

Scoring Model for Predicting Unplanned Readmission After Breast Reduction

using National Data



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BACKGROUND

Reduction mammoplasty continues to be a commonly sought procedure in the United States. Reported complication rates vary widely, with some studies describing as few as 4.3% to as high as 8.2%, with the most common complication being delayed wound healing.

OBJECTIVE

We sought to identify the preoperative risk factors for unplanned readmission within the first post-operative month on a national, multi-institutional scale.

METHODS

Patients who underwent reduction mammoplasty from the ACS-NSQIP 2012 – 2019 database were analyzed to determine rates of readmission within 30 days of the initial breast surgery. The cohort was divided into 60 and 40% random testing and validation samples. A multivariable logistic regression analysis was then performed to isolate independent factors of unplanned readmission using the testing sample (n = 22,743). The predictors were weighted according to beta coefficients to develop an integer-based clinical risk score predictive of complications. This system was then validated using receiver operating characteristics (ROC) analysis of the validation sample (n = 15,162).

RESULTS

Table 1: Multivariate regression analysis for unplanned rates of readmission.

Table 1: Multivariate regression analysis and creation of an integer-based clinical risk score for predicting readmission after breast reduction.

Variable	Multivariate regression: extensive adjustment			Scoring System	
	Odds Ratio	P value	95 % CI	β coefficient (SE ^a)	Integer score
Inpatient status	1.942	<0.0001	(1.42 – 2.65)	0.67 (+/- 0.11)	7
Smoker within 6 months pre-op	1.639	0.0061	(1.15 – 2.33)	0.50 (+/- 0.08)	5
History of COPD	2.256	0.0425	(1.03 – 4.95)	0.81 (+/- 0.04)	8
Hypertension requiring medication	1.426	0.0122	(1.08 – 1.88)	0.36 (+/- 0.08)	4
Age		0.0009			
≤ 44 years	Ref	—	—	—	—
> 44 years	1.555	0.0009	(1.20 – 2.02)	0.44 (+/- 0.12)	4
Body mass index		0.0074			
Normal	Ref	—	—	—	—
Underweight	2.945	0.2981	(0.39 – 22.52)	1.08 (+/- 0.02)	—
Overweight	0.875	0.5537	(0.56 – 1.36)	-0.13 (+/- 0.03)	—
Obese I	1.191	0.4297	(0.77 – 1.84)	0.17 (+/- 0.04)	—
Obese II	1.593	0.0358	(1.03 – 2.46)	0.47 (+/- 0.11)	5
Operation time		0.0097			
≤ 142 minutes	Ref	—	—	—	—
> 142 minutes	1.379	0.0097	(1.08 – 1.76)	0.32 (+/- 0.09)	3
Integer Range	[0, 36]				

This multivariable logistic regression model adjusted for the following perioperative variables: 1. Age (continuous), 2. Gender (dichotomous), 3. Smoking (Dichotomous), 4. Race (categorical), 5. Inpatient status (dichotomous), 6. Operation year (categorical), 7. Body mass index class (categorical), 8. Diabetes mellitus with oral agents or insulin (dichotomous), 9. Chronic steroid use (dichotomous), 10. Dyspnea (dichotomous), 11. Functional health status pre-operative (categorical), 12. Chronic obstructive pulmonary disease (dichotomous), 13. Hypertension requiring medication (dichotomous), 14. History of disseminated cancer (dichotomous), 15. History of bleed disorders (dichotomous), 16. Preoperative weight loss of [10 % in last 6 months (dichotomous), 17. Wound classification (categorical), 18. Preoperative platelet count (continuous), 19. Preoperative International Normalized Ratio (continuous), 20. Preoperative hematocrit (continuous), 21. Pre-operative serum albumin (continuous), 22. Operation time (categorical), 23. Length of hospital stay (continuous), 24. American Society of Anesthesiologist classification

^aSE standard error, represented throughout the text and tables by the symbol “+/-”

Figure 1: ROC curve for unplanned rates of readmission. The AUC is 0.66.

