Supplemental Digital Content

Method 1. Development of predictive model for postoperative discharge to the floor within 24 hours of surgery

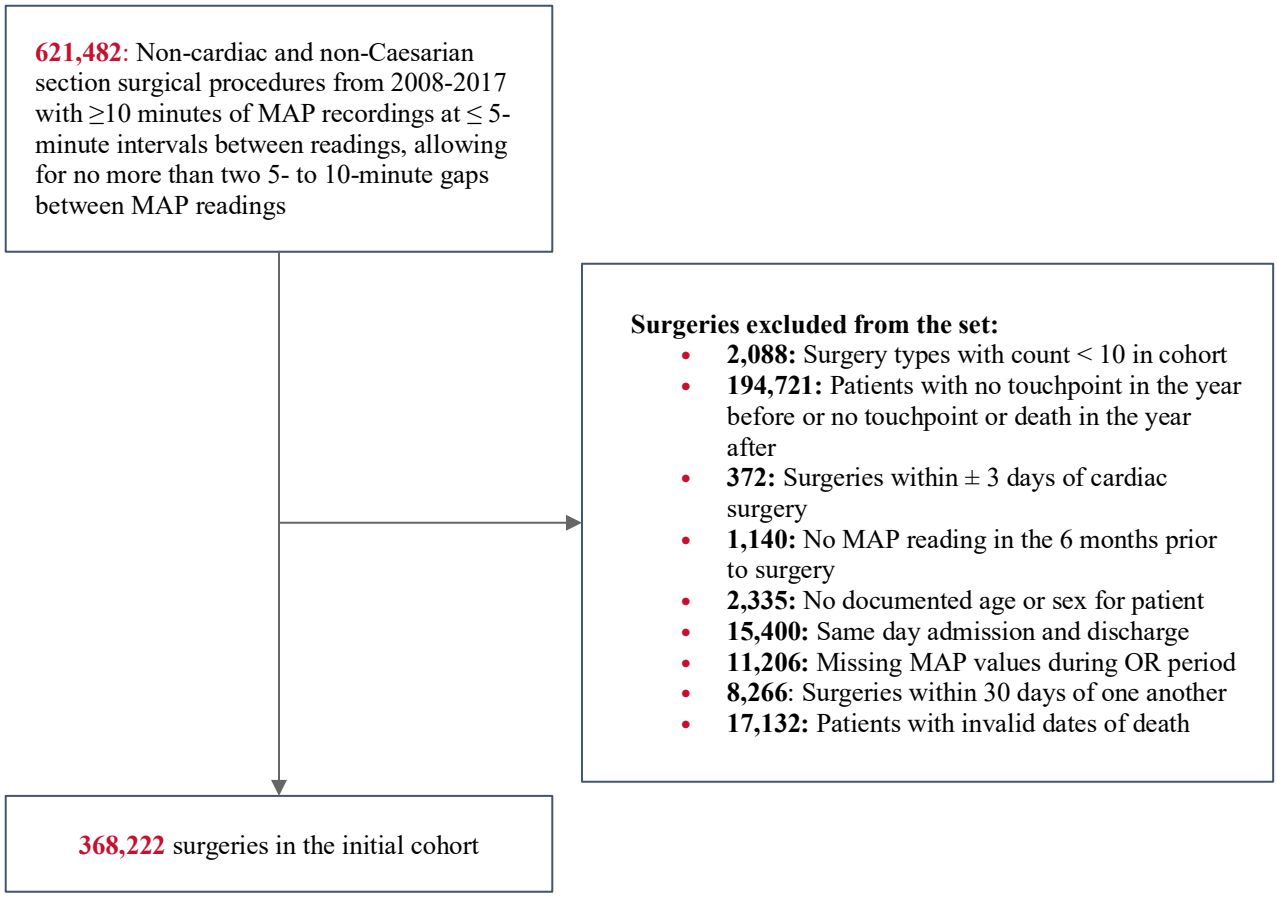
To develop a predictive model for postoperative discharge to the floor within 24 hours of surgery, we leveraged the following approach:

- We used 19,216 intensive care unit and 111,572 ward patients for model development and validation.
- To build the model, we included patients' demographics (age, race, gender, region, ethnicity, income, education), diagnosis and procedure codes (Clinical Classifications Software (CCS)/Current Procedural Terminology (CPT)/Healthcare Common Procedure Coding System (HCPCS) format) in the 3 months before date of surgery, medications grouped by generics in the 3 months before date of surgery, lab values (serum creatinine, hemoglobin, mean corpuscular volume, cell distribution width, hematocrit, platelet count, estimated glomerular filtration rate) in the 3 months before date of surgery, surgical related variables (length of surgery, surgical type, surgery day weekend vs weekday, surgery time day vs night, and intraoperative mean arterial pressure area under threshold 55/65/75 mmHg), and acute comorbidities/procedures (7-day sepsis/delirium/electrolyte disorder, 30-day acute kidney injury/acute myocardial infarction/acute ischemic stroke/prolonged mechanical ventilation/continuous renal replacement therapy/dialysis).
- We restricted the variables with n ≥ 0.5% to remove rare records that have limited statistical power
- Prior to modeling, all variables were scaled (standardized), and missing values were imputed using median. We formatted all the category variables into dummy variables and dropped the first one to avoid multi-collinearity. We split the cohort into training and test set (7:3) stratified by dependent variables (intensive care unit vs. ward).
- Model was trained by using l1-based regularized logistic regression including both feature selection and coefficients penalization. Eight hundred and twenty-seven features were finally selected. Parameter was tuned via grid search 5-fold cross-validation by using performance matric recall, precision, and F1 score. We calculated the specificity, sensitivity (recall), positive predictive value (also known as precision), and negative predictive value for the final model. We also generated a receiver operating characteristic curve and precision-recall curve. The areas under the curve are 0.955 (see Figure 3, Supplemental Digital Content for Secondary outcomes analyzed by restricted cubic spline).
- In order to minimize the cost of false negatives (patients who discharged to the intensive care unit but were identified as ward by our algorithm), we selected the threshold as 0.79 with the positive predictive value as 0.97.

Method 2. List of hypertensive drug classes

- Loop diuretics
- Beta-adrenergic antagonists (beta blockers) w/o ISA
- HMG & CoA reductase inhibitors (statins)
- Anticoagulants; coumarin derivatives
- Alpha- & beta-adrenergic antagonists
- Angiotensin-converting enzyme (ACE) inhibitors
- Thiazides & related agents
- Angiotensin II receptor antagonists (ARB)
- Calcium channel antagonists (calcium channel blockers)

Figure 1. Initial attrition diagram leading into cohort selection for current study



Footnote: MAP: mean arterial pressure; OR: operating room.

Figure 2. The receiver operating characteristic (testing set) obtained from the algorithm created to predict the discharge care unit after surgery

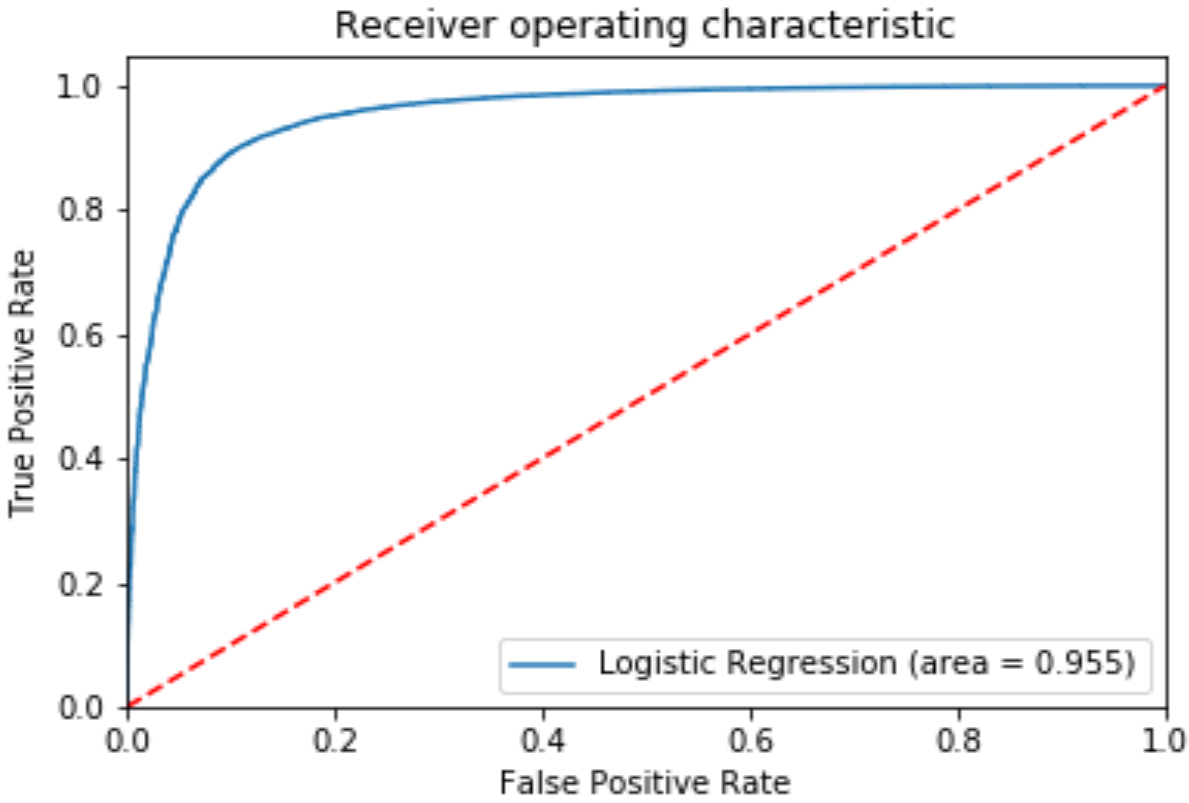
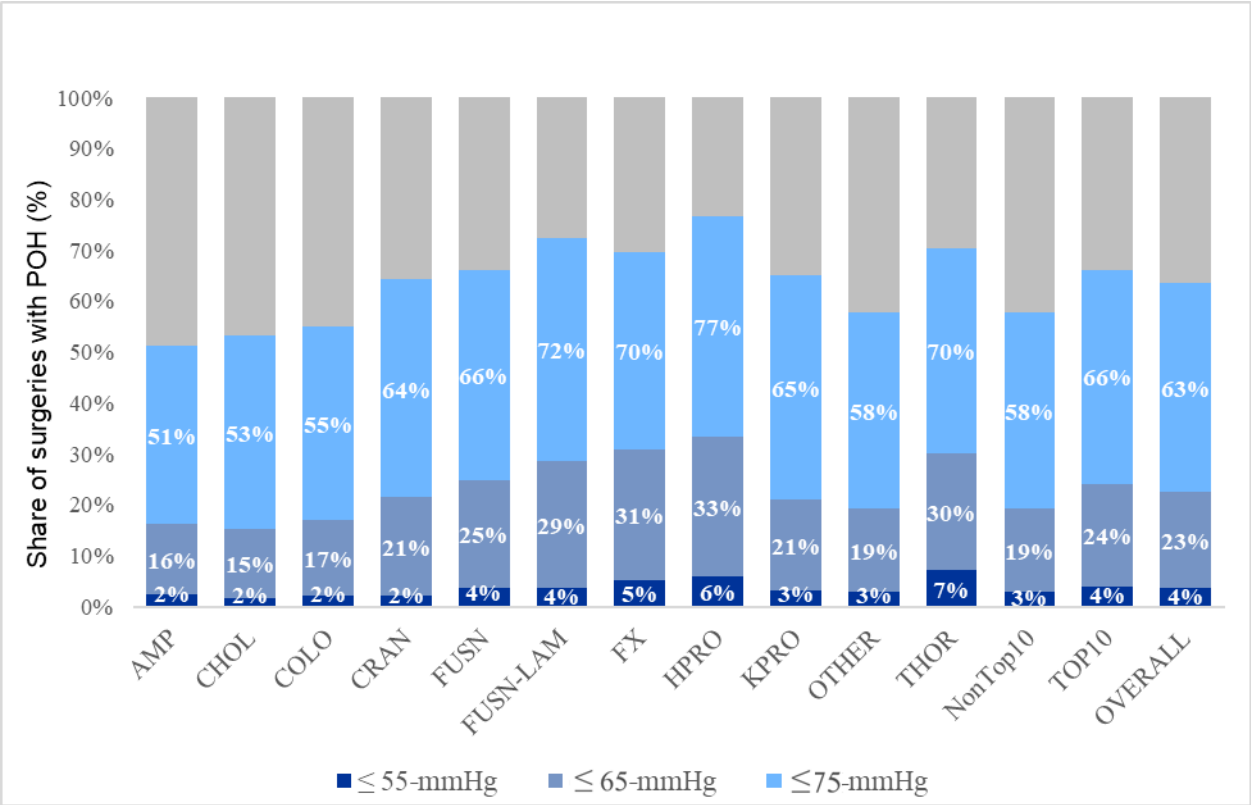


