



UNIVERSITY OF CALGARY

INTRA-OPERATIVE MARGIN ASSESSMENT IN BREAST-CONSERVING SURGERY: A POPULATION-LEVEL COMPARISON OF TECHNIQUES



Alison Laws¹, MD; Mantaj S. Brar², MSc MD; Antoine Bouchard-Fortier¹, MSc MD; Brad Leong³; May Lynn Quan¹, MSc MD
¹ Department of Surgery, University of Calgary; ² Department of Surgery, University of Toronto; ³ Cancer Surgery Alberta, Alberta Health Services

INTRODUCTION

- Positive margins occur in 20-60% of wire-localized breast-conserving surgeries (BCS) for breast cancer
- Various modalities of intra-operative margin assessment have been shown to improve margin status, though the literature is limited
- Optimal margin assessment techniques remain unclear

OBJECTIVES

1. Describe the use of intra-operative margin assessment techniques including specimen mammography, intra-operative ultrasound, gross assessment by pathologist and frozen section analysis in Alberta, Canada
2. Determine the effect of margin assessment techniques on margin status

METHODS

Study Design

- Retrospective population-based review
- Wire-localized BCS in Alberta, Canada from Jan 2010 – Dec 2014
- Non-palpable, biopsy-proven invasive cancer

Data Sources

- Alberta WebSMR, a population-based database in which surgeons prospectively enter pre-operatively identified patient and tumour variables
- Chart review for pathology variables

Statistical Analysis

- Negative margin = no-tumour-on-ink (invasive) and $\geq 2\text{mm}$ (DCIS)
- Multivariable logistic regression adjusting for known confounders to assess the effect of any margin assessment technique on the risk of a positive margin compared to wire localization alone
- Interaction test and secondary analysis to evaluate effect of individual margin assessment techniques on the risk of a positive margin

