

A Canadian Breast Radiotherapy Practice Survey

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Aim

To understand variations in breast radiotherapy practice across Canada.

Methods

An on-line survey was sent to radiotherapy (RT) departments across Canada and posted on-line prior to the 2023 COMP Winter School on Advances in Breast Imaging and Radiotherapy. Questions covering the following patterns of practice were included: 1. General – clinic size, number of patients treated, prescriptions, number of linear accelerators (linacs), and use of novel techniques. 2. Immobilisation and Simulation – use of deep-inspiration breath hold (DIBH) and supine/prone setup. 3. Planning – including constraints for organs at risk and 4. Treatment and image guidance (IGRT).

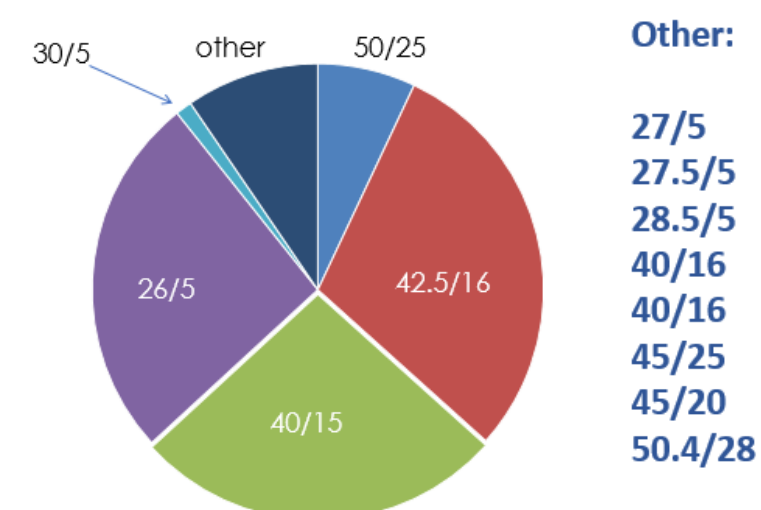
Results

29 Canadian Cancer Treatment centres responded to the survey between November 2022 and January 2023 (response rate of 60%). All 10 provinces were represented.

1. General

- 27 centres treat <6000 patients (all sites, all indications) per year, while 2 treat >6000
- For all centres, 10-40% of the RT workload is breast RT. **For half of the centres, breast RT constitutes ≥20% of all treatments.** Fractionation use is shown in Figure 1
- 70% of centres offer partial breast irradiation**
- 4 centres offer HDR interstitial brachytherapy and one offers permanent seed implants for breast. 2 centres offer intraoperative RT

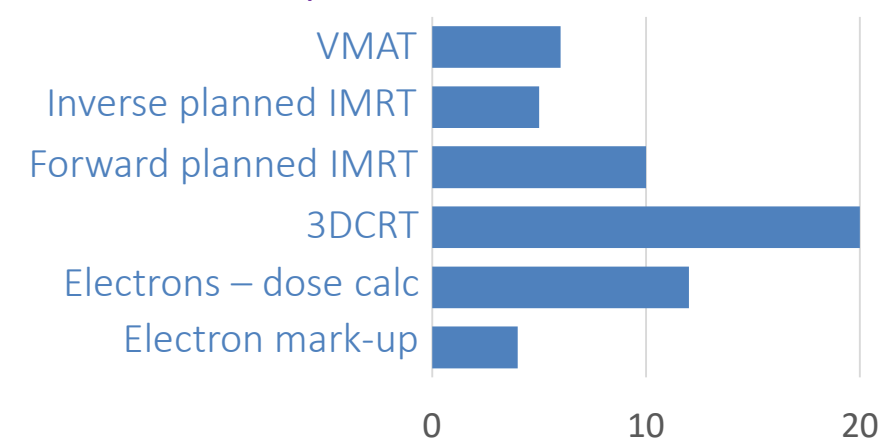
Figure 1: Dose fractionation use for breast RT in total Gy / number of fractions.



