Predictive Model for Symptom Relief in Claudicants with Surgical Intervention

Richard Shi, MD, Nicholas Bulatao, BS, Rupak Mukherjee, PhD, Jean Marie Ruddy, MD, Thomas Brothers, MD, Adam Tanious, MD, MBA, MMSc
Medical University of South Carolina

INTRODUCTION

Society for Vascular Surgery Clinical Practice Guideline on the management of intermittent claudication: Focused update

Michael S. Conte, MD,[a] Bernadette Aulivola, MD, MS,[b] Neal R. Barshes, MD, MPH,[c] Daniel J. Bertges, MD,[d] Matthew A. Corriere, MD, MS,[e] M. Hassan Murad, MD, MPH,[f] Richard J. Powell, MD,[g] Amy B. Reed, MD,[h] William P. Robinson III, MD,[i] *and* Jessica P. Simons, MD, MPH,[j] *San Francisco, CA; Maywood, Springfield, IL; Houston, TX; Burlington, VT; Columbus, OH; Rochester, MN; Hanover, NH; Murrells Inlet, SC; and Worcester, MA*

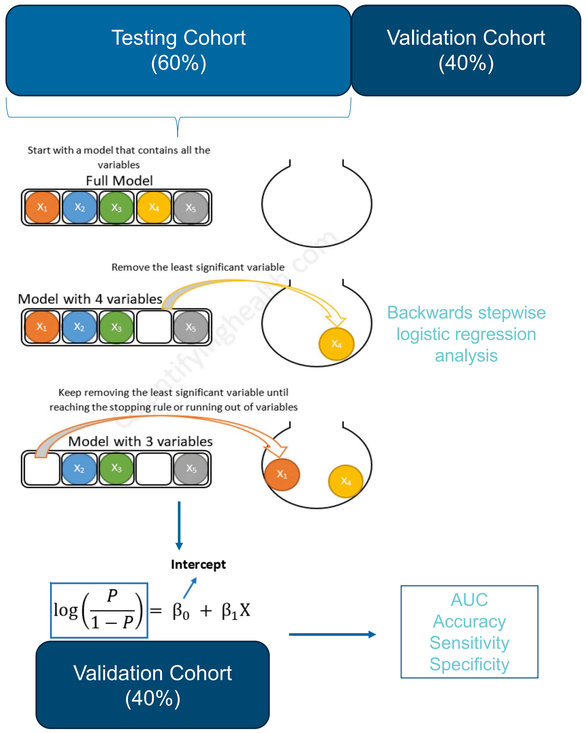
- "In patients being considered for revascularization for intermittent claudication, it is recommended to have shared decision-making conversations involving an assessment of individual risk factors known to influence risks and benefits"
  - Key comorbidities
  - Previous interventions
  - Disease Complexity
  - Procedural strategy
- Their importance/degree of impact on symptom relief remains unclear

AIM

Development of a comprehensive predictive model to identify claudicants most likely to benefit from intervention

METHODOLOGY

- ICD-10 code: claudication
- CPT codes: open/endo intervention
- Years: 2015 - 2022
- Exclusion: CLTI, ALI, no one-year follow-up



RESULTS

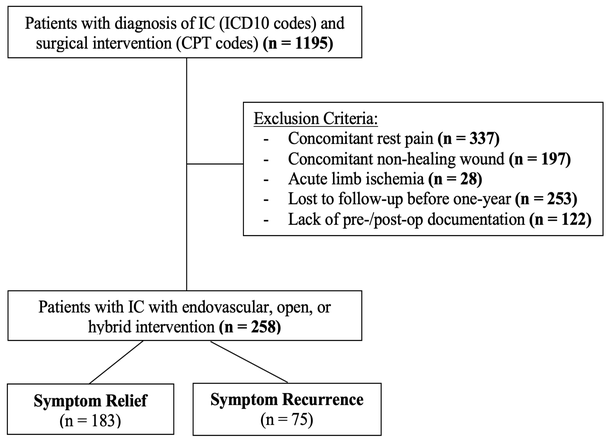


Figure 1. Consort diagram of patients included and excluded from study

	Symptom Resolution (n = 182)	Symptom Recurrence (n = 76)	P-value
Demographics			
Age (years)	66.88 ± .72	67.87 ± 0.94	.40
Gender (Female)	65 (35.5%)	29 (38.7%)	.63
Race (Black)	**56 (30.6%)**	**33 (44.0%)**	**.04**
Co-Morbidities			
HTN	173 (94.5%)	73 (97.3%)	.33
HLD	157 (85.8%)	63 (84.0%)	.71
CAD	134 (73.2%)	59 (78.7%)	.36
COPD	34 (18.6%)	22 (29.3%)	.06
ESRD	**6 (3.3%)**	**7 (9.3%)**	**.04**
Modified Frality Index (>2)	**86 (47.0%)**	**47 (62.7%)**	**.02**