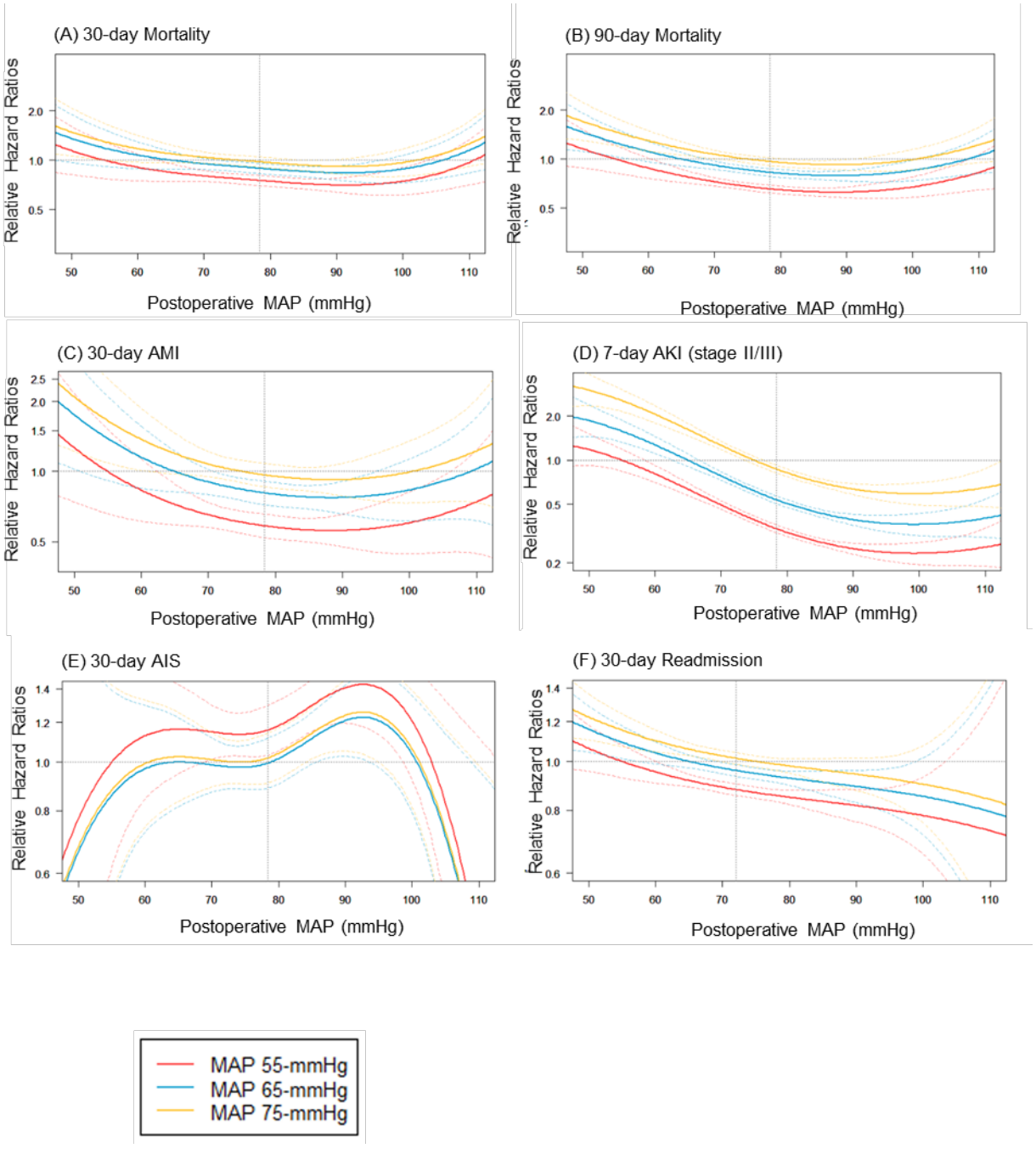
Figure 3. Incidence of postoperative hypotension overall, and for the top 10 surgeries, among patients managed on the ward for 48 hours post non-cardiac surgery. Patients had no history of intraoperative hypotension.



Surgeries in the Top 10 cohort: AMP: limb amputation, CHOL: gallbladder surgery, COLO: colon surgery, CRAN: craniotomy, FUSN: spinal fusion, FUSN-LAM: spinal fusion laminectomy, FX: open reduction of fracture, HPRO: hip prosthesis, KPRO: knee prosthesis, THOR: thoracic surgery (non-cardiac, non-vascular); POH: postoperative hypotension.

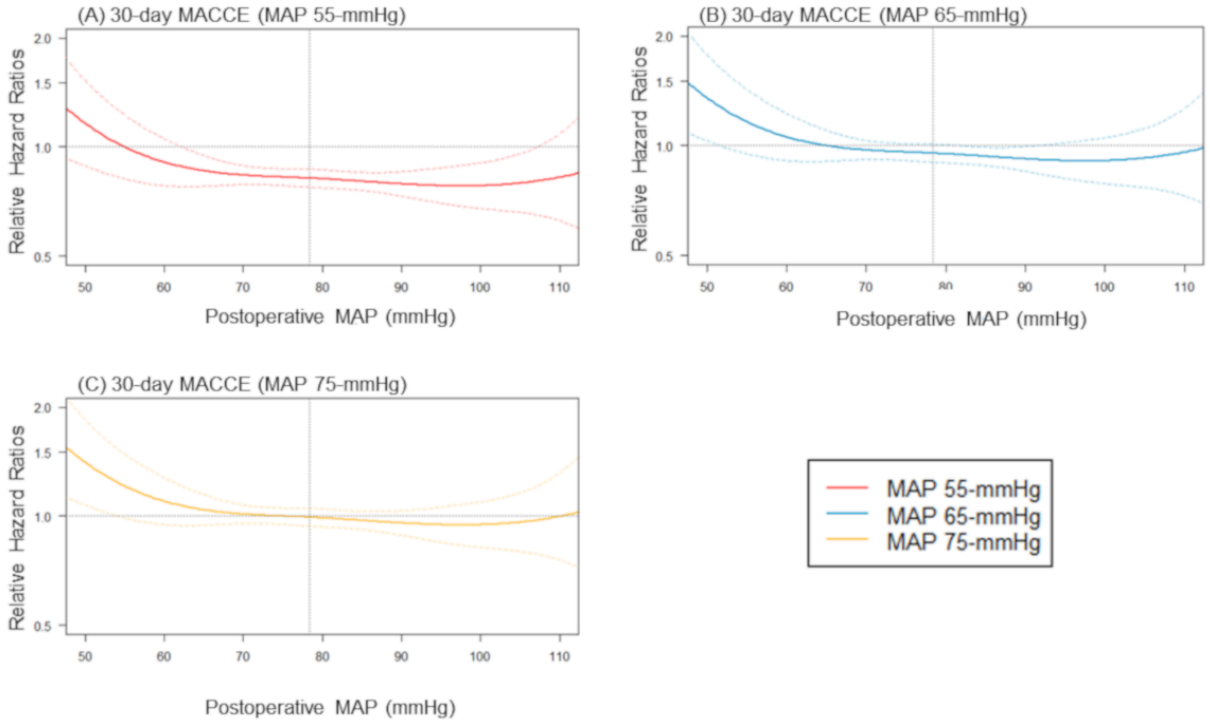
Figure 4. Secondary outcomes analyzed by restricted cubic spline among patients discharged to the ward with no history of intraoperative hypotension. Results for each MAP threshold are presented to explore the non-linear relationship between postoperative hypotension and all secondary outcomes**.** Broken lines represent 95% confidence intervals.

