Supplemental Digital Content 7: Sensitivity Analysis - Multivariable Associations with Perioperative Characteristics and Postoperative Pulmonary Complications – Intraoperative Lung Protective Ventilation Exposure Variables Split into Pre-Cardiopulmonary Bypass and Post-Cardiopulmonary Bypass Periods

	Multivariable Model – Including Bundled LPV Strategy			Multivariable Model – Including Individual LPV Components		
Perioperative Characteristic	**Adjusted Odds Ratio**	**95% Confidence Interval**		**Adjusted Odds Ratio**	**95% Confidence Interval**	
Intraoperative Exposure: LPV & Components						
Pre-CPB Bundled LPV Strategy †	1.19	0.84	1.68	NI		
Post-CPB Bundled LPV Strategy †	0.53	0.38	0.74	NI		
Pre-CPB Median V_T <8 mL / kg PBW	NI			1.25	0.92	1.70
Pre-CPB Median PEEP ≥5 cm H_2O	NI			1.18	0.82	1.71
Pre-CPB Median Driving Pressure <16 cm H_2O	NI			0.77	0.56	1.07
Post-CPB Median V_T <8 mL / kg PBW	NI			0.93	0.69	1.26
Post-CPB Median PEEP ≥5 cm H_2O	NI			1.01	0.71	1.44
Post-CPB Median Driving Pressure <16 cm H_2O	NI			0.57	0.42	0.78
Preoperative Characteristics						
Age	1.00	0.99	1.01	1.01	1.00	1.02
Sex, male	-	-	-	-	-	-
Race, non-white	1.13	0.80	1.58	1.03	0.73	1.46
Height, cm	0.98	0.97	1.00	0.98	0.97	0.99
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^2						
Underweight (<18.5)	1.30	0.50	3.37	1.25	0.48	3.26
Normal weight (18.5-24.9)	Reference	Reference	Reference	Reference	Reference	Reference
Overweight (25-29.9)	0.92	0.69	1.23	0.88	0.65	1.18
Class I Obesity (30-34.9)	1.00	0.72	1.38	0.88	0.63	1.24
Class II Obesity (35-39.9)	1.00	0.67	1.50	0.80	0.52	1.22
Class III Obesity (≥40)	1.08	0.68	1.72	0.85	0.52	1.40
Current Smoker	1.35	0.96	1.90	1.23	0.87	1.75
Chronic Lung Disease *	1.32	0.97	1.80	1.28	0.94	1.74
Recent Pneumonia within one month	-	-	-	-	-	-
Sleep Apnea	0.92	0.62	1.38	0.95	0.64	1.43
Pulmonary Hypertension (Moderate or Severe)	0.89	0.66	1.21	0.97	0.71	1.31
New York Heart Association Class						
I or II	Reference	Reference	Reference	Reference	Reference	Reference
III or IV	1.07	0.93	1.23	1.05	0.91	1.21
Recent Myocardial Infarction < 21 days	1.21	0.79	1.85	1.22	0.80	1.86
Preoperative Left Ventricular Ejection Fraction, %	1.00	0.99	1.01	1.00	0.99	1.01
Poor Mobility **	1.11	0.87	1.42	1.06	0.83	1.36
Extracardiac Arteriopathy	-	-	-	-	-	-
Dyslipidemia	0.91	0.71	1.16	0.95	0.74	1.22
Arrhythmia ***	1.22	0.93	1.61	1.24	0.94	1.63
Renal Impairment						
Creatinine Clearance, mL/min/1.73 m^2 ****	0.91	0.87	0.96	0.92	0.88	0.97
Dialysis Requirement	-	-	-	-	-	-
Diabetes on 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	2.48	1.80	3.43	2.43	1.76	3.36
Hemoglobin, g/dL	0.94	0.88	1.00	0.95	0.88	1.01
Platelet Count, K/uL	NI	NI	NI	NI	NI	NI
White Blood Cell Count, K/uL	1.04	1.01	1.08	1.05	1.01	1.08
International Normalized Ratio	NI	NI	NI	NI	NI	NI
Preoperative SpO_2, %	0.90	0.86	0.95	0.92	0.87	0.97
Preoperative Respiratory Rate	NI	NI	NI	NI	NI	NI
Acuity						
Elective	Reference	Reference	Reference	Reference	Reference	Reference
Urgent	1.52	1.04	2.22	1.50	1.02	2.19
Surgical Procedure Type						
Aortic	3.29	1.60	6.79	3.16	1.52	6.57
Valve + Aortic	1.60	1.04	2.45	1.69	1.10	2.59
Valve + Aortic + CABG	1.94	0.99	3.82	2.06	1.04	4.08
Isolated CABG	Reference	Reference	Reference	Reference	Reference	Reference
Isolated Valve	1.22	0.84	1.79	1.24	0.85	1.82
Valve + CABG	1.70	1.13	2.55	1.73	1.15	2.59
Admission Type						

