Supplemental Digital Content 11A: Sensitivity Analysis: Multivariable Analysis of Preoperative Characteristics and Postoperative Acute Kidney Injury – Logistic Regression Full Model† Performed on Derivation Cohort: 30-Day Index Cases

Risk Factor	β Coefficient	Multivariable model p-value	Adjusted Odds Ratio (95% Confidence Interval) †
Medical Factors			
Patient Age (years)§	0.000006	0.54	1.00 (0.99-1.00)
BMI (kg/m²)§§	0.182	<0.001	1.20 (1.16-1.25)
Male Gender	0.315	<0.001	1.37 (1.29-1.45)
Patient Medical History *			
Congestive Heart Failure	0.016	0.74	1.02 (0.93-1.11)
Cardiac Arrhythmias	0.091	0.02	1.10 (1.02-1.18)
Valvular Disease	-0.005	0.93	0.99 (0.89-1.11)
Pulmonary Circulation Disorders	0.147	0.01	1.16 (1.04–1.29)
Peripheral Vascular Disorders	0.079	0.05	1.08 (1.00-1.17)
Hypertension, Uncomplicated	0.010	0.77	1.01 (0.95-1.08)
Hypertension, Complicated	0.499	<0.001	1.65 (1.50-1.81)
Paralysis/Other Neurological Disorders	0.069	0.18	1.07 (0.97-1.18)
Chronic Pulmonary Disease	0.002	0.96	1.00 (0.93-1.08)
Diabetes, Uncomplicated	0.049	0.18	1.05 (0.98-1.13)
Diabetes, Complicated	0.391	<0.001	1.48 (1.27-1.72)
Hypothyroidism	-0.111	0.02	0.90 (0.82-0.98)
Liver Disease	0.472	<0.001	1.60 (1.47-1.75)
Peptic Ulcer Disease Excluding Bleeding	-0.0004	1.00	1.00 (0.82-1.21)
AIDS/HIV	0.228	0.43	1.26 (0.72-2.20)
Rheumatoid Arthritis / Collagen Vascular Diseases	-0.071	0.34	0.93 (0.80-1.08)
Coagulopathy	0.446	<0.001	1.56 (1.42-1.71)
Lymphoma	0.067	0.51	1.07 (0.88-1.31)
Metastatic Cancer	0.006	0.91	1.01 (0.91-1.12)
Solid Tumor	-0.033	0.45	0.97 (0.89-1.05)
Weight Loss	0.177	<0.001	1.19 (1.09-1.30)
Alcohol Abuse	-0.161	0.02	0.85 (0.74-0.98)
Drug Abuse	-0.018	0.84	0.98 (0.83-1.16)
Psychoses	-0.077	0.54	0.93 (0.73-1.18)
Preoperative Chronic Medications			
ACEI/ARB	0.040	0.34	1.04 (0.96-1.13)
Beta Blocker	0.002	0.97	1.00 (0.93-1.08)
Preoperative hemoglobin (g/dL) §	-0.007	<0.001	0.99 (0.99-0.99)
Preoperative eGFR (mL/min/1.73 m²)** §	-0.00002	<0.001	0.99 (0.99-0.99)
Preinduction Baseline Mean Arterial Pressure (mmHg) §	0.00001	0.06	1.00 (1.00-1.00)
Surgical Factors			
Surgical Body Region			
Elevated Risk	0.896	<0.001	2.45 (2.21-2.71)
Emergent Surgery	0.395	<0.001	1.48 (1.35-1.63)
Anesthetic Factors			
ASA Class			
ASA Class 1	0	(reference)	
ASA Class 2	0.030	0.81	1.03 (0.80-1.32)
ASA Class 3	0.733	<0.001	2.08 (1.63-2.66)
ASA Class 4	1.133	<0.001	3.10 (2.41-4.00)
ASA Class 5	1.809	<0.001	6.10 (4.11-9.05)
Expected Anesthesia Duration§§§	1.112	<0.001	3.06 (2.69-3.47)
General Anesthesia	0.295	<0.001	1.34 (1.23-1.47)
Institutional Factors			
Non-university Hospital (Fixed Effect)	0.021	0.89	1.02 (0.76-1.37)
Institution (Random Effect), ICC (95% CI)			0.16 (0.09-0.30)
Original Model performance (c-statistic)			0.75 (0.74-0.76)
New Model performance (c-statistic)			0.76 (0.75-0.76)

† Mixed effects model with anonymized institution ID as random effect; all other covariates fixed effects.