B



Footnote: MAP: mean arterial pressure; AIS: acute ischemic stroke; AKI: acute kidney injury; AMI: acute myocardial infarction; the imaginary line on x axis represents the median value of postoperative MAP (mmHg); the different solid colorful lines represent the relative hazard ratios when choosing different MAP threshold as the reference group (hazard ratio = 1) .

Figure 5. Restricted cubic spline to explore the non-linear relationship between postoperative hypotension and 30-day MACCE among patients discharged to the ward with no intraoperative hypotension. Results are shown for each MAP threshold. Broken lines represent 95% confidence intervals.



Footnote: MAP: mean arterial pressure; MACCE: major adverse cardiac or cerebrovascular events; the imaginary line on x axis represents the median value of postoperative MAP (mmHg); the different solid colorful lines represent the relative hazard ratios when choosing different MAP threshold as the reference group (hazard ratio = 1).

Table 1. International Classification of Diseases (ICD) codes

Condition	ICD 9	ICD 10	CPT
Prior myocardial infarction	410, 412	I21, I22, I252	
Cerebrovascular accident	430, 431, 433, 434, 436-438	I60-I63, I6782, I69	
Chronic obstructive pulmonary disease	49, 500-505	I278, I279, J684, J701, J703, J40-J47, J60-J67	
Heart failure	428	I0981, I110, I130, I132, I50, I9713	
Valvular heart disease	424, 394-397	I34-I39, I05-I07	
Pulmonary circulatory disorder	416	I27	
Peripheral vascular disease	4439, 441, 7854, V434	I70, I71, I73, I771, I790, I792, K551, K558, K559, Z958, Z959	
Hypertension	401, 4160	I10-I13, I15, I16	
Paralysis	3441, 342	G041, G114, G801, G802, G81-G83	
Diabetes	249, 250	E08-E11, E13, E14	
Hypothyroidism	243, 244	E03, E890	
Renal disease	582, 583, 585, 586, 588	I12, I13, N03, N05, N17-N19, N25-N29, Z49, Z940, Z992	
Liver disease	570-573	K70-K77	
Lymphoma	200-202	C81-C86, C88	
Solid tumor (local + meta)	140-172, 174-198, 1990, 1991, 200-208	C0, C1, C20-C26, C30-C34, C37-C41, C43, C45-C58, C60-C85, C88, C90-C97	
Rheumatoid arthritis/collagen vascular disease	3571, 710, 714	M05, M06, M32, M34, M35	
Coagulopathy	286	D65-D68	
Obesity	278	E66	
Anemia	280-285	D50-D53, D55-D59, D61-D64	
Alcohol abuse	291, 303, 3050	F10, Z714 (excluding F1022)	
Drug abuse	292, 304, 305 (excluding 3051, 3050, 30500, 30501, 30502, 30503, 3059, 30590, 30591, 30592, 30593)	F11-F19 (excluding F1111, F1121, F1211, F1221, F1311, F1321, F1411, F1421, F1511, F1521, F1611, F1621, F17210, F17211, F17213, F17218, F17219, F17200, F17201, F17203, F17208, F17209, F17221, F17291, F1811, F1821, F1911, F1921)	
Smoking	3051, 3052	F1720, F1721	
Depression	296, 311	F32, F33, F34	
Sleep apnea	32721, 32723, 32727, 78057	G4730, G4731, G4733, G4737, R0681	
Dementia	290	F051, G311, F00, F01, F02, F03, G30	
Supplemental oxygen use	V462	Z9981	

(continued)

Table 1. International Classification of Diseases (ICD) codes (continued)

Condition	ICD 9	ICD 10	CPT
Dialysis	39.95, 54.98	5A1D70Z, 5A1D80Z, 5A1D90Z, 5A1D00Z, 3E1M39Z	90935, 90937, 90945, 90947, 4054F, 4055F
Coronary artery bypass grafting	36.10-36.16, 36.2	0210093, 02100A3, 02100J3, 02100K3, 02100Z3, 210493, 02104A3, 02104J3, 02104K3, 02104Z3, 021008W, 021009W, 02100AW, 02100JW, 02100KW, 021048W, 021049W, 02104AW, 02104JW, 02104KW, 021108W, 021109W, 02110AW, 02110JW, 02110KW, 021148W, 021149W, 02114AW, 02114JW, 02114KW, 021208W, 021209W, 02120AW, 02120JW, 02120KW, 021248W, 021249W, 02124AW, 02124JW, 02124KW, 021308W, 021309W, 02130AW, 02130JW, 02130KW, 021348W, 021349W, 02134AW, 02134JW, 02134KW, 210088, 210089, 021008C, 210098, 210099, 021009C, 02100A8, 02100A9, 02100AC, 02100J8, 02100J9, 02100JC, 02100K8, 02100K9, 02100KC, 02100Z8, 02100Z9, 02100ZC, 210488, 210489, 021048C, 210498, 210499, 021049C, 02104A8, 02104A9, 02104AC, 02104J8, 02104J9, 02104JC, 02104K8, 02104K9, 02104KC, 02104Z8, 02104Z9, 02104ZC, 211088, 211089, 021108C, 211098, 211099, 021109C, 02110A8, 02110A9, 02110AC, 02110J8, 02110J9, 02110JC, 02110K8, 02110K9, 02110KC, 02110Z8, 02110Z9, 02110ZC, 211488, 211489, 021148C, 211498, 211499, 021149C, 02114A8, 02114A9, 02114AC, 02114J8, 02114J9, 02114JC, 02114K8, 02114K9, 02114KC, 02114Z8, 02114Z9, 02114ZC, 021208C, 021209C, 02120AC, 02120JC, 02120KC, 02120ZC, 021248C, 021249C, 02124AC, 02124JC, 02124KC, 02124ZC, 021308C, 021309C, 02130AC, 02130JC, 02130KC, 02130ZC, 021348C, 021349C, 02134AC, 02134JC, 02134KC, 02134ZC	33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33522, 33523, 33530, 33534, 33535, 33536
Percutaneous coronary intervention	00.66, 36.07	02703, 02704, 02713, 02714, 02723, 02724, 02733, 02734	92920, 92924, 92928, 92933, 92937, 92941, 92943
Continuous renal replacement therapy	39.95	5A1D90Z	90935, 90937, 4054F

(continued)

Table 1. International Classification of Diseases (ICD) codes (continued)

Condition	ICD 9	ICD 10	CPT
Acute myocardial infarction	410	I21, I22	
Acute ischemic stroke	43301, 43311, 43321, 43331, 43381, 43391, 43401, 43411, 43491, 436, 4371	I63	
Acute kidney injury	584	N17	
Delirium	F05	29011, 2903, 2930, 2931, 30011, 308, 78009, 78039	
Electrolyte disorders	276	E87	
Sepsis/SIRS	028, 77181, 9959	A40, A41, P36, R65	
Right side valve disease*	moderate or severe tricuspid regurgitation/insufficiency		
Left side valve disease*	moderate or severe mitral regurgitation/insufficiency, aortic regurgitation/insufficiency, or aortic stenosis		

*Using physicians' notes to define the variables

Table 2. Comorbidities and additional cohort patient characteristics for the original study cohort (n = 67,968). Characteristics for non-cardiac surgery patients managed on the floor for 48-hours after surgery without intraoperative hypotension (MAP ≤65-mmHg)

		Postoperative Hypotension			
Patient Characteristics	**Overall (n = 67,968)**	**MAP ≤55-mmHg (n = 2,417)**	**MAP ≤65-mmHg (n = 15,377)**	**MAP ≤75-mmHg (n = 43,157)**	**MAP >75-mmHg (n = 24,811)**
Comorbidities					
Myocardial Infarction	4,759 (7%)	245 (10%)	1,296 (8%)	3,239 (8%)	1,520 (6%)
Cerebrovascular accident	4,337 (6%)	222 (9%)	1,182 (8%)	2,894 (7%)	1,443 (6%)
Chronic obstructive pulmonary disease	16,339 (24%)	634 (26%)	4,032 (26%)	10,721 (25%)	5,618 (23%)
Heart Failure	5,506 (8%)	329 (14%)	1,684 (11%)	3,858 (9%)	1,648 (7%)
Pulmonary circulatory disorder	1,827 (3%)	104 (4%)	548 (4%)	1,278 (3%)	549 (2%)
Peripheral vascular disease	7,276 (11%)	305 (13%)	1,765 (11%)	4,645 (11%)	2,631 (11%)
Hypertension	46,647 (69%)	1,698 (70%)	10,365 (67%)	29,007 (67%)	17,640 (71%)
Paralysis	688 (1%)	19 (1%)	161 (1%)	442 (1%)	246 (1%)
Diabetes	18,036 (27%)	599 (25%)	3,897 (25%)	10,988 (25%)	7,048 (28%)
Hypothyroidism	11,964 (18%)	537 (22%)	3,311 (22%)	8,397 (19%)	3,567 (14%)
Renal Disease	11,932 (18%)	509 (21%)	2,921 (19%)	7,413 (17%)	4,519 (18%)
Liver disease	4,851 (7%)	145 (6%)	930 (6%)	2,815 (7%)	2,036 (8%)
Lymphoma	495 (1%)	26 (1%)	129 (1%)	325 (1%)	170 (1%)
Solid tumor (local)	11,925 (18%)	432 (18%)	2,533 (16%)	7,261 (17%)	4,664 (19%)
Rheumatoid arthritis / collagen vascular disease	3,599 (5%)	137 (6%)	916 (6%)	2,434 (6%)	1,165 (5%)
Coagulopathy	1,167 (2%)	46 (2%)	286 (2%)	765 (2%)	402 (2%)
Obesity	20,280 (30%)	605 (25%)	4,059 (26%)	12,324 (29%)	7,956 (32%)
Anemia	27,047 (40%)	1,308 (54%)	7,478 (49%)	18,417 (43%)	8,630 (35%)
Alcohol abuse	2,473 (4%)	85 (4%)	443 (3%)	1,380 (3%)	1,093 (4%)
Drug abuse	2,958 (4%)	112 (5%)	620 (4%)	1,707 (4%)	1,251 (5%)
Smoking	11,860 (18%)	384 (16%)	2,441 (16%)	7,056 (16%)	4,804 (19%)
Depression	16,755 (25%)	697 (29%)	4,381 (28%)	11,294 (26%)	5,461 (22%)
Sleep apnea	10,347 (15%)	307 (13%)	2,070 (13%)	6,249 (14%)	4,098 (17%)
Dementia	1,669 (2%)	107 (4%)	539 (4%)	1,184 (3%)	485 (2%)
Right side valve disease	485 (1%)	41 (2%)	163 (1%)	362 (1%)	123 (1%)
Left side valve disease	964 (1%)	63 (3%)	332 (2%)	716 (2%)	248 (1%)
Creatinine					
< 0.9	41,531 (61%)	1,429 (59%)	9,495 (62%)	26,895 (62%)	14,636 (59%)
1.0 – 1.4	16,976 (25%)	623 (26%)	3,635 (24%)	10,295 (24%)	6,681 (27%)
1.5 – 1.9	2,415 (4%)	105 (4%)	593 (4%)	1,499 (3%)	916 (4%)
2.0 +	1,282 (2%)	64 (3%)	291 (2%)	723 (2%)	559 (2%)
Unknown	5,764 (8%)	196 (8%)	1,363 (9%)	3,745 (9%)	2,019 (8%)
Hemoglobin					
< 10.0	6,297 (9%)	319 (13%)	1,738 (11%)	4,165 (10%)	2,132 (9%)
10.1 – 13.0	27,644 (41%)	1,127 (47%)	7,026 (46%)	18,399 (43%)	9,245 (37%)
13.1 – 15.0	23,489 (35%)	723 (30%)	4,785 (31%)	14,638 (34%)	8,851 (36%)
15.1 +	6,429 (9%)	102 (4%)	911 (6%)	3,327 (8%)	3,102 (13%)
Unknown	4,109 (6%)	146 (6%)	917 (6%)	2,628 (6%)	1,481 (6%)