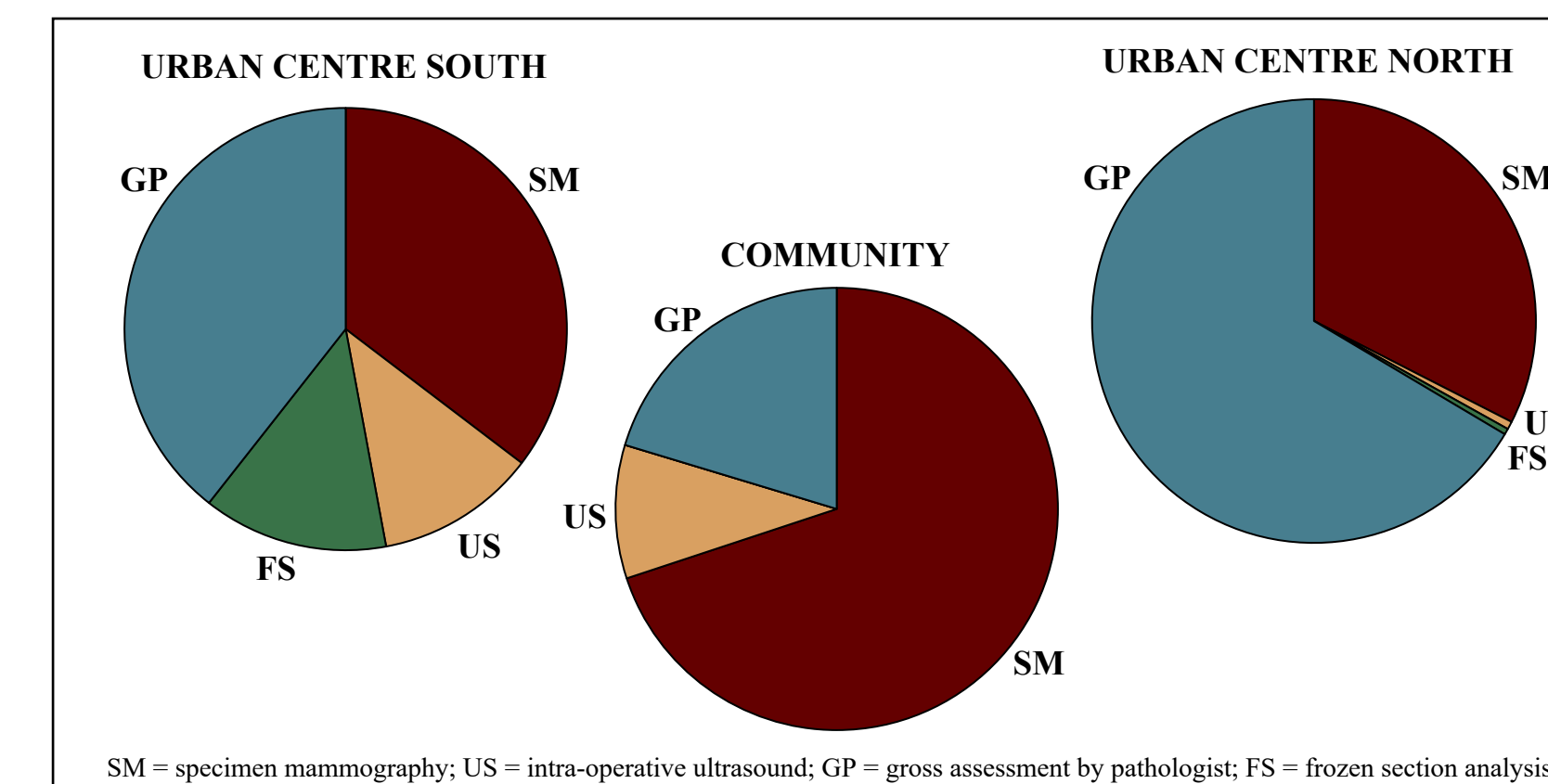
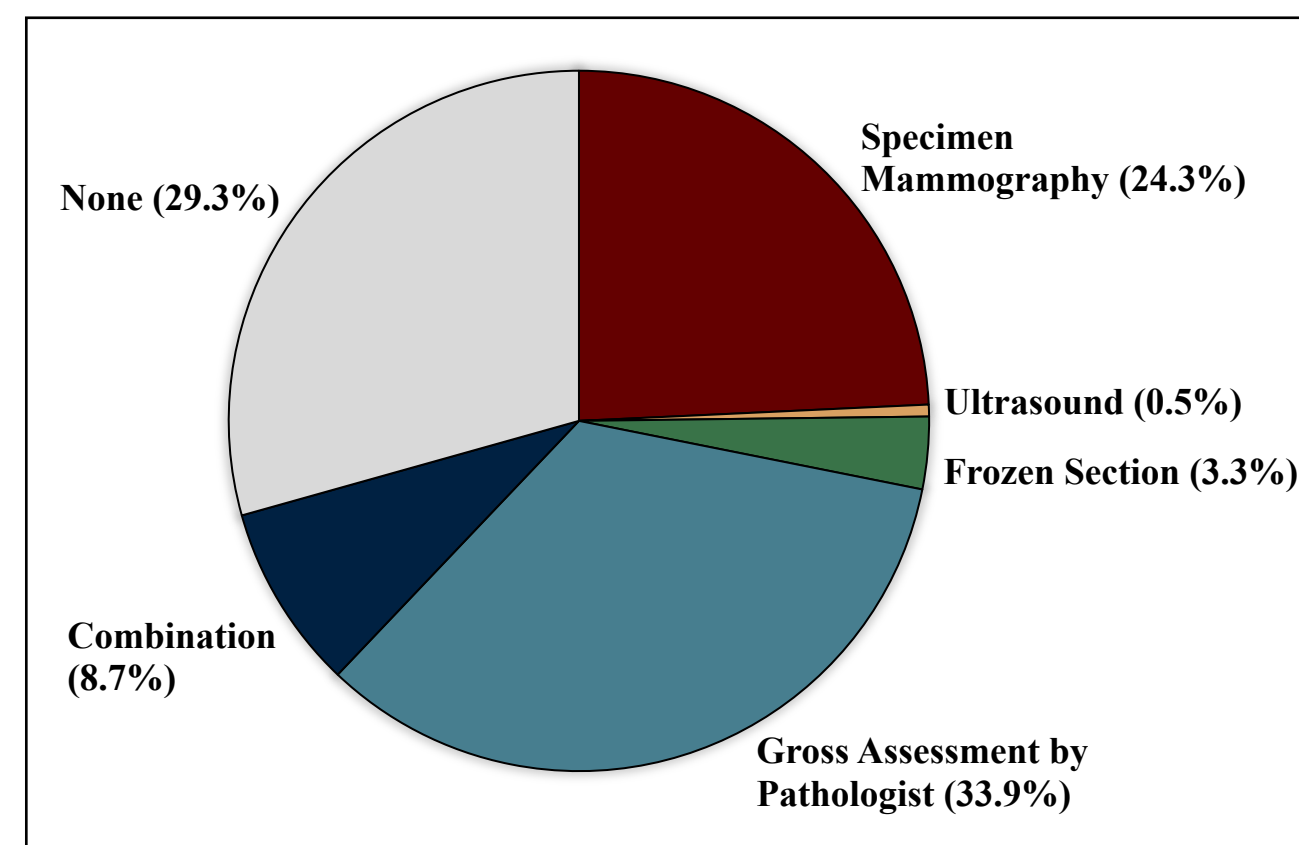
RESULTS

