies (Table 1).

Of the 40 patients who obtained the recommended studies, pathology or imaging consistent with gross disease was identified in 13 cases (32.5%; Table 1). These findings consistent with gross disease resulted in a major change in the treatment strategy from radiation to surgery in 4 cases. Lastly, consultation from the disease management team or specialists was recommended in 23 (4.5%) of the 511 cases.

Table 1 Recommendations for additional workup

Additional workup	Recommended	Obtained	Positive findings
Biopsies	22	20	7 (35.0%)
Imaging studies	19	16	5 (31.3%)
Both	4	4*	1 (25.0%)

* Of the 4 patients recommended to get both biopsies and imaging studies, 1 only had imaging.

Discussion

Our analysis of peer review volume rounds for head and neck cancer PTVs found that 31.5% of cases required a minor or major change and 13.3% required additional workup or consultation before treatment planning. With the omission of palliative quad shot and resimulation cases, the rate of recommended modifications increases from 31.5% to 38.5%. These findings are in accordance with a similar study published by Zairis et al, which found that peer review of head and neck cases before treatment planning led to recommended changes in 46.7% of cases.⁹

Given the complexity of head and neck treatment planning, making modifications to contours before treatment planning would save time and resources. In addition to the added quality assurance, the peer review during volume rounds also harmonizes target delineation across the institution. At our institution, all head and neck radiation oncologists from the main campus and 6 regional centers participate in weekly volume rounds, which ensures each case is treated uniformly across the institution.

To our knowledge, this is the largest head and neck cancer specific study on peer review for radiation therapy contours and highlights the effect of performing peer review early in the radiation therapy planning process. Peer review during volume rounds led to frequent changes in target contours and occasionally led to an overall change in management from radiation to surgery. These major changes should lead to additional improvement in patient outcomes. Limitations of this study include retrospective collection of data and potential subjectivity with the categorization of “minor” versus “major” changes to target contours.

Conclusion

The complexity of head and neck cancer cases warrants a supplemental peer review process focused on reviewing target contours before treatment planning. The implementation of volume rounds could lead to a reduction in replanning because traditional chart rounds occur after planning is completed. Lastly, site-specific peer review for institutions with multiple locations confers uniformity in treatment planning among all affiliated locations.

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