(continued)

Table 2. Comorbidities and additional cohort patient characteristics for the original study cohort (n = 67,968). Characteristics for non-cardiac surgery patients managed on the floor for 48-hours after surgery without intraoperative hypotension (MAP ≤65-mmHg) **(continued)**

		Postoperative Hypotension			
Patient Characteristics	**Overall (n = 67,968)**	**MAP ≤55-mmHg (n = 2,417)**	**MAP ≤65-mmHg (n = 15,377)**	**MAP ≤75-mmHg (n = 43,157)**	**MAP >75-mmHg (n = 24,811)**
Procedures in the year before					
Dialysis	245 (0%)	15 (1%)	59 (0%)	136 (0%)	109 (0%)
Coronary artery bypass grafting	185 (0%)	6 (0%)	53 (0%)	127 (0%)	58 (0%)
Percutaneous coronary intervention	332 (1%)	28 (1%)	91 (1%)	226 (1%)	106 (0%)
Within 30 days before surgery:					
Acute myocardial infarction	651 (1%)	44 (2%)	201 (3%)	458 (1%)	193 (1%)
Acute ischemic stroke	768 (1%)	35 (1%)	193 (3%)	488 (1%)	280 (1%)
Within 7 days before surgery:					
Acute kidney injury	4,011 (6%)	268 (11%)	1,170 (8%)	2,562 (6%)	1,449 (6%)
Sepsis	1,460 (2%)	60 (2%)	336 (2%)	804 (2%)	656 (3%)
Delirium	883 (1%)	48 (2%)	233 (2%)	590 (1%)	293 (1%)
Electrolyte disorder	10,201 (15%)	512 (21%)	2,606 (17%)	6,376 (15%)	3,825 (15%)
Admitted from:					
Home	55,215 (81%)	1,982 (82%)	12,764 (83%)	35,709 (83%)	19,506 (79%)
Inpatient	9,681 (14%)	310 (13%)	1,904 (12%)	5,476 (13%)	4,205 (17%)
Skilled nursing facility	1,202 (2%)	62 (3%)	297 (2%)	776 (2%)	426 (2%)
Unknown	1,870 (3%)	63 (3%)	412 (3%)	1,196 (3%)	674 (3%)
Date of surgery					
Weekend	9,740 (14%)	359 (15%)	2,174 (14%)	5,982 (14%)	3,758 (15%)
Night	3,169 (5%)	106 (4%)	739 (5%)	2,037 (5%)	1,132 (5%)
Time dependent variables (48-hours post-surgery)					
Evidence of major bleeding	1,093 (2%)	50 (2%)	234 (2%)	668 (2%)	425 (2%)
Antihypertensives	41,893 (62%)	1,664 (69%)	9,723 (63%)	26,588 (62%)	15,305 (62%)
Vasopressors	1,922 (3%)	142 (6%)	594 (4%)	1,425 (3%)	497 (2%)

Footnote*:* MAP: mean arterial pressure; POH: postoperative hypotension.
Because of rounding, categories will not always add to 100%

Table 3. Baseline characteristics for cohort #2 (n = 16,034), non-cardiac surgery patients managed on the ward for 48 hours after surgery with intraoperative hypotension (MAP ≤ 65 mmHg)

Patient Characteristics	Overall (n = 16,034)	Postoperative Hypotension			
		MAP ≤ 55 mmHg (n = 1,903)	MAP ≤ 65 mmHg (n = 7,639)	MAP ≤ 75 mmHg (n = 13,529)	MAP >75 mmHg (n = 2,505)
Sex					
Male	5,474 (34%)	524 (28%)	2,043 (27%)	4,215 (31%)	1,259 (50%)
Female	10,560 (66%)	1,379 (72%)	5,596 (73%)	9,314 (69%)	1,246 (50%)
Race					
Asian	194 (1%)	23 (1%)	81 (1%)	159 (1%)	35 (1%)
Black	1,044 (7%)	85 (4%)	348 (5%)	750 (6%)	294 (12%)
Other	1,260 (8%)	154 (8%)	592 (8%)	1,036 (8%)	224 (9%)
White	13,536 (84%)	1,641 (86%)	6,618 (87%)	11,584 (86%)	1,952 (78%)
Region					
Midwest	7,691 (48%)	1,022 (54%)	3,736 (49%)	6,468 (48%)	1,223 (49%)
North	501 (3%)	45 (2%)	185 (2%)	367 (3%)	134 (5%)
Other	316 (2%)	36 (2%)	162 (2%)	273 (2%)	43 (2%)
South	4,067 (35%)	485 (24%)	2,155 (28%)	3,710 (27%)	357 (14%)
West	3,459 (22%)	342 (18%)	1401 (18%)	2,744 (20%)	748 (30%)
Age (years)					
< 40	1,330 (8%)	201 (11%)	621 (8%)	1,080 (8%)	250 (10%)
40-50	1,412 (9%)	102 (5%)	585 (8%)	1,074 (8%)	338 (13%)
50-60	2,875 (18%)	282 (15%)	1,278 (17%)	2,335 (17%)	540 (22%)
60-70	4,480 (28%)	481 (25%)	2,023 (26%)	3,770 (28%)	710 (28%)
70-80	3,700 (23%)	463 (24%)	1,849 (24%)	3,257 (24%)	443 (18%)
80+	2,237 (14%)	374 (20%)	1,283 (17%)	2,013 (15%)	224 (9%)
Charlson Comorbidity Index					
0	6,475 (40%)	733 (39%)	3,040 (40%)	5,496 (41%)	979 (39%)
1	3,083 (19%)	318 (17%)	1,391 (18%)	2,570 (19%)	513 (20%)
2	2,443 (15%)	299 (16%)	1,176 (15%)	2,064 (15%)	379 (15%)
3	1,354 (8%)	166 (9%)	642 (8%)	1,145 (8%)	209 (8%)
4+	2,679 (17%)	387 (20%)	1,390 (18%)	2,254 (17%)	425 (17%)
Comorbidities					
Myocardial Infarction	1,274 (8%)	188 (10%)	674 (9%)	1,094 (8%)	180 (7%)
Cerebrovascular accident	1,129 (7%)	183 (10%)	601 (8%)	979 (7%)	150 (6%)
Chronic obstructive pulmonary disease	4,118 (26%)	541 (28%)	2,067 (27%)	3,510 (26%)	608 (24%)
Heart Failure	1,625 (10%)	288 (15%)	918 (12%)	1,424 (``%)	201 (8%)
Pulmonary circulatory disorder	494 (3%)	88 (5%)	267 (4%)	417 (3%)	77 (3%)
Peripheral vascular disease	2,027 (13%)	304 (16%)	1,033 (14%)	1,728 (13%)	299 (12%)
Hypertension	10,696 (67%)	1,212 (64%)	4,973 (65%)	8,905 (66%)	1,791 (72%)
Paralysis	219 (1%)	36 (2%)	122 (2%)	187 (1%)	32 (1%)
Diabetes	4,129 (26%)	449 (24%)	1,901 (25%)	3,389 (25%)	740 (30%)
Hypothyroidism	3,073 (19%)	413 (22%)	1,591 (21%)	2,685 (20%)	388 (15%)
Renal Disease	3,224 (20%)	411 (22%)	1,570 (21%)	2,692 (20%)	532 (21%)

(continued)

Table 3. Baseline characteristics for cohort #2 (n = 16,034), non-cardiac surgery patients managed on the ward for 48 hours after surgery with intraoperative hypotension (MAP ≤ 65 mmHg) **(continued)**