Practice Patterns

- 1,649 patients included in analysis from fourteen institutions across the province
- 71% had some form of margin assessment
- Gross assessment by pathologist and specimen mammography most common techniques, though significant regional variation exists

Effect on Margin Status

- Multivariable logistic regression revealed no difference in the odds of a positive margin with any margin assessment technique versus wire localization alone
- Individually, both gross assessment by pathologist and frozen section analysis significantly reduced the odds of a positive margin, while specimen mammography and intra-operative ultrasound showed no effect



	Positive Margin Rate	Adjusted OR	P-value	95% CI
None	115/484 (23.8%)			
Any margin assessment technique		0.79	0.22	0.54-1.16
Specimen mammography	114/400 (28.5%)	1.23	0.29	0.84-1.81
Intraoperative ultrasound	1/10 (10.0%)	1.09	0.83	0.50-2.37
Gross assessment by pathologist	79/560 (14.1%)	0.56	0.002	0.39-0.81
Frozen section analysis	8/55 (14.5%)	0.43	0.046	0.19-0.98

DISCUSSION

Strengths

- Retrospective design however WebSMR contains pre-operative patient and tumour data entered prospectively by the operating surgeon
- First study evaluating multiple margin assessment techniques at a population-level

Limitations

- Effect of the margin assessment group as a whole may be poorly estimated given collinearity between surgeons and their use of margin assessment
- Use or intent of a particular technique not captured in our dataset; difficult to identify whether surgeons are performing true margin assessment versus merely confirming lesion excision, especially for both imaging techniques
- Lack of power in the intra-operative ultrasound group

CONCLUSIONS

- The majority of Alberta surgeons are using an intra-operative margin assessment technique, most commonly gross assessment by pathologist and specimen mammography
- Overall, use of any margin assessment technique failed to improve margin status over wire localization alone
- Both gross assessment by pathologist and frozen section analysis significantly reduced the odds of a positive margin, while imaging-alone techniques did not demonstrate an effect

FUTURE DIRECTIONS

- We did not investigate cosmetic outcomes, length of surgery or cost effectiveness for each technique which should be considered
- Standard protocols for each technique need to be created allowing for prospective comparison in the future.