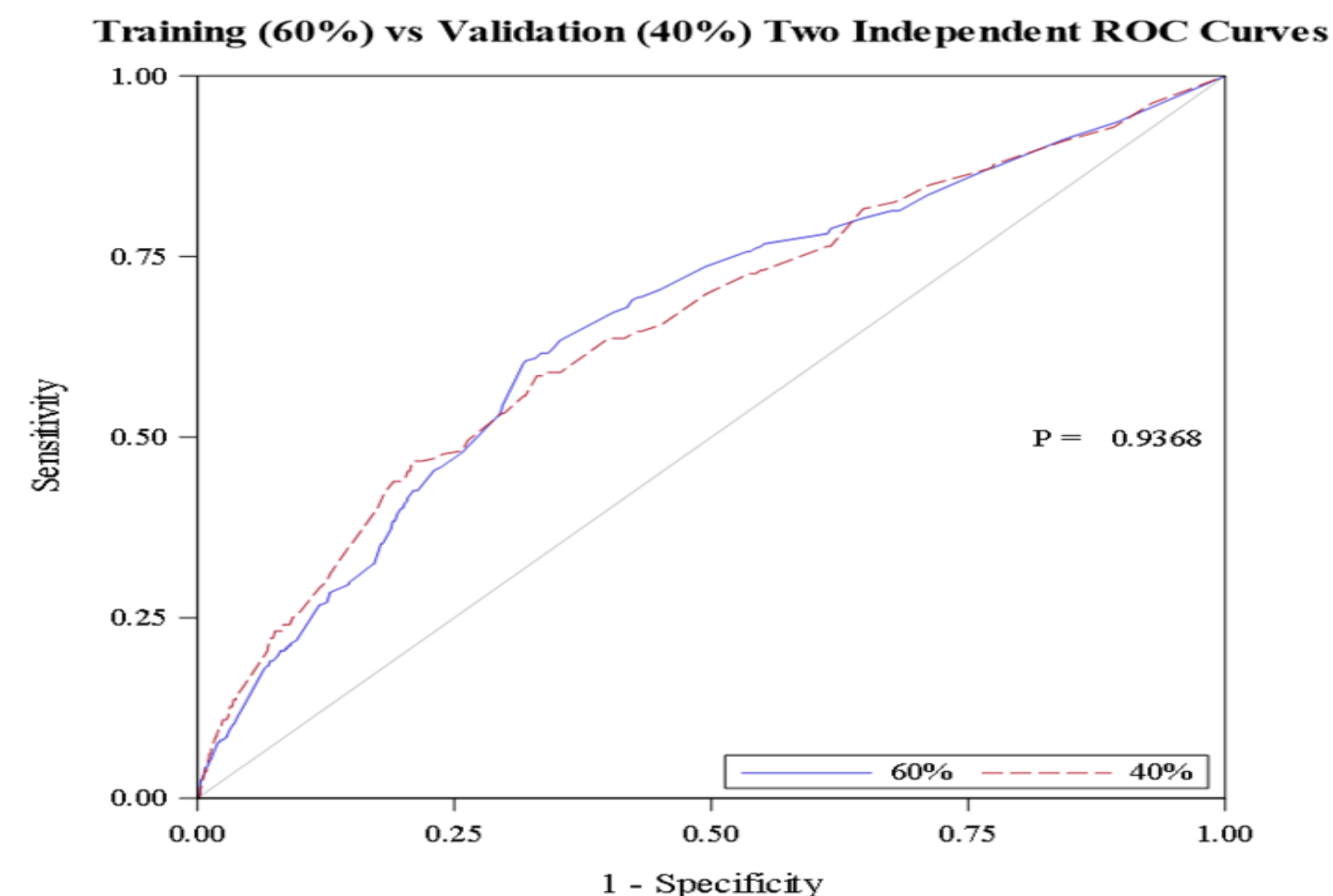
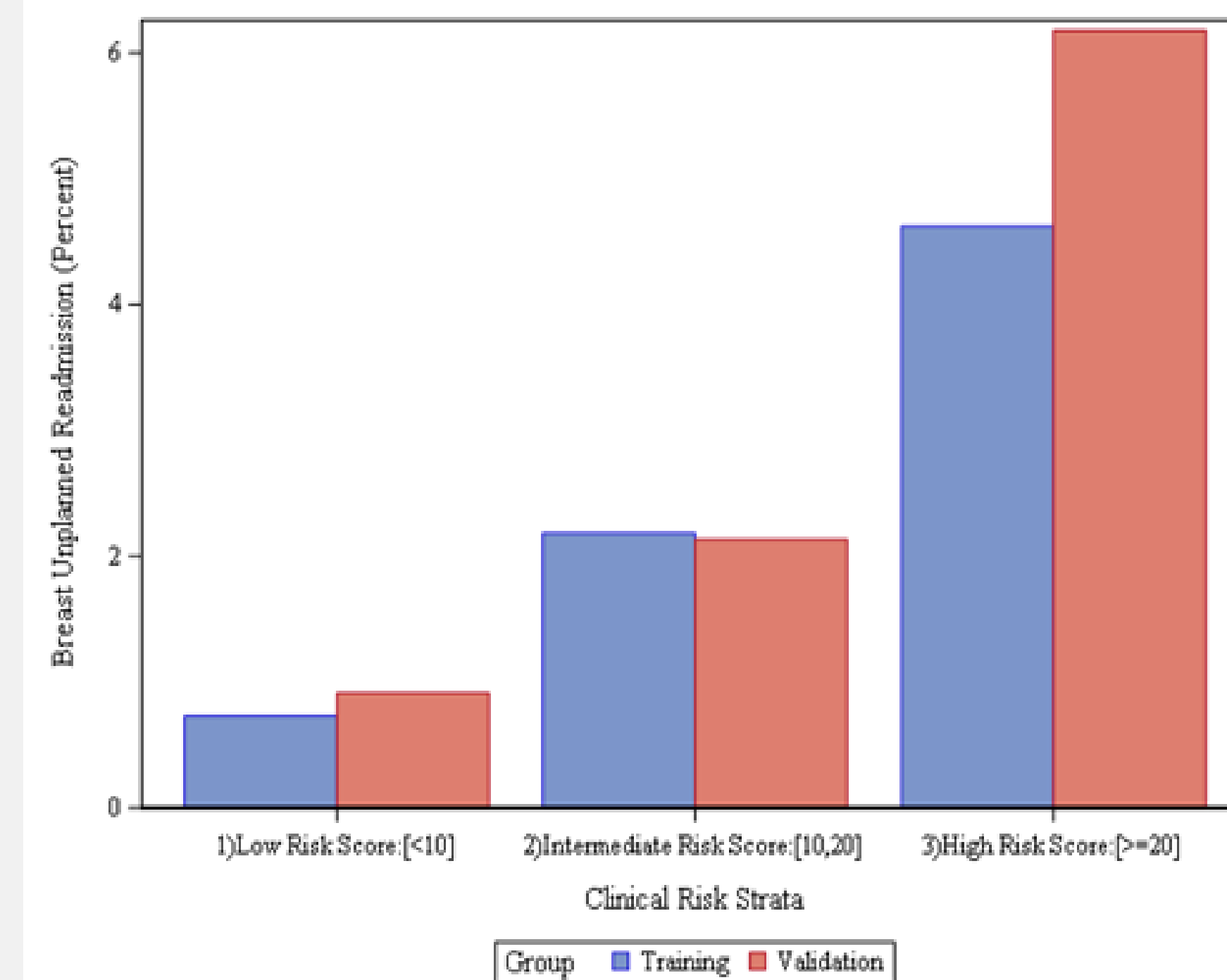


Figure 2: Score risk groups for unplanned readmission.



CONCLUSION

Independent risk factors for readmission included age older than the median of 44 years (p < 0.01), inpatient procedure (p < 0.01), smoking (p < 0.01), hypertensive medication (p = 0.01), COPD (p < 0.05), BMI ≥ 35 (p < 0.01), and operation time greater than the median of 142 minutes (p < 0.01). The scoring model from this data can be utilized not only to improve preoperative planning and identify high risk patients, but also to decrease unnecessary healthcare costs.

ARTICLES SELECTED

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