

Supplemental Digital Content 8: Sensitivity Analysis - Multivariable Associations with Perioperative Characteristics and Postoperative Pulmonary Complications – Reduced 24-Variable Model

Perioperative Characteristic	Multivariable Model – Including Bundled LPV Strategy			Multivariable Model – Including Individual LPV Components		
	Adjusted Odds Ratio	95% Confidence Interval		Adjusted Odds Ratio	95% Confidence Interval	
<b>Exposure Variable: LPV &amp; Components</b>						
<b>Bundled LPV Strategy †</b>	0.47	0.36	0.61	NI		
<b>Median V<sub>T</sub>, mL / kg</b>		NI		0.95	0.74	1.24
<b>Median PEEP, cm H<sub>2</sub>O</b>		NI		0.99	0.78	1.26
<b>Median Driving Pressure, cm H<sub>2</sub>O</b>		NI		0.50	0.39	0.64
<b>Preoperative Characteristics</b>						
Age	1.00	1.00	1.01	1.01	1.00	1.02
Sex, male	-	-	-	-	-	-
Race, non-white	-	-	-	-	-	-
Height, cm	0.99	0.98	1.00	0.98	0.97	1.00
Actual Body Weight, kg	NI	NI	NI	NI	NI	NI
Predicted Body Weight, kg	NI	NI	NI	NI	NI	NI
Body mass index, kg/m <sup>2</sup>	-	-	-	-	-	-
Current Smoker	-	-	-	-	-	-
Chronic Lung Disease *	-	-	-	-	-	-
Recent Pneumonia within one month	-	-	-	-	-	-
Sleep Apnea	-	-	-	-	-	-
Pulmonary Hypertension (Moderate or Severe)	-	-	-	-	-	-
New York Heart Association Class						
I or II	Reference	Reference	Reference	Reference	Reference	Reference
III or IV	1.06	0.93	1.20	1.03	0.90	1.17
Recent Myocardial Infarction < 21 days	-	-	-	-	-	-
Preoperative Left Ventricular Ejection Fraction, %	1.00	0.99	1.01	1.00	0.99	1.01
Poor Mobility **	-	-	-	-	-	-
Extracardiac Arteriopathy	-	-	-	-	-	-
Dyslipidemia	-	-	-	-	-	-
Arrhythmia ***	-	-	-	-	-	-
Renal Impairment						
Creatinine Clearance, 10 mL/min/1.73 m <sup>2</sup> ****	0.92	0.88	0.97	0.92	0.88	0.97
Dialysis Requirement	-	-	-	-	-	-
Diabetes treated with Insulin	-	-	-	-	-	-
Liver Disease	-	-	-	-	-	-
Cancer	NI	NI	NI	NI	NI	NI
Active Endocarditis	-	-	-	-	-	-
Critical Preoperative State (Preoperative Inotropic Support, Cardiogenic Shock, or Intra-aortic balloon pump)	2.17	1.61	2.94	2.09	1.54	2.83
Hemoglobin, g/dL	0.93	0.88	1.00	0.94	0.89	1.01
Platelet Count, K/uL	NI	NI	NI	NI	NI	NI
White Blood Cell Count, K/uL	1.04	1.01	1.07	1.04	1.01	1.07
International Normalized Ratio	NI	NI	NI	NI	NI	NI
Preoperative SpO <sub>2</sub> , %	0.90	0.86	0.95	0.91	0.87	0.96
Preoperative Respiratory Rate	NI	NI	NI	NI	NI	NI
Acuity						
Elective	Reference	Reference	Reference	Reference	Reference	Reference
Urgent	1.49	1.03	2.14	1.46	1.01	2.10
Surgical Procedure Type	-	-	-	-	-	-
Admission Type						
Admit Inpatient	Reference	Reference	Reference	Reference	Reference	Reference
Outpatient	1.15	0.81	1.65	1.17	0.81	1.67
Date of surgery by STS Version	-	-	-	-	-	-
ASA Physical Status	-	-	-	-	-	-
<b>Intraoperative Characteristics</b>						
Perfusion Time, hours	2.05	1.63	2.57	1.99	1.59	2.51
Aortic Crossclamp Time, hours	0.77	0.58	1.02	0.78	0.59	1.03
Anesthesia Duration, hours	1.02	1.00	1.05	1.02	1.00	1.05
Anesthesia Provider *****	-	-	-	-	-	-
Intraoperative Albuterol	-	-	-	-	-	-
Intraoperative Diuretic *****	-	-	-	-	-	-
Intraoperative Vasopressor infusion (phenylephrine, norepinephrine, vasopressin)	-	-	-	-	-	-
Intraoperative Inotrope infusion (epinephrine, dobutamine, milrinone, isoproterenol, dopamine)	1.67	1.31	2.12	1.63	1.28	2.08
Total intraoperative opioid, oral morphine equivalents	NI	NI	NI	NI	NI	NI

Total intraoperative crystalloid, L	1.06	1.01	1.12	1.07	1.02	1.12
Total intraoperative colloid, L	-	-	-	-	-	-
Intraoperative Transfusion (Intraoperative packed red blood cells, Intraoperative red blood cell salvage, Fresh frozen plasma, Platelets, or Cryoprecipitate)	1.31	1.03	1.67	1.37	1.07	1.76
Total urine output, L	0.89	0.80	0.98	0.89	0.80	0.99
Median SpO <sub>2</sub> , %	0.90	0.81	1.00	0.91	0.82	1.01
Median Inspired FiO <sub>2</sub> , %	1.00	0.99	1.01	1.01	1.00	1.02
<b>Summary</b>						
Overall Model Performance, c-statistic (95% CI)	0.79 (0.77, 0.82)			0.79 (0.77, 0.81)		
Akaike Information Criterion (AIC)	2550.35			2552.46		

ASA = American Society of Anesthesiologists; CABG = coronary artery bypass graft; CPB= cardiopulmonary bypass; FIO<sub>2</sub> = fraction of inspired oxygen; LPV = lung-protective ventilation; PA = pulmonary artery; STS = Society of Thoracic Surgeons

Study exposure variables presented in ***bold/italic***.

† Defined as intraoperative median values of: tidal volume <8 mL/kg predicted body weight, positive end-expiratory pressure ≥ 5 cm H<sub>2</sub>O, and driving pressure <16 cm H<sub>2</sub>O

\* Defined by chronic lung disease ≥ moderate *or* bronchodilator therapy within STS; or chronic obstructive pulmonary disease ≥ moderate on preoperative anesthesia history & physical

\*\* Defined by functional capacity – Low (≤4 metabolic equivalents of task) on preoperative anesthesia history & physical

\*\*\* Defined via STS as a history of any of the following: atrial fibrillation, atrial flutter, 3<sup>rd</sup> degree heart block, ventricular fibrillation, ventricular tachycardia

\*\*\*\* Calculated using the Chronic Kidney Disease – Epidemiology Collaboration equation; a unit increase defined as a 10 mL/min/1.73 m<sup>2</sup> (e.g. increase from 50 to 60 mL/min/1.73 m<sup>2</sup> defined as one unit)

\*\*\*\*\* Defined as the frequency of primary anesthesiology attending using a bundled LPV strategy, as a proportion of all cardiac cases performed by the anesthesiology attending among the study population, transformed into tertiles.

\*\*\*\*\* Defined as intraoperative administration of furosemide, bumetanide, or mannitol

Variables indicated by an ‘-’ were not chosen from the least absolute shrinkage and selection operator model.

Variables indicated by an ‘NI’ were not eligible for inclusion in the least absolute shrinkage and selection operator model.