Title of abstract

Effectiveness in Predicting Breast Cancer Diagnosis Using an Artificial Intelligence Point-of-Care Ultrasound (POCUS) System at a Tertiary Hospital Diagnostic Breast Clinic

Names of author(s):
K Malherbe[1], F Malherbe2, L Roodt[2]
[1]Medsol AI Solutions (Pty) Ltd, South Africa, [2]Groote Schuur Hospital,[2]University of Cape Town, South Africa

Introduction: Breast cancer remains a significant public health concern in South Africa, with delayed diagnoses contributing to poor outcomes. Ultrasound is an accessible, non-invasive imaging tool, yet operator variability limits broader application. This study explores how artificial intelligence (AI) integrated into point-of-care ultrasound (Breast AI) may enhance diagnostic accuracy and triage efficacy.

Aim of Study: To evaluate the diagnostic performance of a locally developed AI-enabled POCUS system (Breast AI) for predicting malignancy in women with palpable breast lesions at a tertiary hospital.

Materials and Methods: Study design: Prospective cohort study.
Setting and sampling: Conducted at Groote Schuur Hospital breast clinic (June–November 2024); included women ≥25 years presenting with palpable abnormalities for biopsy.
Inclusion/exclusion criteria: Included patients with no prior confirmed diagnosis; excluded those <25 years, with locally advanced tumours, infections, or incomplete follow-up/histology.
Data collected: Patient demographics, lesion location, AI prediction percentage, final histology.
Data/statistical analysis: Sensitivity, specificity, PPV, ROC AUC, F1 score. ANOVA and raincloud plots were used for subgroup performance.
Ethical considerations: Ethical approval from University of Cape Town HREC (Ref 371/2024); informed consent obtained.

Results: A total of 174 patients were enrolled; median age 48 years (IQR 38–60). Using a 51% malignancy risk threshold, Breast AI achieved: Sensitivity: 67.2%**,** Specificity: 79.4%**,** PPV: 70.3%**,** AUC: 0.76**,** F1 Score: 69%**.** Benign lesions clustered below 30%, malignant lesions above 51%. Laterality analysis revealed better right-sided lesion sensitivity (85.7%) vs left (58.8%). A three-tiered risk stratification model (<30%, 30–51%, >51%) was proposed to guide triage.

Conclusion: Breast AI demonstrates promising diagnostic accuracy for triaging breast lesions in resource-constrained environments. Integration into clinical workflow may reduce unnecessary biopsies and support timely intervention. Further multi-centre validation is recommended.

Table 1: Diagnostic Performance Metrics

Metric	Breast AI System	Diagnostic Benchmark
Sensitivity (%)	67.2	85%
Specificity (%)	79.4	80%
Positive Predictive Value (%)	70.3	70%
F1 Score (%)	69.0	

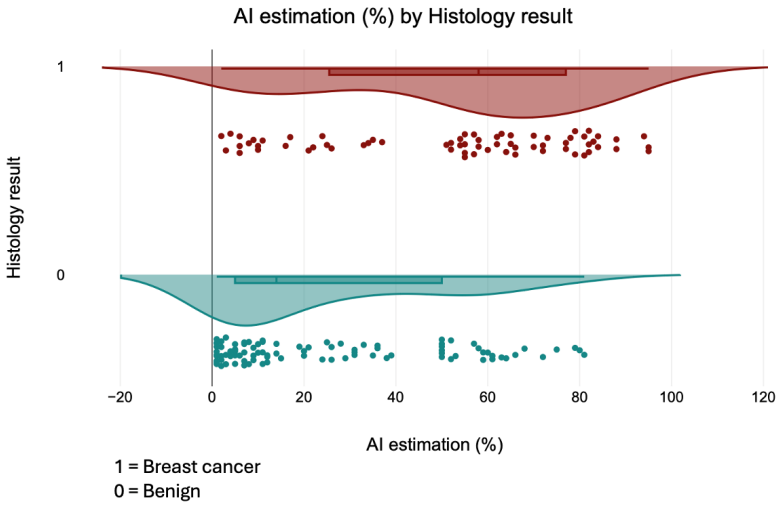

Figure 1: Rain cloud plot interpretation