Patient Characteristics	Overall (n = 16,034)	Post-operative Hypotension			
		MAP ≤ 55 mmHg (n = 1,903)	MAP ≤ 65 mmHg (n = 7,639)	MAP ≤ 75 mmHg (n = 13,529)	MAP >75 mmHg (n = 2,505)
Comorbidities					
Liver disease	1,202 (8%)	143 (8%)	551 (7%)	977 (7%)	225 (9%)
Lymphoma	149 (1%)	22 (1%)	73 (1%)	126 (1%)	23 (1%)
Solid tumor (local)	3,174 (20%)	403 (21%)	1,538 (20%)	2,680 (20%)	494 (20%)
Rheumatoid arthritis / collagen vascular disease	835 (5%)	103 (5%)	433 (6%)	736 (5%)	99 (4%)
Coagulopathy	313 (2%)	55 (3%)	164 (2%)	271 (2%)	42 (2%)
Obesity	4,494 (28%)	431 (23%)	1,922 (25%)	3,627 (27%)	867 (35%)
Anemia	6,900 (43%)	1,019 (54%)	3,749 (49%)	6,077 (45%)	823 (33%)
Alcohol abuse	600 (4%)	56 (3%)	237 (3%)	456 (3%)	144 (6%)
Drug abuse	805 (5%)	96 (5%)	326 (4%)	617 (5%)	188 (8%)
Smoking	2,743 (17%)	296 (16%)	1,283 (17%)	2,243 (17%)	500 (20%)
Depression	4,104 (26%)	532 (28%)	2,088 (27%)	3,483 (26%)	621 (25%)
Sleep apnea	2,307 (14%)	262 (14%)	1,036 (14%)	1,898 (14%)	409 (16%)
Dementia	414 (3%)	70 (4%)	233 (3%)	371 (3%)	43 (2%)
Right side valve disease	171 (1%)	33 (2%)	90 (1%)	153 (1%)	18 (1%)
Left side valve disease	357 (2%)	79 (4%)	201 (3%)	322 (2%)	35 (1%)
Creatinine					
< 0.9	9,957 (62%)	1,188 (62%)	4,806 (63%)	8,468 (63%)	1,489 (59%)
1.0 – 1.4	3,707 (23%)	407 (21%)	1,718 (22%)	3,079 (23%)	628 (25%)
1.5 – 1.9	588 (4%)	82 (4%)	276 (4%)	496 (4%)	92 (4%)
2.0 +	466 (3%)	74 (4%)	226 (3%)	386 (3%)	80 (3%)
Unknown	1,316 (8%)	152 (8%)	613 (8%)	1,100 (8%)	216 (9%)
Hemoglobin					
< 10.0	2,128 (13%)	394 (21%)	1,228 (16%)	1,883 (14%)	245 (10%)
10.1 – 13.0	6,866 (43%)	877 (47%)	3,490 (46%)	5,906 (44%)	960 (38%)
13.1 – 15.0	4,817 (30%)	431 (23%)	2,070 (27%)	3,978 (29%)	839 (33%)
15.1 +	1,064 (7%)	75 (4%)	363 (5%)	814 (6%)	250 (10%)
Unknown	1,159 (7%)	116 (6%)	488 (6%)	948 (7%)	211 (8%)
Procedures in the year before					
Dialysis	120 (1%)	21 379 (15%)	71 (1%)	105 (1%)	15 (1%)
Coronary artery bypass grafting	73 (0%)	13 (1%)	37 (0%)	63 (0%)	10 (0%)
Percutaneous coronary intervention	114 (1%)	20 (1%)	64 (1%)	98 (1%)	16 (1%)
Use of antihypertensives (year pre-surgery)	12,596 (79%)	1,4660 (77%)	5,945 (78%)	10,578 (78%)	2,018 (81%)
Within 30 days before surgery:					
Acute myocardial infarction	228 (1%)	36 (2%)	116 (2%)	192 (1%)	36 (1%)
Acute ischemic stroke	196 (1%)	34 (2%)	104 (1%)	167 (1%)	29 (1%)
Within 7 days before surgery:					
Acute kidney injury	1,083 (7%)	186 (10%)	599 (8%)	933 (7%)	150 (6%)
Sepsis	478 (3%)	70 (4%)	224 (3%)	399 (3%)	79 (3%)

(continued)

Table 3. Baseline characteristics for cohort #2 (n = 16,034), non-cardiac surgery patients managed on the ward for 48 hours after surgery with intraoperative hypotension (MAP ≤ 65 mmHg) **(continued)**

Patient Characteristics	Overall (n = 16,034)	Post-operative Hypotension			
		MAP ≤ 55 mmHg (n = 1,903)	MAP ≤ 65 mmHg (n = 7,639)	MAP ≤ 75 mmHg (n = 13,529)	MAP >75 mmHg (n = 2,505)
Within 7 days before surgery:					
Delirium	240 (2%)	45 (2%)	134 (2%)	206 (2%)	34 (1%)
Electrolyte disorder	2,769 (17%)	417 (22%)	1,412 (18%)	2,357 (17%)	412 (16%)
Admitted from:					
Home	13,417 (84%)	1,542 (81%)	6,385 (84%0	11,342 (84%)	2,075 (83%)
Inpatient	2,104 (13%)	299 (16%)	984 (13%)	1,728 (13%)	376 (15%)
Skilled nursing facility	246 (2%)	36 (2%)	136 (2%)	217 (2%)	29 (1%)
Unknown	267 (2%)	26 (1%)	134 (2%)	242 (2%)	25 (1%)
Surgery types (10 most common):					
AMP	603 (4%)	56 (3%)	243 (3%)	460 (3%)	143 (6%)
CHOL	311 (2%)	18 (1%)	118 (2%)	236 (2%)	75 (3%)
COLO	671 (4%)	56 (3%)	263 (3%)	522 (4%)	149 (6%)
CRAN	39 (0%)	13 (1%)	22 (0%)	30 (0%)	9 (0%)
FUSN	629 (4%)	118 (6%)	368 (5%)	540 (4%)	89 (4%)
FUSN-LAM	441 (3%)	64 (3%)	233 (3%)	403 (3%)	38 (2%)
FX	1,057 (7%)	160 (8%)	567 (7%)	925 (7%)	132 (5%)
HPRO	2,738 (17%)	417 (22%)	1,628 (21%)	2,529 (19%)	209 (8%)
KPRO	3,631 (23%)	277 (15%)	1,473 (19%)	3,069 (23%)	562 (22%)
Other	5,499 (34%)	629 (33%)	2,471 (32%)	4,443 (33%)	1,056 (42%)
THOR	415 (3%)	95 (5%)	253 (3%)	372 (3%)	43 (2%)
Surgery length:					
≤ 1 hr	7,173 (45%)	910 (48%)	3,991 (52%)	6,534 (48%)	639 (26%)
1 – 2 hr	4,234 (26%)	499 (26%)	1,866 (24%)	3,465 (26%)	769 (31%)
> 2 hr	4,627 (27%)	494 (26%)	1,782 (23%)	3,530 (26%)	1,097 (44%)
Date of surgery					
Weekend	2,502 (16%)	340 (18%)	1,208 (16%)	2,109 (16%)	393 (16%)
Night	607 (4%)	79 (4%)	331 (4%)	538 (4%)	69 (3%)
Year of surgery					
2008-2011	767 (5%)	123 (6%)	416 (5%)	689 (5%)	78 (3%)
2012-2013	1,974 (12%)	259 (14%)	1,128 (15%)	1,816 (14%)	158 (6%)
2014-2015	6,259 (39%)	775 (41%)	2,928 (38%)	5,237 (39%)	1,022 (415%
2016-2017	7,034 (44%)	746 (39%)	3,167 (41%)	5,787 (43%)	1,247 (50%)
Time dependents (48-hours post-surgery)					
Evidence of major bleeding	302 (2%)	46 (2%)	141 (2%)	249 (2%)	53 (2%)
Antihypertensives	9,715 (61%)	1,125 (59%)	4,569 (60%)	8,138 (60%)	1,577 (63%)
Vasopressors	608 (4%)	175 (9%)	441 (6%)	578 (4%)	30 (1%)

Because of rounding, categories will not always add to 100%

Footnote: MAP: mean arterial pressure; POH: postoperative hypotension.

Surgeries in the Top 10 cohort: AMP: limb amputation, CHOL: gallbladder surgery, COLO: colon surgery, CRAN: craniotomy, FUSN: spinal fusion, FUSN-LAM: spinal fusion laminectomy, FX: open reduction of fracture, HPRO: hip prosthesis, KPRO: knee prosthesis, THOR: thoracic surgery (non-cardiac, non-vascular); MAP: mean arterial pressure; POH: postoperative hypotension.

Table 4. Baseline characteristics for the combined cohort (cohort #3) of patients without (original cohort) and with (cohort #2) IOH, examined for POH (n = 84,002). Characteristics for non-cardiac surgery patients managed on the ward for 48 hours after surgery with and without intraoperative hypotension (MAP ≤ 65 mmHg)

		Postoperative Hypotension			
Patient Characteristics	**Overall (n = 84,002)**	**MAP ≤ 55 mmHg (n = 4,320)**	**MAP ≤ 65 mmHg (n = 23,016)**	**MAP ≤ 75 mmHg (n = 56,686)**	**MAP >75 mmHg (n = 27,315)**
Sex					
Male	31,641 (38%)	1,170 (27%)	6,012 (26%)	17,985 (32%)	13,656 (50%)
Female	52,361 (62%)	3,150 (73%)	17,004 (74%)	38,701 (68%)	13,660 (50%)
Race					
Asian	510 (1%)	29 (1%)	154 (1%)	368 (1%)	142 (1%)
Black	8,055 (10%)	211 (5%)	1,245 (5%)	4,086 (7%)	3,969 (15%)
Other	6,165 (7%)	288 (7%)	1,627 (7%)	4,070 (7%)	2,095 (8%)
White	69,272 (82%)	3,792 (88%)	19,990 (87%)	48,162 (85%)	21,110 (77%)
Region					
Midwest	37,508 (45%)	2,165 (50%)	10,781 (47%)	25,699 (45%)	1,809 (43%)
North	1,854 (2%)	84 (2%)	397 (2%)	1,128 (2%)	726 (3%)
Other	1,919 (2%)	117 (3%)	565 (2%)	1,298 (2%)	621 (2%)
South	37,010 (44%)	1,476 (34%)	9,213 (40%)	24,317 (43%)	12,693 (46%)
West	5,711 (7%)	478 (11%)	2,060 (9%)	4,244 (7%)	1,467 (5%)
Age (years)					
< 40	6,143 (7%)	311 (7%)	1,550 (7%)	3,885 (7%)	2,258 (8%)
40-50	8,239 (10%)	259 (6%)	1,738 (8%)	4,822 (9%)	3,417 (13%)
50-60	16,614 (20%)	645 (15%)	3,887 (17%)	10,482 (18%)	6,132 (22%)
60-70	23,407 (28%)	1,128 (26%)	6,183 (27%)	15,814 (28%)	7,593 (28%)
70-80	18,685 (22%)	1,076 (25%)	5,619 (24%)	13,404 (24%)	5,281 (19%)
80+	10,914 (13%)	901 (21%)	4,039 (18%)	8,279 (15%)	2,635 (10%)
Charlson Comorbidity Index					
0	35,977 (43%)	1,693 (39%)	9,564 (42%)	24,321 (43%)	11,656 (43%)
1	16,019 (19%)	765 (18%)	4,196 (18%)	10,776 (19%)	5,243 (19%)
2	12,571 (15%)	674 (16%)	3,507 (15%)	8,552 (15%)	4,019 (15%)
3	7,084 (8%)	422 (10%)	2,070 (9%)	4,787 (8%)	2,297 (8%)
4+	12,351 (15%)	766 (18%)	3,679 (16%)	8,250 (15%)	4,101 (15%)
Comorbidities					
Myocardial Infarction	6,033 (7%)	433 (10%)	1,970 (9%)	4,333 (8%)	1,700 (6%)
Cerebrovascular accident	5,466 (7%)	405 (9%)	1,783 (8%)	3,873 (7%)	1,593 (6%)
Chronic obstructive pulmonary disease	20,457 (24%)	1,175 (27%)	6,099 (27%)	14,231 (25%)	6,226 (23%)
Heart Failure	7,131 (8%)	617 (14%)	2,602 (11%)	5,282 (9%)	1,849 (7%)
Pulmonary circulatory disorder	2,321 (3%)	192 (4%)	815 (4%)	1,695 (3%)	626 (2%)
Peripheral vascular disease	9,303 (11%)	609 (14%)	2,798 (12%)	6,373 (11%)	2,930 (11%)
Hypertension	57,343 (68%)	2,910 (67%)	15,338 (67%)	37,912 (67%)	19,431 (71%)
Paralysis	907 (1%)	55 (1%)	283 (1%)	629 (1%)	278 (1%)
Diabetes	22,165 (26%)	1,048 (24%)	5,798 (25%)	14,377 (25%)	7,788 (29%)
Hypothyroidism	15,037 (18%)	950 (22%)	4,902 (21%)	1,082 (20%)	3,955 (14%)
Renal Disease	15,156 (18%)	920 (21%)	4,491 (20%)	10,105 (18%)	5,051 (18%)

