

DOSIMETRIC EVALUATION OF VMAT RADIOTHERAPY FOR BREAST CANCER

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OBJECTIVE

VMAT is used for breast and chest wall radiotherapy. It shapes the dose around the target. Low-dose exposure to normal tissues still needs review.

Aim: To review PTV coverage and organ-at-risk doses in VMAT plans.

METHODS

- Concurrent audit from 1 December 2025 onwards.
- PTV and OAR dose-volume limits were reviewed.
- OARs: heart, both lungs, contralateral breast, and spinal cord.
- Schedules: 26 Gy/5, 40.05 Gy/15, and 48 Gy/15 with SIB.

TABLE 1. PATIENT GROUPS

Group	No	%
Whole breast	27	54
Breast + SCF	9	18
Chest wall ± nodes	14	28
Total	50	100

LIMITATIONS

Small subgroups. Mixed sites and schedules. Descriptive audit only. No comparator plans. No toxicity, control, treatment-time, or cost data.

RESULTS: WHOLE BREAST

26 Gy in 5 fractions | n = 20

Dose limit	Achieved
PTV V105	20/20
PTV Dmax	19/20
Heart V1.5 Gy	19/20
Heart V7 Gy	20/20
Lung V8	9/20
Contra. lung V2.7	12/20

Main gaps

- Lung V8: 10 acceptable; 1 not achieved.
- Contralateral lung: 6 not achieved; 2 not assessed.
- Contralateral breast: 18 acceptable; 1 achieved; 1 not assessed.

RESULTS: 15-FRACTION BREAST

40.05 Gy in 15 fractions | n = 4

- PTV V95 and D50: 4/4 achieved.
- Spinal cord: 4/4 achieved.
- Lung V16: 2/4 not achieved.
- Heart mean dose: 4/4 acceptable.

48 Gy in 15 fractions with SIB | n = 3

- All listed PTV limits: 3/3 achieved.
- Lung V16: 1/3 not achieved.
- Other listed lung, heart, breast, and cord limits were achieved or acceptable.

RESULTS: NODES / CHEST WALL

Breast + SCF | n = 9

- All listed PTV limits achieved.
- 48 Gy/15: lung D35 not achieved in 1/5.
- 40.05 Gy/15: all listed limits achieved or acceptable.

Chest wall ± nodes | n = 14

- All listed PTV limits achieved.
- Heart, contralateral lung, and cord: 14/14 achieved.
- Chest wall only: lung V16 not achieved in 1/1; V8 acceptable.

SCF: supraclavicular fossa. SIB: simultaneous integrated boost.

DISCUSSION

Target coverage was consistent across the audited groups. Most heart and spinal cord limits were met. The main shortfalls involved lung dose. Low-dose exposure to the contralateral lung also needs attention in the 26 Gy/5-fraction group.

The FAST-Forward trial supports 26 Gy in 5 fractions for selected patients.² ASTRO guidance supports hypofractionated whole-breast treatment.³ Published planning data show that VMAT dose patterns vary with technique.^{1,4} Plan-level OAR review remains important.

CONCLUSION

- Most listed PTV goals were met.
- Heart and cord limits were usually met.
- Lung dose was the main area for improvement.
- Review missed lung limits and contralateral low-dose spread.
- Repeat the audit after corrective action.

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