[*] *As determined by Elixhauser Comorbidity Enhanced ICD-9-CM/ICD-10 CM Algorithm*
[**] As determined by CKD-EPI formula, indexed by body surface area. Race assumed non-black for patients with race data unavailable.
§ Squared transformation
§§ Square root transformation
§§§ Logarithmic transformation

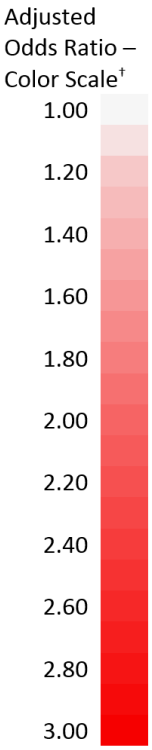
ACEI = angiotensin-converting enzyme inhibitor; AIDS = autoimmune deficiency syndrome; AKI = acute kidney injury; ARB = angiotensin II receptor blocker; ASA = American Society of Anesthesiologists; CKD-EPI = Chronic Kidney Disease Epidemiology Collaboration; *CPT = Current Procedural Terminology; eGFR = estimated glomerular filtration rate; HIV = human immunodeficiency virus; ICC = intraclass correlation coefficient; KDIGO = Kidney Disease: Improving Global Outcomes; WHO = World Health Organization*

Log likelihood = -18,144.62

Supplemental Digital Content 11B: Sensitivity Analysis: Risk of Acute Kidney Injury Associated with Intraoperative Hypotension by Preoperative Risk Quartile – 30-Day Index Cases

Absolute Hypotension - Derivation Cohort				
Intraoperative Hypotension† - Absolute MAP Values	Quartile 1* Low Preoperative Risk (N = 17,715)	Quartile 2* Medium Preoperative Risk (N = 17,715)	Quartile 3* High Preoperative Risk (N = 17,715)	Quartile 4* Highest Preoperative Risk (N = 17,715)
No Absolute Hypotension	(reference) n = 10,113	(reference) n = 10,303	(reference) n = 10,318	(reference) n = 9,274
MAP 60-64 mmHg	0.85 (0.63-1.14) n = 3,867	1.17 (0.97-1.42) n = 3,726	1.07 (0.93-1.24) n = 3,640	1.10 (0.99-1.21) n = 3,848
MAP 55-59 mmHg	0.75 (0.52-1.09) n = 2,474	1.16 (0.92-1.45) n = 2,368	1.20 (1.02-1.41) **Increased AKI** n = 2,371	1.37 (1.23-1.52) **Increased AKI** n = 2,743
MAP 50-54 mmHg	1.14 (0.69-1.89) n = 858	1.34 (0.96-1.87) n = 850	1.42 (1.12-1.80) **Increased AKI** n = 829	1.55 (1.34-1.80) **Increased AKI** n = 1,100
MAP <50 mmHg	1.38 (0.73-2.64) n = 403	1.86 (1.27-2.72) **Increased AKI** n = 468	1.55 (1.18-2.04) **Increased AKI** n = 557	2.10 (1.78-2.48) **Increased AKI** n = 750

Relative Hypotension - Derivation Cohort				
Intraoperative Hypotension† – Relative MAP Values	Quartile 1* Low Preoperative Risk (N = 17,715)	Quartile 2* Medium Preoperative Risk (N = 17,715)	Quartile 3* High Preoperative Risk (N = 17,715)	Quartile 4* Highest Preoperative Risk (N = 17,715)
No Relative Hypotension	(reference) n = 4,865	(reference) n = 5,478	(reference) n = 5,762	(reference) n = 6,491
MAP 20-30% Below Baseline	0.87 (0.65-1.18) n = 4,708	0.86 (0.71-1.06) n = 4,501	0.95 (0.82-1.10) n = 4,517	0.84 (0.76-0.93) **Decreased AKI** n = 4,299
MAP 30-40% Below Baseline	0.91 (0.67-1.23) n = 4,872	0.93 (0.76-1.14) n = 4,613	1.00 (0.86-1.16) n = 4,357	0.90 (0.81-0.99) **Decreased AKI** n = 3,922
MAP > 40% Below Baseline	1.41 (1.03-1.91) **Increased AKI** n = 3,270	1.30 (1.05-1.60) **Increased AKI** n = 3,123	1.20 (1.02-1.41) **Increased AKI** n = 3,079	1.10 (0.98-1.22) n = 3,003



Values presented as adjusted odds ratio and 95% confidence interval.
** Patients were stratified by risk of postoperative AKI using the full multivariable model.*
† Color scale used only for adjusted odds ratios demonstrating statistically significant associations.
Regression within each quartile included all four blood pressure ranges and operative duration (log transformed).
AKI = acute kidney injury; MAP = mean arterial pressure