(continued)

Table 4. Baseline characteristics for the combined cohort (cohort #3) of patients without (original cohort) and with (cohort #2) IOH, examined for POH (n = 84,002). Characteristics for non-cardiac surgery patients managed on the ward for 48 hours after surgery with and without intraoperative hypotension (MAP ≤ 65-mmHg) **(continued)**

Patient Characteristics	Overall (n = 84,002)	Post-operative Hypotension			
		MAP ≤ 55 mmHg (n = 4,320)	MAP ≤ 65 mmHg (n = 23,016)	MAP ≤ 75 mmHg (n = 56,686)	MAP >75 mmHg (n = 27,315)
Comorbidities					
Liver disease	6,053 (7%)	288 (7%)	1,481 (6%)	3,792 (7%)	2,261 (8%)
Lymphoma	644 (1%)	48 (1%)	202 (1%)	451 (1%)	193 (1%)
Solid tumor (local)	15,099 (18%)	835 (19%)	4,071 (18%)	9,941 (18%)	5,158 (19%)
Rheumatoid arthritis / collagen vascular disease	4,434 (5%)	240 (6%)	1,349 (6%)	3,170 (6%)	1,264 (5%)
Coagulopathy	1,480 (2%)	101 (2%)	450 (2%)	1,036 (2%)	444 (2%)
Obesity	24,774 (29%)	1,036 (24%)	5,981 (26%)	15,951 (28%)	8,823 (32%)
Anemia	33,947 (40%)	2,327 (54%)	11,227 (49%)	24,494 (43%)	9,453 (35%)
Alcohol abuse	3,073 (4%)	141 (3%)	680 (3%)	1,836 (3%)	1,237 (5%)
Drug abuse	3,763 (4%)	208 (5%)	946 (4%)	2,324 (4%)	1,439 (5%)
Smoking	14,603 (17%)	680 (16%)	3,724 (16%)	9,299 (16%)	5,304 (19%)
Depression	20,859 (25%)	1,229 (28%)	6,469 (28%)	14,777 (26%)	6,082 (22%)
Sleep apnea	12,654 (15%)	569 (13%)	3,106 (13%)	8,147 (14%)	4,507 (17%)
Dementia	2,083 (2%)	177 (4%)	772 (3%)	1,555 (3%)	528 (2%)
Right side valve disease	656 (1%)	74 (2%)	253 (1%)	515 (1%)	141 (1%)
Left side valve disease	1,321 (2%)	142 (3%)	533 (2%)	1,038 (2%)	283 (1%)
Creatinine					
< 0.9	51,488 (61%)	2,617 (61%)	14,301 (62%)	35,363 (62%)	16,125 (59%)
1.0 – 1.4	20,683 (25%)	1,030 (24%)	5,353 (23%)	13,374 (24%)	7,309 (27%)
1.5 – 1.9	3,003 (4%)	187 (4%)	869 (4%)	1,995 (4%)	1,008 (4%)
2.0 +	1,748 (2%)	138 (3%)	517 (2%)	1,109 (2%)	639 (2%)
Unknown	7,080 (8%)	348 (8%)	1,976 (9%)	4,845 (9%)	2,235 (8%)
Hemoglobin					
< 10.0	8,425 (10%)	713 (17%)	2,966 (13%)	6,048 (11%)	2,377 (9%)
10.1 – 13.0	34,510 (41%)	2,014 (47%)	10,516 (46%)	24,305 (43%)	10,205 (37%)
13.1 – 15.0	28,306 (34%)	1,154 (27%)	6,855 (30%)	18,616 (33%)	9,690 (35%)
15.1 +	7,493 (9%)	177 (4%)	1,274 (6%)	4,141 (7%)	3,352 (12%)
Unknown	5,268 (6%)	262 (6%)	1,4005 (6%)	3,576 (6%)	1,692 (6%)
Procedures in the year before					
Dialysis	365 (0%)	42 (1%)	130 (1%)	241 (0%)	124 (0%)
Coronary artery bypass grafting	258 (0%)	19 (0%)	90 (0%)	190 (0%)	68 (0%)
Percutaneous coronary intervention	446 (1%)	48 (1%)	155 (1%)	324 (1%)	122 (0%)
Use of antihypertensives (year pre-surgery)	68,749 (82%)	3,484 (81%)	18,543 (81%)	45,867 (81%)	22,882 (84%)
Within 30 days before surgery:					
Acute myocardial infarction	879 (1%)	80 (2%)	317 (1%)	650 (1%)	229 (1%)
Acute ischemic stroke	964 (1%)	69 (2%)	297 (1%)	655 (1%)	309 (1%)
Within 7 days before surgery:					
Acute kidney injury	5,094 (6%)	454 (11%)	1,769 (8%)	3,495 (6%)	1,599 (6%)
Sepsis	1,938 (2%)	130 (3%)	560 (2%)	1,203 (2%)	735 (3%)

(continued)

Table 4. Baseline characteristics for the combined cohort (cohort #3) of patients without (original cohort) and with (cohort #2) IOH, examined for POH (n = 84,002). Characteristics for non-cardiac surgery patients managed on the ward for 48 hours after surgery with and without intraoperative hypotension (MAP ≤ 65 mmHg) **(continued)**

		Post-operative Hypotension			
Patient Characteristics	**Overall (n = 84,002)**	**MAP ≤ 55 mmHg (n = 4,320)**	**MAP ≤ 65 mmHg (n = 23,016)**	**MAP ≤ 75 mmHg (n = 56,686)**	**MAP >75 mmHg (n = 27,315)**
Within 7 days before surgery:					
Delirium	1,123 (1%)	93 (2%)	367 (2%)	796 (1%)	327 (1%)
Electrolyte disorder	12,970 (15%)	929 (22%)	4,018 (17%)	8,733 (15%)	4,237 (16%)
Admitted from:					
Home	68,632 (82%)	3,524 (82%)	19,149 (83%)	47,051 (83%)	21,581 (79%)
Inpatient	11,785 (14%)	609 (14%)	2,888 (15%)	7,204 (13%)	4,581 (17%)
Skilled nursing facility	1,448 (2%)	98 (2%)	433 (2%)	993 (2%)	455 (2%)
Unknown	2,137 (3%)	89 (2%)	546 (2%)	1,438 (3%)	699 (3%)
Surgery types (10 most common):					
AMP	3,049 (4%)	114 (3%)	641 (3%)	1,713 (3%)	1,336 (5%)
CHOL	2,521 (3%)	54 (1%)	457 (2%)	1,414 (2%)	1,107 (4%)
COLO	4,204 (5%)	134 (3%)	865 (4%)	2,466 (4%)	1,738 (6%)
CRAN	137 (0%)	15 (0%)	43 (0%)	93 (0%)	44 (0%)
FUSN	3,964 (5%)	240 (6%)	1,198 (5%)	2,745 (5%)	1,219 (4%)
FUSN-LAM	2,215 (3%)	127 (3%)	741 (3%)	1,689 (3%)	526 (2%)
FX	5,161 (6%)	374 (9%)	1,831 (8%)	3,786 (7%)	1,375 (5%)
HPRO	11,706 (15%)	949 (2%)	4,613 (20%)	9,408 (17%)	2,298 (8%)
KPRO	22,843 (27%)	892 (21%)	5,524 (24%)	15,573 (27%)	7,270 (27%)
Other	26,990 (32%)	1,269 (29%)	6,610 (29%)	16,866 (30%)	10,124 (37%)
THOR	1,212 (1%)	152 (4%)	493 (2%)	933 (2%)	279 (1%)
Surgery length:					
≤ 1 hr	64,222 (76%)	2,974 (69%)	17,093 (74%)	43,267 (76%)	20,955 (77%)
1 – 2 hr	13,618 (16%)	812 (19%)	3,885 (17%)	9,072 (16%)	4,546 (17%)
> 2 hr	6,162 (7%)	534 (12%)	2,038 (9%)	4,347 (8%)	1,815 (7%)
Date of surgery					
Weekend	12,242 (15%)	699 (16%)	3,382 (15%)	8,091 (14%)	4,151 (15%)
Night	3,776 (5%)	185 (4%)	1,070 (5%)	2,575 (5%)	1,201 (4%)
Year of surgery					
2008-2011	4,019 (5%)	268 (6%)	1,203 (5%)	2,722 (5%)	1,297 (5%)
2012-2013	14,661 (17%)	820 (19%)	4,277 (19%)	10,137 (18%)	4,524 917%)
2014-2015	31,092 (37%)	1,608 (37%)	8,537 (37%)	20,985 (37%)	10,107 (37%)
2016-2017	34,230 (41%)	1,624 (38%)	8,999 (39%)	22,842 (40%)	11,388 (42%)
Time dependents (48-hours post-surgery)					
Evidence of major bleeding	1,395 (2%)	96 (2%)	375 (2%)	917 (2%)	478 (2%)
Antihypertensives	51,608 (61%)	2,789 (65%)	14,292 (62%)	34,726 (61%)	16,882 (62%)
Vasopressors	2,530 (3%)	317 (7%)	1,035 (5%)	2,003 (4%)	527 (2%)

Because of rounding, categories will not always add to 100%

Footnote: MAP: mean arterial pressure; POH: postoperative hypotension.

