Comparison of Wire, Radioactive Seed, and Magnetic Seed Localization Platforms for Breast-Conserving Surgery and Sentinel Node Biopsy: A Regional Implementation Study

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Background:

- Advances in breast cancer screening have expanded the need for effective image-guided localization in breast-conserving surgery.
- In June 2024, a magnetic localization platform for breast lesions and sentinel node biopsy was implemented.
- We compared magnetic seeds to historic localization methods of wire guided and radioactive seed localizations.

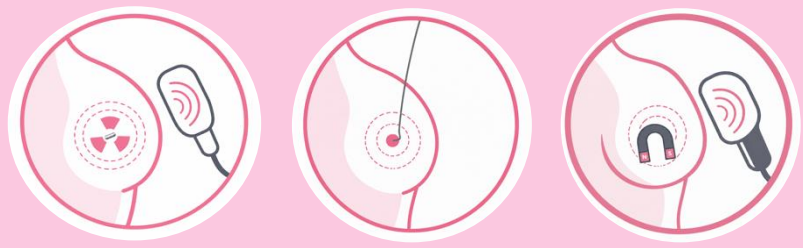
Methods

- Image-guided breast-conserving surgeries between January 2024 and May 2025 at three hospitals.
- Demographic, tumour, localization device (wire, radioactive seed, magnetic seed), and operative/pathologic data was collected.
- Univariate and multivariable analyses identified factors associated with each outcome.

Primary Outcomes Included:

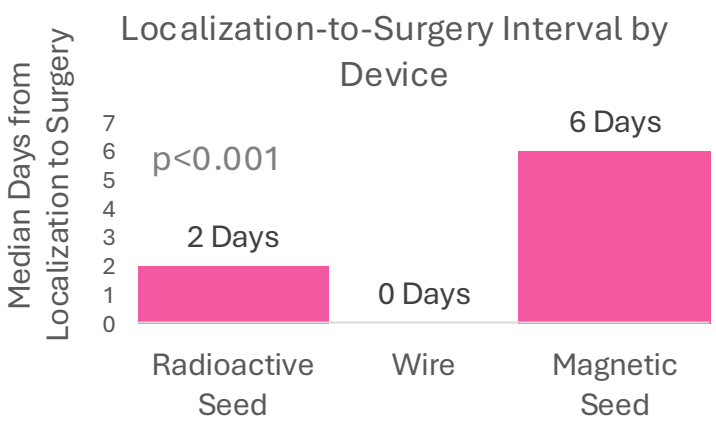
- Margin Status
- Re-excision rates
- Localization to surgery interval
- Operating Room Time
- Specimen Volume & Weight

