

Prediction Of Adverse Outcomes Following Free Tissue Transfer Using LACE Index For The Treatment Of Chronic Lower Extremity Wounds

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Purpose

As healthcare costs rise, scales that predict hospital readmission are needed to identify at-risk patients. The LACE Index is used to predict nonelective readmission and mortality within 30 days of discharge. Variation of the LACE index have been studied in plastic surgery populations, but evidence among specific cohorts is lacking. Our aim was to evaluate the utility of LACE in patients undergoing free tissue transfer (FTT) to the lower extremity (LE), a population at high risk of poor outcomes.

LACE Index

Length of stay
Acute admission
Comorbidities (CCI)
Emergency department visits in the last 6 months

Methods

Following IRB approval (MHRI Mod #2018-173), a single institution retrospective chart review was performed for all patients undergoing FTT for chronic lower extremity wounds between 2013 and 2019.

Length of stay, acuity of admission, comorbidity burden determined by Charlson Comorbidity Index (CCI), and utilization of emergency department within the previous six months were collected to calculate LACE Index.

Outcomes were defined as emergency department (ED) and inpatient admissions, re-operation, and mortality within 30 and 90 days of discharge.

Association between LACE scores and outcomes were analyzed using univariate analysis and post-hoc multivariable logistic regression. Statistical significance was defined as $p < 0.05$.

Results

170 patients were included in our study. Patients were an average of 55.6 years old (SD:14.7 years) and had an average body mass index (BMI) of 29.5 kg/m² (SD: 6.6 kg/m²). Eighty-four patients (49.4%) had a previous diagnosis of diabetes. 79 patients (46.5%) in the study sample had been admitted to an inpatient unit at least once within 1 year prior to admission for free tissue transfer.

On univariate analysis, both older age was associated with decreased odds of emergency department (ED) admissions (OR: 0.974, $p=0.028$), while previous inpatient admission was associated with increased odds of ED admission within 90 days (OR: 1.356, $p=0.044$), but not readmission. Higher BMI was associate with increased odds of inpatient readmission, both within 30 days (OR: 1.087, $p=0.004$) and 90 days (OR: 1.077, $p=0.004$). Diabetes was associated with markedly increased odds of both ED admission and inpatient readmission within both timeframes studied (**Table 1**).

Multivariable logistic regression including age, previous admissions, and different LACE score thresholds found LACE ≥ 11 was significantly associated with higher odds of 90-day ED admission (OR: 2.424, $p=0.023$). No association was found between LACE and inpatient readmission or re-operation (**Table 1**). No patients died within the follow-up period.

Table 1: Analysis of LACE Index to Predict Outcomes in Patients Undergoing FTT to LE

	Overall	ED Admission within:		Inpatient Readmission within:		Reoperation within:	
		30-days	90-days	30-days	90-days	30-days	90-days
Age (years)	55.6 ± 14.7	OR: 0.980 p=0.150	OR: 0.974 $p=0.028$	OR: 0.974 p=0.085	OR: 0.980 p=0.079	OR: 0.987 p=0.379	OR: 0.991 p=0.446
Diabetes	84 (49.4%)	OR: 2.659 $p=0.034$	OR: 2.242 $p=0.026$	OR: 2.659 $p=0.034$	OR: 3.120 $p=0.003$	OR: 1.267 p=0.606	OR: 1.923 p=0.065
BMI (kg/m ²)	29.5 ± 6.6	OR: 1.058 p=0.058	OR: 1.025 p=0.346	OR: 1.087 $p=0.004$	OR: 1.077 $p=0.004$	OR: 1.059 p=0.071	OR: 1.036 p=0.176
Inpatient Admission in the last year	79* (47.5%)	OR: 1.371 p=0.058	OR: 1.356 $p=0.044$	OR: 1.004 p=0.982	OR: 1.160 p=0.329	OR: 1.050 p=0.808	OR: 1.191 p=0.243
Length of Stay (days)	27.9 ± 14.0	OR: 1.005 p=0.726	OR: 1.008 p=0.483	OR: 1.001 p=0.938	OR: 1.021 p=0.083	OR: 0.993 p=0.683	OR: 1.002 p=0.846
POD of Discharge	16.1 ± 9.8	OR: 0.999 p=0.998	OR: 0.992 p=0.684	OR: 0.996 p=0.860	OR: 1.021 p=0.204	OR: 0.976 p=0.417	OR: 0.998 p=0.906
LACE Score	12 (IQR:10-15)	OR: 1.051 p=0.444	OR: 1.101 p=0.361	OR: 1.030 p=0.444	OR: 1.096 p=0.804	OR: 0.907 p=0.446	OR: 0.999 p=0.720

Multivariable Logistic Regression

LACE ≥ 10	-	[†] OR: 1.514 p=0.326	[§] OR: 1.395 p=0.514	[§] OR: 1.063 p=0.878	-	-
LACE ≥ 11	-	[†]OR: 2.424 $p=0.023$ 95% CI: 1.13–5.21	[§] OR: 1.785 p=0.194	[§] OR: 1.857 p=0.093	-	-

ED – Emergency department, OR – odds ratio, BMI – body mass index (kg/m²), POD – postoperative day, LACE – LACE Index, calculated utilizing van Walraven et al. methods¹, IQR – interquartile range, CI – confidence interval (95%)

*79 patients had been admitted to an inpatient unit at least once within 1 year prior of admission for FTT surgery.

[†]Variables included in Multivariable logistic regression were age (years), number of inpatient admissions in the last year, and applicable LACE Index score cut-offs. Diabetes was excluded as variable is utilized in LACE calculations.

[§]Variables included in Multivariable logistic regression were body mass index (BMI) and applicable LACE Index score cut-offs. Diabetes was excluded as variable is utilized in LACE calculations.

Conclusion

Our analysis demonstrates that certain LACE Index score cut-offs may predict 90-day ED admissions, but traditional use of LACE to predict 30-day outcomes may not be suitable to predict readmission following LE FTT. Further studies should ascertain whether other versions of the LACE Index are a viable risk stratification tool for patients undergoing free tissue transfer.

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