Surgeries in the Top 10 cohort: AMP: limb amputation, CHOL: gallbladder surgery, COLO: colon surgery, CRAN: craniotomy, FUSN: spinal fusion, FUSN-LAM: spinal fusion laminectomy, FX: open reduction of fracture, HPRO: hip prosthesis, KPRO: knee prosthesis, THOR: thoracic surgery (non-cardiac, non-vascular); MAP: mean arterial pressure; POH: postoperative hypotension.

Table 5. E-values to assess the magnitude of an unobserved or unaccounted confounding effect for POH among patients without (original cohort, n= 67,968) and with (cohort #2, n = 16,034) IOH. Sensitivity analysis to determine unobserved or unaccounted confounding effects for POH at three thresholds and with and without IOH (MAP ≤ 65 mmHg) for primary and secondary endpoints E-values represent the effect size required for an unmeasured confounding to reduce the observed effect to OR 1.0.

E-Values	Floor Patients without IOH (n = 67,968)			Floor Patients with IOH (n = 16,034)		
	POH MAP Threshold			POH MAP Threshold		
	≤ 55 mmHg	≤ 65 mmHg	≤ 75 mmHg	≤ 55 mmHg	≤ 65 mmHg	≤ 75 mmHg
MACCE	1.76	1.64	1.64	2.43	1.90	1.54
30-day mortality	1.97	2.04	1.83	3.10	1.86	1.43
90-day mortality	2.37	1.97	1.64	2.26	1.92	1.51
AIS	1.99	1.16	1.49	1.24	1.43	1.36
AKI	3.58	2.94	2.85	3.87	2.24	1.79
AMI	2.87	1.49	1.25	1.37	1.59	1.69
30-day readmission	1.79	1.40	1.43	1.54	1.54	1.57

Footnote: POH: postoperative hypotension; IOH: intraoperative hypotension; MAP: mean arterial pressure; MACCE: major adverse cardiovascular or cerebrovascular events; AIS: acute ischemic stroke; AKI: acute kidney injury; AMI: acute myocardial infarction.

E-values to reduce the observed effect to an odds ratio of 1.0 were calculated as previously described by VanderWeele and Ding (VanderWeele TJ, Ding P. Sensitivity Analysis in Observational Research: Introducing the E-Value. Annals of Internal Medicine. 2017;167(4):268.)

*Specifically, following formula was used**: E-value=HR+sqrt{HR×(HR-1)}***

This formula applies to a risk ratio greater than 1; for a risk ratio less than 1, we first took the inverse of the observed risk ratio and then applied the same formula.

Table 6. Number of patients censored for the models and due to death

Outcome	Number of patients were censored for the models	Number of patients were censored due to death
30-day MACCE	65537	-
30-day mortality	67374	-
90-day mortality	66920	-
30-day AIS	66301	537
7-day AKI (Stage II/III)	66665	194
30-day AMI	66548	543
30-day readmission	62490	170

Footnote: AIS: acute ischemic stroke; AKI: acute kidney injury; AMI: acute myocardial infarction; MACCE: major adverse cardiac or cerebrovascular events

Table 7. P-values for HRs for patients with POH without (original cohort, n = 67,968) and with (cohort #2, n = 16,034) IOH.

Outcome	POH threshold	p-value POH without IOH (n = 67,968)	p-value POH with IOH (n = 16,034)
30-day MACCE	≤ 55 mmHg	0.121	**0.006***
	≤ 65 mmHg	0.028	0.061
	≤ 75 mmHg	0.023	0.484
30-day mortality	≤ 55 mmHg	0.104	**0.001***
	≤ 65 mmHg	**0.002***	0.161
	≤ 75 mmHg	0.017	0.702
90-day mortality	≤ 55 mmHg	**0.001***	**0.016***
	≤ 65 mmHg	**<0.001***	0.056
	≤ 75 mmHg	0.022	0.487
30-day AIS	≤ 55 mmHg	0.214	0.923
	≤ 65 mmHg	0.881	0.708
	≤ 75 mmHg	0.365	0.851
7-day AKI	≤ 55 mmHg	**<0.001***	**<0.001***
	≤ 65 mmHg	**<0.001***	**0.009***
	≤ 75 mmHg	**<0.001***	0.237
30-day AMI	≤ 55 mmHg	0.038	0.824
	≤ 65 mmHg	0.468	0.570
	≤ 75 mmHg	0.808	0.583
30-day readmission	≤ 55 mmHg	**0.002***	0.115
	≤ 65 mmHg	**0.008***	0.028
	≤ 75 mmHg	**0.003***	0.100

*Footnote: * means significant after applying Bonferroni adjustment. POH: postoperative hypotension; IOH: intraoperative hypotension; MAP: mean arterial pressure; MACCE: major adverse cardiovascular or cerebrovascular events; AIS: acute ischemic stroke; AKI: acute kidney injury; AMI: acute myocardial infarction.*

Table 8. Primary and secondary outcomes for patients identified as discharged to the ward. Hazard ratios and 95% confidence intervals are presented for patients stratified by absence (top half of table) or presence (bottom half of table) of intraoperative hypotension (MAP ≤ 65-mmHg). Hazard ratio (A) patient cohort with first post-operative hypotension event occurring within 4-48 hours post-surgery; (B) patient cohort with a documented post-surgical care location (no algorithm utilized).

Outcome	POH Threshold	Hazard Ratio (A) (Cohort with first POH event within 4-48 hours)	P value	Hazard Ratio (B) (Cohort with a documented care unit after surgery)	P value
Ward Patients Without IOH (MAP ≤ 65 mmHg)					
30-day MACCE	≤ 55 mmHg	1.29 (0.97, 1.71)	0.0804	1.27 (0.92, 1.76)	0.1539
30-day MACCE	≤ 65 mmHg	1.18 (1.01, 1.39)	0.0402	1.22 (1.00, 1.48)	0.0514
30-day MACCE	≤ 75 mmHg	1.17 (1.00, 1.36)	0.0535	1.19 (0.99, 1.44)	0.0647
30-day mortality	≤ 55 mmHg	1.45 (1.02, 2.07)	0.0411	1.64 (1.14, 2.37)	0.0078*
30-day mortality	≤ 65 mmHg	1.41 (1.15, 1.72)	0.0009*	1.51 (1.20, 1.91)	0.0006*
30-day mortality	≤ 75 mmHg	1.32 (1.07, 1.62)	0.0101*	1.49 (1.15, 1.92)	0.0022*
90-day mortality	≤ 55 mmHg	1.61 (1.25, 2.09)	0.0003*	1.87 (1.41, 2.47)	< .0001*
90-day mortality	≤ 65 mmHg	1.34 (1.15, 1.56)	0.0002*	1.56 (1.30, 1.87)	< .0001*
90-day mortality	≤ 75 mmHg	1.24 (1.06, 1.45)	0.0066*	1.43 (1.18, 1.75)	0.0003*
30-day AIS	≤ 55 mmHg	1.35 (0.83, 2.19)	0.2206	1.26 (0.72, 2.21)	0.418
30-day AIS	≤ 65 mmHg	0.99 (0.74, 1.32)	0.9484	0.95 (0.66, 1.36)	0.7832
30-day AIS	≤ 75 mmHg	1.06 (0.82, 1.38)	0.6844	0.89 (0.65, 1.22)	0.4624
7-day AKI	≤ 55 mmHg	2.48 (1.85, 3.31)	< .0001*	2.13 (1.55, 2.95)	< .0001*
7-day AKI	≤ 65 mmHg	1.95 (1.62, 2.33)	< .0001*	1.66 (1.36, 2.02)	< .0001*
7-day AKI	≤ 75 mmHg	1.87 (1.58, 2.22)	< .0001*	1.69 (1.42, 2.01)	< .0001*
30-day AMI	≤ 55 mmHg	1.83 (1.06, 3.17)	0.0314	1.87 (0.94, 3.72)	0.0734
30-day AMI	≤ 65 mmHg	1.07 (0.75, 1.53)	0.7144	1.09 (0.70, 1.71)	0.7104
30-day AMI	≤ 75 mmHg	0.85 (0.61, 1.19)	0.3481	0.83 (0.54, 1.25)	0.3692
30-day readmission	≤ 55 mmHg	1.23 (1.06, 1.43)	0.0053*	1.29 (1.08, 1.54)	0.0044*
30-day readmission	≤ 65 mmHg	1.08 (1.00, 1.16)	0.0438	1.21 (1.10, 1.32)	< .0001*
30-day readmission	≤ 75 mmHg	1.11 (1.04, 1.19)	0.0027*	1.11 (1.02, 1.21)	0.0158*
Ward Patients With IOH (MAP ≤ 65 mmHg)					
30-day MACCE	≤ 55 mmHg	1.44 (0.96, 2.15)	0.0756	1.88 (1.37, 2.59)	< .0001*
30-day MACCE	≤ 65 mmHg	1.15 (0.82, 1.60)	0.4128	1.40 (1.03, 1.90)	0.0298
30-day MACCE	≤ 75 mmHg	1.16 (0.74, 1.80)	0.5222	1.12 (0.74, 1.68)	0.5927
30-day mortality	≤ 55 mmHg	1.60 (0.99, 2.57)	0.0533	2.38 (1.63, 3.48)	< .0001*
30-day mortality	≤ 65 mmHg	1.01 (0.70, 1.70)	0.6569	1.58 (1.10, 2.28)	0.0142*

(continued)

Table 8. Primary and secondary outcomes for patients identified as discharged to the ward. Hazard ratios and 95% confidence intervals are presented for patients stratified by absence (top half of table) or presence (bottom half of table) of intraoperative hypotension (MAP ≤ 65 mmHg). Hazard ratio (A) patient cohort with first post-operative hypotension event occurring within 4-48 hours post-surgery; (B) patient cohort with a documented post-surgical care location (no algorithm utilized). **(continued)**