2. Immobilisation and Simulation

- All centers offer DIBH treatments, primarily through use of a patient surface marker. For centers offering DIBH, 4/28 do not perform complementary free-breathing scans, 3 only do sometimes and the rest always do
- All centres offer supine setup, with 15 of those using *Vac-Loks*TM
- 7/27 do not use bolus for treating chest walls and a further 3 only use bolus sometimes.** 6 centres use 3D printed bolus, the rest use commercially purchased sheets, wet towels or metal mesh

Figure 2: Number of centres using particular breast RT boost technique



- Prone setup is offered at 10 centres
- To support large breasts during supine treatment: 4 centres use bras, 7 use thermoplastic shells, 4 use Styrofoam wedges and other solutions including vacloks, rolled gauze, *Cosmas Cups*TM and specialised devices such as CARA. **11 centres have no provisions for large breasts**

3. Planning

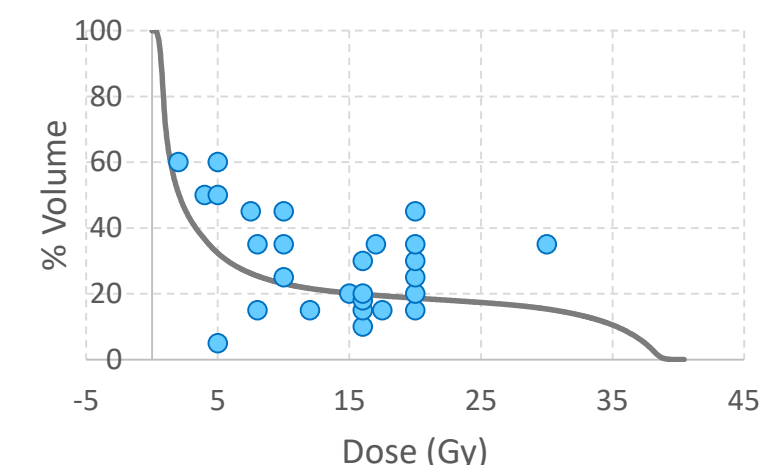
- For whole breast treatment, 22 centres use forward planned tangents including wedges and the step and shoot technique. 9 centres use inverse planned IMRT and 11 use VMAT
- For breast + nodes, 24 centres use a 4-field technique, 7 use a 3-field technique **and 10 use VMAT**
- Boosts are mostly sequential (26/27 centres). 3 centres use SIB. Techniques used for boost planning are shown in figure 2.
- Treatment planning constraints varied significantly across respondents.**
- For the 40Gy/15 whole breast prescription, planning dose constraints for mean heart dose range from <1Gy to <5Gy and mean lung dose constraints range from <2Gy to <20Gy
- The largest variation was seen in lung volume constraints in both breast and breast+nodes planning, as exemplified in Figure 3

Conclusions

At the time of the survey, the 26Gy/5 dose prescription was used in approximately 30% of whole breast RT. 1/3 of responding centres offer prone setup. VMAT is used in approximately 1/3 of centres for selected whole breast +/- regional nodes. Treatment planning dose constraints for heart and lung vary significantly across Canada.

- The variability in constraints is smaller for the ultra-hypofractionated regimes vs. the standard 15-25 fractions

Figure 3: Lung constraints for breast planning for 40Gy/15 and 42.5Gy/16 prescriptions. Each dot represents a centre, with grey line indicating a representative lung DVH for a typical case



4. Treatment and IGRT

- 88% of centres offer daily image guidance for all breast treatments**, the rest do so for hypofractionated treatments only. Most perform IGRT through a combination of MV portals, kV planar images and CBCT. Only 1 centre uses surface guidance.
- During image guidance for a standard course (15+ fractions) of radiotherapy, therapists at **most centres are matching to bony anatomy (ex: spine, sternum) or a combination of soft tissue and bone**, while only 2 centres match to soft tissue only and 1 centre matches to clips. The same trend is true for hypofractionated (≤7 fractions) regimens.