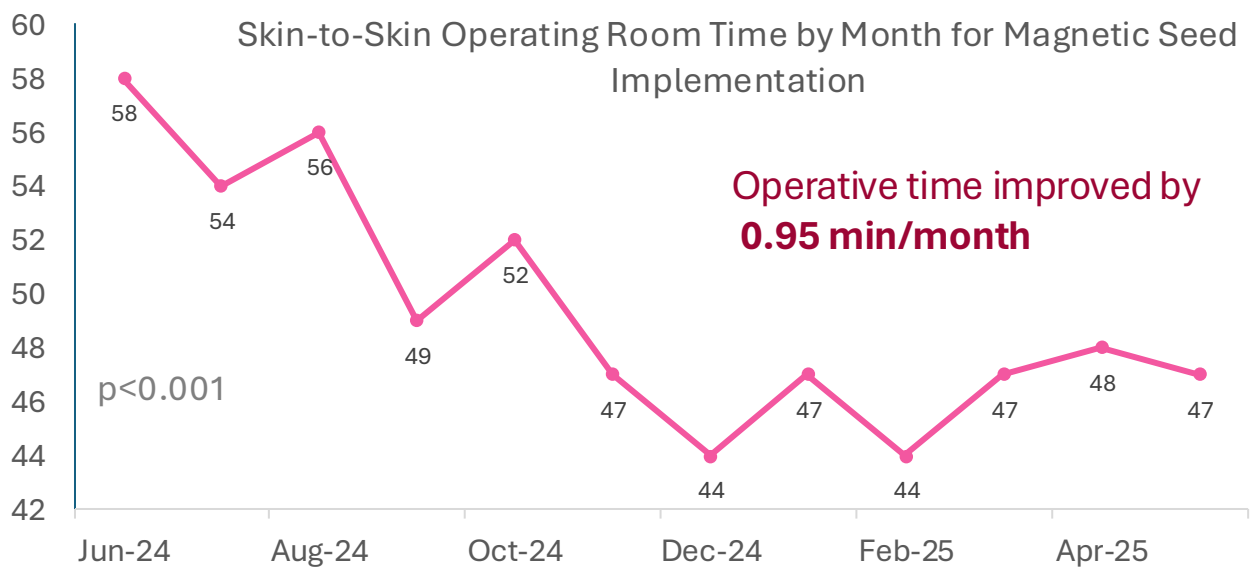
Results

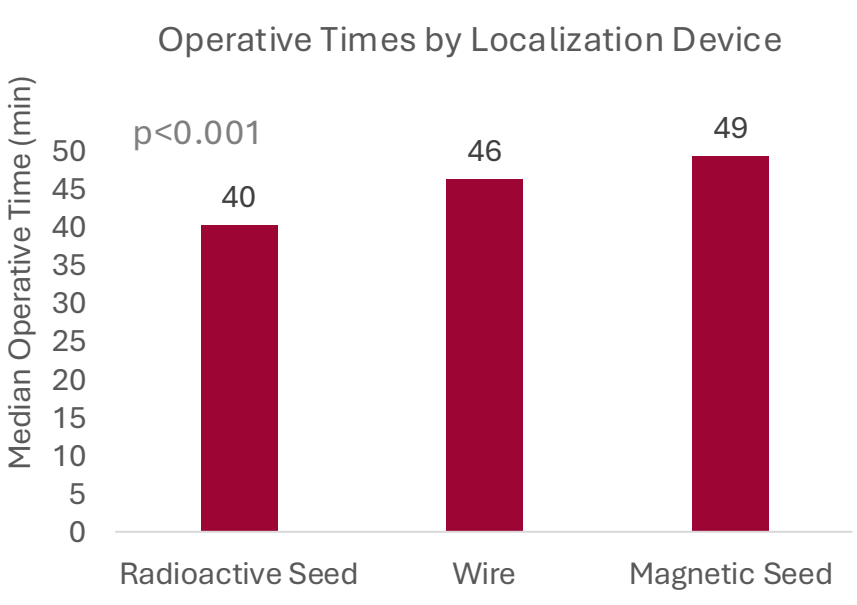


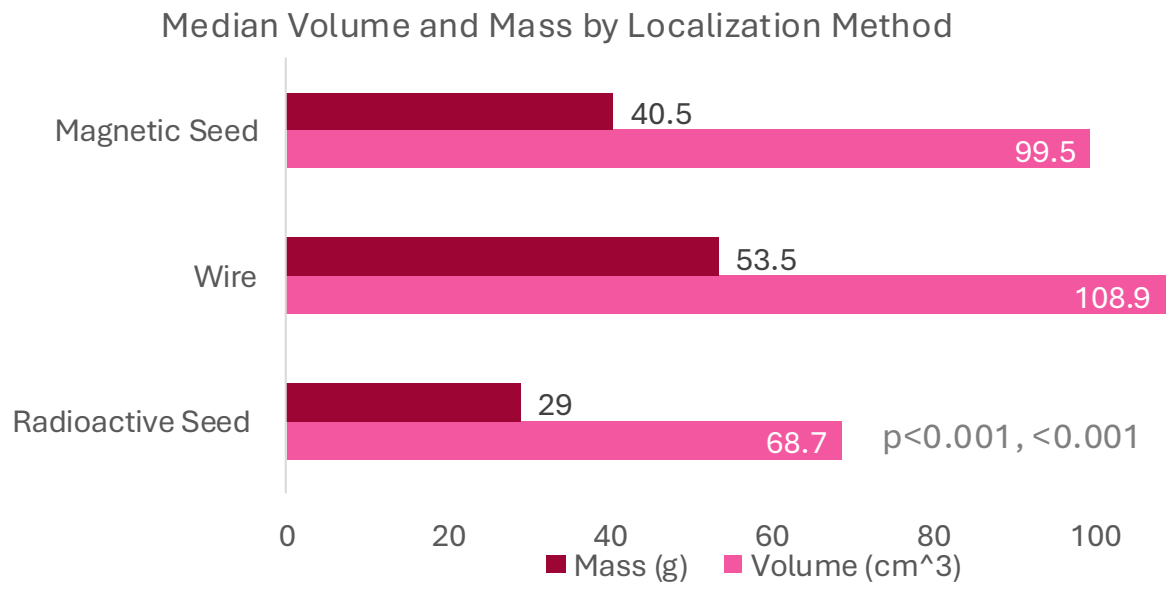
	Radioactive Seed (n=133)	Wire (n=217)	Magnetic Seed (n=730)	p-value
Neoadjuvant chemo (%)	11.3	10.6	16.7	**0.04**
SLNB performed (%)	70.7	72.8	64.5	**0.046**
Positive margins (%)	20	13.4	14.9	0.269
Re-excision rate (%)	12.0	9.2	8.4	0.021

- **Multivariable analysis:**
  - Neoadjuvant chemotherapy, SLNB, higher grade → larger volume and longer OR time (all p<0.0001)
  - 2x higher positive margins with mammographic vs ultrasound localization
  - RSL → smaller volume (–23.2 cm^3, p=0.006)
  - Notable surgeon variation









Conclusion:

- **Magnetic seed localization** achieved **comparable margin outcomes** to wire and radioactive seed techniques, with a **learning-curve improvement** in OR times.
- Greater **scheduling flexibility** and integration of neoadjuvant chemotherapy.
- Offers a **patient centered approach** with potential system-level benefits.

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