Table 1. Basic demographics and co-morbidities

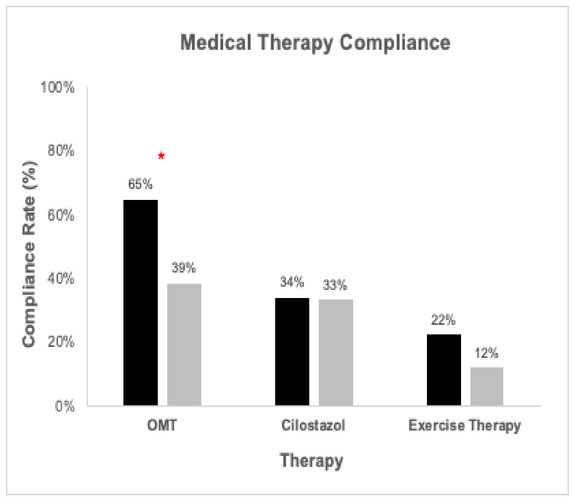


Figure 2. Pre-op rates of medication adherence

	Symptom Resolution (n = 182)	Symptom Recurrence (n = 76)	P-value
Disease Severity			
ABI (ipsilateral)	.70 ± .02	.66 ± .03	.25
TASC (C/D)	28 (36.8%)	53 (29.1%)	.19
Intervention Details			
Time to Intervention (>6 month)	94 (51.4%)	36 (48.0%)	.62
Prior Intervention	**21 (11.5%)**	**19 (25.3%)**	**<.01**
Intervention Type			
Endo	**127 (69.8%)**	**66 (86.8%)**	
Open	**24 (13.2%)**	**4 (5.3)**	
Hybrid	**31 (17.0%)**	**6 (7.9%)**	**.02**
# Arteries Treated			
1	137 (75.3%)	57 (75.0%)	
2	40 (22.0%)	16 (21.1%)	
3	5 (2.7%)	3 (3.9%)	.87

Table 2. Severity of disease and intervention details

	Symptom Resolution (n = 182)	Symptom Recurrence (n = 76)	P-value
Intervention Location			
Iliac	77 (42.1%)	25 (33.3%)	.19
CFA	47 (25.7%)	17 (22.7%)	.61
Femoropopliteal	102 (55.7%)	51 (68.0%)	.07
Tibial	7 (3.8%)	4 (5.3%)	.59
Devices			
POBA	124 (67.8%)	55 (73.3%)	.38
DCB	54 (29.5%)	28 (37.3%)	.22
Stent	96 (52.5%)	43 (57.3%)	.48
Atherectomy	37 (20.2%)	22 (29.3%)	.113

Table 3. Intervention location and type

CONCLUSIONS

Table IV. Multivariable Logistic Regression of Factors Affecting One-Year Symptom Relief

	Covariate	Beta	Odds Ratio	P-value
✗	End Stage Renal Disease	-1.91	0.15	0.03
✗	Chronic Obstructive Pulmonary Disease	-0.63	0.54	0.20
✓	Optimal Medical Therapy (ASA/statin/smoking cessation)	1.02	2.77	0.02
✓	Exercise Therapy	1.54	4.64	0.02
✗	5-Item Modified Frailty Index (>2)	-0.60	0.55	0.18
✗	TASC Grade (C/D)	-0.66	0.52	0.19
✗	History of Prior Intervention	-0.88	0.42	0.09
✓	Intervention Type (Open)	1.07	2.93	< 0.01
✓	Intervention Location (Iliac)	0.90	2.45	0.07
✗	Greater than Two Arteries Treated	-1.13	0.32	0.03

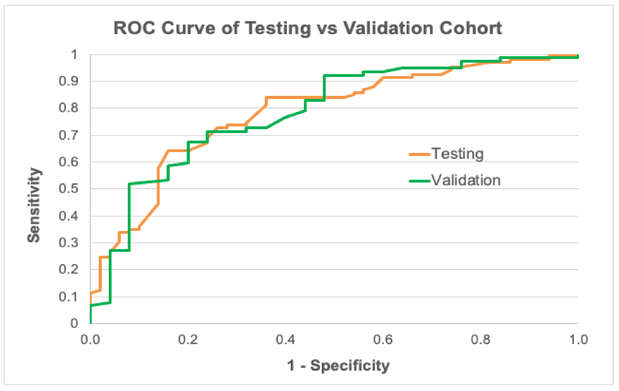


Figure 3. ROC Analysis of Testing vs Validation Cohort

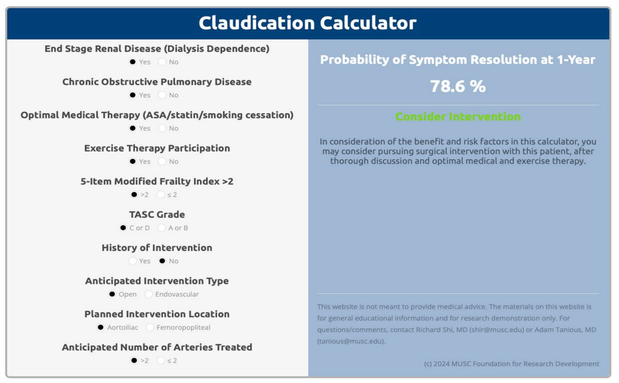


Figure 4. Interactable Calculator for symptom relief

CONCLUSIONS

- Successful development of an acceptable, internally validated predictive model of symptom relief
- Limitations
  - Small sample size (poor follow-up and documentation)
  - Lack of QoL survey instruments, response bias
  - Lack of external validation
- Future work: incorporation of PROMs, future studies with external validation of future patient cohorts