Outcome	POH MAP Threshold	Hazard Ratio (A) (Cohort with first POH event within 4-48 hours)	p-value	Hazard Ratio (B) (Cohort with a documented care unit after surgery)	p-value
Ward Patients With IOH (MAP ≤ 65-mmHg)					
30-day mortality	≤ 75 mmHg	1.01 (0.52, 1.98)	0.9675	1.20 (0.70, 2.04)	0.5108
90-day mortality	≤ 55 mmHg	1.30 (0.88, 1.92)	0.1921	1.75 (1.28, 2.40)	0.0005*
90-day mortality	≤ 65 mmHg	1.27 (0.91, 1.76)	0.1587	1.62 (1.21, 2.19)	0.0014*
90-day mortality	≤ 75 mmHg	1.19 (0.71, 2.02)	0.5079	1.28 (0.81, 2.04)	0.2919
30-day AIS	≤ 55 mmHg	0.90 (0.33, 2.47)	0.8435	1.69 (0.83, 3.45)	0.1495
30-day AIS	≤ 65 mmHg	0.71 (0.34, 1.50)	0.3685	0.71 (0.38, 1.32)	0.2774
30-day AIS	≤ 75 mmHg	1.65 (0.72, 3.83)	0.2432	0.99 (0.44, 2.24)	0.9766
7-day AKI	≤ 55 mmHg	2.50 (1.62, 3.85)	< .0001*	2.39 (1.70 3.36)	< .0001*
7-day AKI	≤ 65 mmHg	1.22 (0.82, 1.83)	0.3232	1.46 (1.08, 1.97)	0.0128*
7-day AKI	≤ 75 mmHg	0.96 (0.58, 1.59)	0.8643	1.32 (0.91, 1.92)	0.1474
30-day AMI	≤ 55 mmHg	1.04 (0.42, 2.53)	0.9405	0.81 (0.35, 1.89)	0.6248
30-day AMI	≤ 65 mmHg	1.02 (0.54, 1.91)	0.9532	1.01 (0.53, 1.92)	0.9765
30-day AMI	≤ 75 mmHg	0.94 (0.43, 2.05)	0.8758	0.87 (0.41, 1.82)	0.7082
30-day readmission	≤ 55 mmHg	0.97 (0.78, 1.20)	0.7519	1.05 (0.87, 1.27)	0.6126
30-day readmission	≤ 65 mmHg	1.09 (0.94, 1.26)	0.2715	1.19 (1.03, 1.37)	0.021
30-day readmission	≤ 75 mmHg	1.18 (0.97, 1.43)	0.1073	1.16 (0.95, 1.43)	0.1467

*Footnote: * means significant after applying Bonferroni adjustment. POH: postoperative hypotension; IOH: intraoperative hypotension; MAP: mean arterial pressure; MACCE: major adverse cardiovascular or cerebrovascular events; AIS: acute ischemic stroke; AKI: acute kidney injury; AMI: acute myocardial infarction.*

Table 9. Primary and secondary outcomes for patients without IOH (n = 67,968) and identified as discharged to the ward. Hazard ratios are presented for patients stratified by time spent in the hospital (72 or 96 hours).

Outcome	POH MAP Threshold	p-value	Hazard Ratio	95% CI lower bound	95% CI upper bound
Ward Patients Without IOH – 72 Hours					
Peri-op MACCE	≤ 55 mmHg	0.0592	1.38	0.99	1.94
Peri-op MACCE	≤ 65 mmHg	0.0002*	1.44	1.19	1.75
Peri-op MACCE	≤ 75 mmHg	0.0421	1.22	1.01	1.48
30 day mortality	≤ 55 mmHg	0.2238	1.29	0.86	1.95
30 day mortality	≤ 65 mmHg	<.0001*	1.61	1.28	2.04
30 day mortality	≤ 75 mmHg	0.0194	1.33	1.05	1.68
90 day mortality	≤ 55 mmHg	0.0015*	1.61	1.20	2.16
90 day mortality	≤ 65 mmHg	0.0006*	1.39	1.15	1.67
90 day mortality	≤ 75 mmHg	0.0184	1.25	1.04	1.51
30 day AIS	≤ 55 mmHg	0.0686	1.74	0.96	3.15
30 day AIS	≤ 65 mmHg	0.5577	1.12	0.77	1.64
30 day AIS	≤ 75 mmHg	0.9532	0.99	0.67	1.45
AKI	≤ 55 mmHg	0.0018*	1.80	1.25	2.60
AKI	≤ 65 mmHg	<.0001*	1.68	1.36	2.07
AKI	≤ 75 mmHg	<.0001*	2.01	1.65	2.44
30 day AMI	≤ 55 mmHg	0.0376	2.00	1.04	3.86
30 day AMI	≤ 65 mmHg	0.2835	1.26	0.82	1.94
30 day AMI	≤ 75 mmHg	0.6015	0.90	0.60	1.35
30 day readmission	≤ 55 mmHg	0.0163*	1.24	1.04	1.47
30 day readmission	≤ 65 mmHg	0.0830	1.09	0.99	1.20
30 day readmission	≤ 75 mmHg	0.1212	1.08	0.98	1.19
Ward Patients Without IOH – 96 Hours					
Peri-op MACCE	≤ 55 mmHg	0.1649	1.35	0.88	2.06
Peri-op MACCE	≤ 65 mmHg	0.0040*	1.45	1.13	1.86
Peri-op MACCE	≤ 75 mmHg	0.2732	1.15	0.89	1.49
30 day mortality	≤ 55 mmHg	0.4445	1.21	0.75	1.94
30 day mortality	≤ 65 mmHg	0.0008*	1.64	1.23	2.19
30 day mortality	≤ 75 mmHg	0.1074	1.27	0.95	1.70
90 day mortality	≤ 55 mmHg	0.0150*	1.57	1.09	2.26
90 day mortality	≤ 65 mmHg	0.0001*	1.60	1.26	2.02
90 day mortality	≤ 75 mmHg	0.0370	1.30	1.02	1.66
30 day AIS	≤ 55 mmHg	0.0791	2.08	0.92	4.70
30 day AIS	≤ 65 mmHg	0.7051	1.12	0.64	1.96
30 day AIS	≤ 75 mmHg	0.4459	0.79	0.43	1.45
AKI	≤ 55 mmHg	0.0184	1.81	1.11	2.96
AKI	≤ 65 mmHg	0.0246	1.39	1.04	1.86
AKI	≤ 75 mmHg	<.0001*	1.95	1.50	2.54
30 day AMI	≤ 55 mmHg	0.0212	2.83	1.17	6.85
30 day AMI	≤ 65 mmHg	0.3299	1.37	0.73	2.57

(continued)

Table 9. Primary and secondary outcomes for patients without IOH and identified as discharged to the ward. Hazard ratios are presented for patients stratified by time spent in the hospital (72- or 96-hours). **(continued)**

Outcome	POH MAP Threshold	Value	Hazard Ratio	95% CI Lower Bound	95% CI Upper Bound
Ward Patients Without IOH – 96 Hours					
30 day AMI	≤ 75 mmHg	0.1664	0.66	0.37	1.19
30 day readmission	≤ 55 mmHg	0.0544	1.25	1.00	1.57
30 day readmission	≤ 65 mmHg	0.8639	1.01	0.88	1.17
30 day readmission	≤ 75 mmHg	0.9842	1.00	0.87	1.15

*Footnote: * means significant after applying Bonferroni adjustment. POH: postoperative hypotension; IOH: intraoperative hypotension; MAP: mean arterial pressure; MACCE: major adverse cardiovascular or cerebrovascular events; AIS: acute ischemic stroke; AKI: acute kidney injury; AMI: acute myocardial infarction; CI: Confidence Interval.*

Table 10: Sensitivity analysis of the original cohort (n = 67,968) and cohort #2 (n = 16,034) excluding patients who died within the first 48-hours post-surgery for MACCE

Outcome	POH Threshold	Without IOH (n = 67,968)		With IOH (n = 16,034)	
		Hazard Ratio	P value	Hazard Ratio	P value
30-day MACCE	≤ 55 mmHg	1.24 (0.90, 1.83)	0.112	1.49 (1.02, 2.33)	0.011
	≤ 65 mmHg	1.18 (0.99, 1.47)	0.024	1.30 (0.93, 1.93)	0.063
	≤ 75 mmHg	1.17 (0.66, 1.44)	0.026	1.15 (0.72, 2.02)	0.476

Footnote: POH: postoperative hypotension; IOH: intraoperative hypotension; MACCE: major adverse cardiovascular or cerebrovascular events,

Table 11: Interaction of POH and IOH using the combined cohort (cohort #3; n = 84,002). P-values of the interaction term between POH and IOH exposures on primary and secondary outcomes.

Outcome	POH Threshold	p-values
30-day MACCE	MAP ≤ 55 mmHg	0.477
	MAP ≤ 65 mmHg	0.854
	MAP ≤ 75 mmHg	0.823
30-day mortality	MAP ≤ 55 mmHg	0.322
	MAP ≤ 65 mmHg	0.552
	MAP ≤ 75 mmHg	0.687
90-day mortality	MAP ≤ 55 mmHg	0.633
	MAP ≤ 65 mmHg	0.620
	MAP ≤ 75 mmHg	0.883
30-day AIS	MAP ≤ 55 mmHg	0.544
	MAP ≤ 65 mmHg	0.582
	MAP ≤ 75 mmHg	0.828
7-day AKI	MAP ≤ 55 mmHg	0.518
	MAP ≤ 65 mmHg	0.065
	MAP ≤ 75 mmHg	0.029
30-day AMI	MAP ≤ 55 mmHg	0.190
	MAP ≤ 65 mmHg	0.617
	MAP ≤ 75 mmHg	0.789
30-day readmission	MAP ≤ 55 mmHg	0.293
	MAP ≤ 65 mmHg	0.731
	MAP ≤ 75 mmHg	0.590

*Footnote: * means significant after applying Bonferroni adjustment. POH: postoperative hypotension; IOH: intraoperative hypotension; MAP: mean arterial pressure; MACCE: major adverse cardiovascular or cerebrovascular events; AIS: acute ischemic stroke; AKI: acute kidney injury; AMI: acute myocardial infarction.*