Lymph Node Evaluation in Breast Cancer: A Comparative Study of CNB and FNA.

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Abstract

Accurate lymph node evaluation guides staging and treatment in breast cancer, particularly in low-resource settings. We compared fine-needle aspiration (FNA) and core needle biopsy (CNB) in a retrospective cohort of women evaluated in the Brazilian public health system (2015–2023). Diagnostic performance data informed a 1-year budget impact and decision-tree model using national reimbursement costs. CNB showed far fewer inconclusive results and lower overall costs, despite its higher initial price. CNB is the more cost-effective first-line strategy for lymph node evaluation in resource-limited settings.

Introduction and Objectives

Assessment of regional lymph nodes in patients with breast cancer (BC) is one of the main predictive and prognostic factors for treatment. An accurate assessment is essential for deciding on the best management both in initial cases and in suspected recurrence.

Fine-needle aspiration (FNA) and core needle biopsy (CNB) are the two main percutaneous techniques used, but they differ in in sensitivity, specificity, complication rates and associated healthcare costs.

The study aimed to compare the diagnostic performance and economic impact of FNA versus CNB for lymph node evaluation in breast cancer patients within the Brazilian public healthcare system, emphasizing the relevance of cost-effective strategies in low- and middle-income countries (LMICs).

Methods and Materials

A retrospective cohort study was conducted, including women with suspicious lymph nodes who underwent FNA or CNB between 2015 and 2023.

A 1-year budget impact model nested with a decision tree model was used as economic model. Probabilities from the cohort study were used as clinical inputs. Costs were obtained from Sigtap (Brazilian listing of procedures reimbursement).

The economic analysis considered only the procedural costs, assuming that each patient could undergo either FNA or CNB as the initial approach. In cases of inconclusive results, the patient could then undergo CNB or surgery. All analyses were reported as American dollar (USD), using an exchange rate of 6 brazilian reais to 1 USD.

Table 1. Lymph nodes biopsies according to needle type, biopsy site and pathological results.

	Total n = 300		FNA n = 79		CNB n = 221		
	N, mean	%, sd	N, mean	%, sd	N, mean	%, sd	P value
Age (years)	54.1	11.6	53.0	10.9	54.4	11.8	0.35
Biopsy site							
Axillary	**243**	81.0	**53**	67.1	**190**	86.0	<0.05
Cervical	**22**	7.3	**8**	10.1	**14**	6.3	0.26
Supraclavicular	**35**	11.7	**18**	22.8	**17**	7.7	<0.05
Pathological results							
Malignant	**146**	48.7	**24**	30.3	**122**	55.2	<0.05
Benign	**108**	36.0	**15**	19.0	**93**	42.1	<0.05
Inconclusive	**46**	15.3	**40**	50.7	**6**	2.7	<0.05

Results and Discussion

The 300 women included in the study had similar ages (FNA: 53 vs CNB: 54 years old, average). The overall rate of inconclusive results in the sample was 15%. The rate of inconclusive results in procedures performed with CNB was lower than FNA (2.7% vs. 50.7%, p<0.05).

Among the 79 patients who underwent FNA as the initial procedure, the total cost was USD 16.901, whereas for the 221 women who initially underwent CNB, the cost was USD 9.930. Although the initial FNA procedure was less expensive (USD 1.755) than the initial CNB procedure (USD 8.185), FNA resulted in a 17-fold higher rate of inconclusive results, and the need for additional procedures made CNB more cost-effective overall.

A scenario in which only FNA was available as the initial procedure resulted in 11% higher overall costs compared to the base-case scenario (USD 26.832). Conversely, if CNB were available to all patients as the initial procedure, overall costs would be USD 13.718, approximately 50% lower than the base-case scenario.

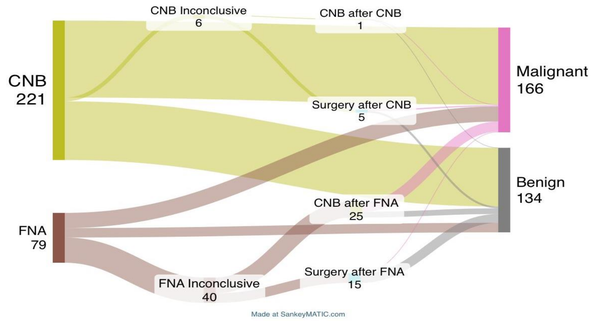


Figure 1. Procedure after inconclusive result and final diagnosis.

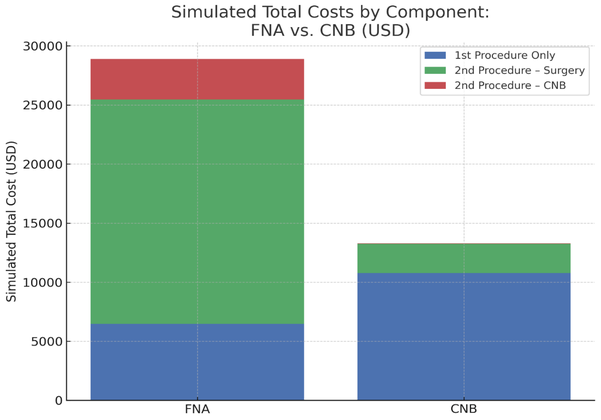


Figure 2. Sensitivity analyses considering 100% of cases doing FNA or CNB as first procedure.

Conclusions

CNB offers superior diagnostic performance and greater economic efficiency compared to fine-needle aspiration for lymph node evaluation in breast cancer.

Prioritizing CNB as the first-line diagnostic approach could improve resource allocation in public healthcare systems, particularly in LMICs where cost-effectiveness is crucial to expanding access to high-quality cancer care.

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