Admit Inpatient	Reference 1.09	Reference 0.76	Reference 1.58	Reference 1.12	Reference 0.77	Reference 1.62
Date of surgery by STS Version						
2.52 (Jan 2006-Dec 2007)	Reference	Reference	Reference	Reference	Reference	Reference
2.61 (Jan 2008-June 2011)	1.66	1.00	2.77	1.70	1.02	2.84
2.73 (July 2011-June 2014)	1.62	0.98	2.68	1.51	0.91	2.51
2.81 (July 2014-May 2017)	0.92	0.50	1.71	0.77	0.41	1.45
ASA Physical Status	-	-	-	-	-	-
Intraoperative Characteristics						
Perfusion Time, hours	1.89	1.49	2.39	1.84	1.45	2.34
Aortic Crossclamp Time, hours	0.80	0.60	1.07	0.80	0.60	1.07
Anesthesia Duration, hours	1.02	1.00	1.05	1.02	1.00	1.04
Anesthesia Provider *****	-	-	-	-	-	-
Intraoperative Albuterol	2.00	0.92	4.35	1.81	0.83	3.97
Intraoperative Diuretic ******	-	-	-	-	-	-
Intraoperative Vasopressor infusion (phenylephrine, norepinephrine, vasopressin)	-	-	-	-	-	-
Intraoperative Inotrope infusion (epinephrine, dobutamine, milrinone, isoproterenol, dopamine)	1.56	1.21	2.00	1.50	1.16	1.93
Total intraoperative opioid, oral morphine equivalents	NI	NI	NI	NI	NI	NI
Total intraoperative crystalloid, L	1.06	1.01	1.12	1.06	1.01	1.12
Total intraoperative colloid, L	1.14	0.86	1.50	1.16	0.87	1.53
Intraoperative Transfusion ******	1.20	0.92	1.56	1.19	0.92	1.55
Total urine output, L	0.89	0.80	0.99	0.89	0.81	0.99
Median SpO_2, %	0.89	0.80	1.00	0.89	0.79	1.00
Median Inspired FiO_2, %	1.00	0.99	1.01	1.00	0.99	1.01
Summary						
Overall Model Performance, c-statistic (95% CI)	0.80 (0.78, 0.82)			0.80 (0.78, 0.82)		
Akaike Information Criterion (AIC)	2556.54			2548.35		

ASA = American Society of Anesthesiologists; CABG = coronary artery bypass graft; CI = confidence interval; CPB= cardiopulmonary bypass; FiO2 = 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 H2O, and driving pressure <16 cm H2O

* 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, 3rd 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 m2 (e.g. increase from 50 to 60 mL/min/1.73 m2 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

******* Including any of the following: packed red blood cells, red blood cell salvage, fresh frozen plasma, platelets, or cryoprecipitate

Variables indicated by 'NI' were not included in the multivariable least absolute shrinkage and selection operator model.
Variables indicated by '-' were not selected by the least absolute shrinkage and selection operator model.