Effective Health Care Program

Cancer
Head and Neck Cancer

# Comparative Effectiveness and Safety of Radiotherapy Treatments for Head and Neck Cancer

## Key Clinical Issue

**What is the comparative effectiveness and safety of external-beam radiation therapies for head and neck cancer?**

## Background Information

Decisions about treatment for head and neck cancer are largely dependent on the site, stage, and histological characteristics of the disease. Treatment may include surgery, radiotherapy, chemotherapy, or some combination of these.

In recent years, the techniques for external-beam radiation therapy have evolved with the intended purpose of delivering more radiation to the tumor while sparing normal tissues and adjacent vulnerable organs. In recent years, two-dimensional radiation therapy (2DRT), three-dimensional conformal radiation therapy (3DCRT), and intensity-modulated radiation therapy (IMRT) have been the most commonly used techniques for head and neck cancer. Despite the widespread adoption of IMRT throughout the United States, few prospective, randomized studies have directly compared the clinical effectiveness of IMRT with that of either 3DCRT or 2DRT. Proton beam therapy is less commonly used.

## Conclusions

Despite proposed advantages and risks of various radiotherapies for head and neck cancer, the current evidence is insufficient to determine if 2DRT, 3DCRT, or IMRT confers any advantages in terms of tumor control and survival. This does not mean that differences do not exist but that future study is required. However, with respect to adverse events and quality of life, IMRT is associated with a lower incidence of late xerostomia and with improved quality of life for domains related to late xerostomia. For other adverse effects, differences and risks may exist, but there is insufficient evidence from which to permit conclusions about any comparative effects.

### A note about this Clinician Guide

**A systematic review** of 108 clinical studies was conducted by independent researchers, funded by AHRQ, to synthesize the evidence on what is known and not known on this clinical issue.

**This topic was nominated** through a public process. The research questions and the results of the report were subject to expert input, peer review, and public comment.

**The results of this review** are summarized here for use in your decisionmaking and in discussions with patients. The full report, with references for included and excluded studies, is available at www.effectivehealthcare.ahrq.gov.

## Clinical Bottom Line

**Comparative Evidence for 2DRT, 3DCRT, and IMRT**

**Tumor Control or Survival:** There is insufficient evidence to determine if 2DRT, 3DCRT, or IMRT confers any advantages when compared to each other in terms of tumor control or survival.

**Adverse Effects:** IMRT is associated with a lower incidence of late xerostomia when compared to 3DCRT (●●○) or 2DRT (●●○). There is insufficient evidence to permit conclusions about the comparative effects of 2DRT, 3DCRT, or IMRT on adverse events other than late xerostomia.

**Quality of Life:** Patients who received IMRT had improved quality of life, with respect to late xerostomia, when compared with those who received 3DCRT (●●○) or 2DRT (●●○). There is insufficient evidence to determine the comparative effects of IMRT, 3DCRT, and 2DRT on other quality-of-life measures.

**Experience of Treatment Team:** The data is insufficient to determine whether the experience of the clinical team confers an advantage, because no comparative studies addressed this issue.

**Comparative Evidence for Proton Beam Therapy vs. 2DRT, 3DCRT, and IMRT**

**Across Outcomes:** No comparative studies addressed the domains of tumor control, survival, adverse effects, quality of life, or experience of the treatment team. Therefore, the data are insufficient to permit any conclusions about proton beam therapy when compared to other radiotherapy modalities for head and neck cancer.

**Confidence Scale**

| | | |
|---|---|---|
| High: | ●●● | There are consistent results from good-quality studies. Further research is very unlikely to change the conclusions. |
| Moderate: | ●●○ | Findings are supported, but further research could change the conclusions. |
| Low: | ●○○ | There are very few studies, or existing studies are flawed. |

Agency for Healthcare Research and Quality
Advancing Excellence in Health Care • www.ahrq.gov

## Gaps in Knowledge

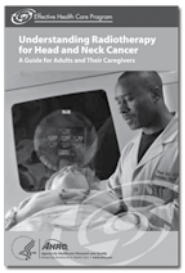
- Because of insufficient evidence, high-quality studies are needed to determine the comparative effectiveness of IMRT, 3DCRT, 2DRT, and proton beam therapy:
  - In achieving tumor control and improving patient survival.
  - In reducing adverse events and improving quality of life.
  - In understanding how outcomes are affected by the characteristics of the tumor, the patient, and the physician/radiotherapy team (e.g., experience), or by radiation treatment planning (e.g., target volume delineation, dosimetric parameters).
- Further research is needed to define the extent to which discrepancies between planned dose and the amount of radiation delivered to the tumor occur.
- Well-designed, multicenter, prospective observational studies—where randomized trials are not practical or advisable—would improve the usefulness and generalizability of the evidence.
- The body of evidence would be improved by studies that use standardized terminology, use valid and reliable outcome measures with blinded assessments, and assess quality-of-life and patient-reported outcomes with validated instruments.
- Research is needed to improve the management of xerostomia in patients with head and neck cancer and to better understand risk factors for xerostomia.

## What To Discuss With Your Patients

- Whether critical normal structures are present in the field to be irradiated (e.g., salivary glands, pituitary gland, optic nerve) and the potential resulting adverse events.
- The potential benefits and the acute and late harms of the proposed radiation treatment for the individual patient—given the type, location, and stage of his or her cancer.
- The potential long-term adverse effects of radiation on quality of life—given the patient's individual lifestyle and values.
- The likely out-of-pocket expense to the patient for each type of radiation therapy, depending on the patient's insurance coverage.

## Resource for Patients

*Understanding Radiotherapy for Head and Neck Cancer, A Guide for Adults and Their Caregivers* is a free companion to this clinician guide. It can help patients talk with their health care professionals about the many options for treatment. It provides information about:




- The differences between radiotherapy systems.
- The side effects of radiotherapy.
- Current evidence of effectiveness and harms.
- Questions for patients to ask their doctor.

## Source

The information in this summary is based on *Comparative Effectiveness and Safety of Radiation Therapy Treatments for Head and Neck Cancer*, Comparative Effectiveness Review No. 20, prepared by the Blue Cross Blue Shield Association Technology Evaluation Center and Evidence-based Practice Center under Contract No. 290-02-0026 for the Agency for Healthcare Research and Quality, January 2009. Available at: www.effectivehealthcare.ahrq.gov. This summary was prepared by the John M. Eisenberg Center for Clinical Decisions and Communications Science at Baylor College of Medicine, Houston, Texas.

## Ordering Information

For electronic copies of *Understanding Radiotherapy for Head and Neck Cancer, A Guide for Adults and Their Caregivers* (AHRQ Pub. No. 10(11)-EHC014-A), this clinician guide, and the full systematic review, visit www.effectivehealthcare.ahrq.gov. To order free print copies, call the AHRQ Publications Clearinghouse at 800-358-9295.

AHRQ Pub. No. 10(11)-EHC014-3
October 2010