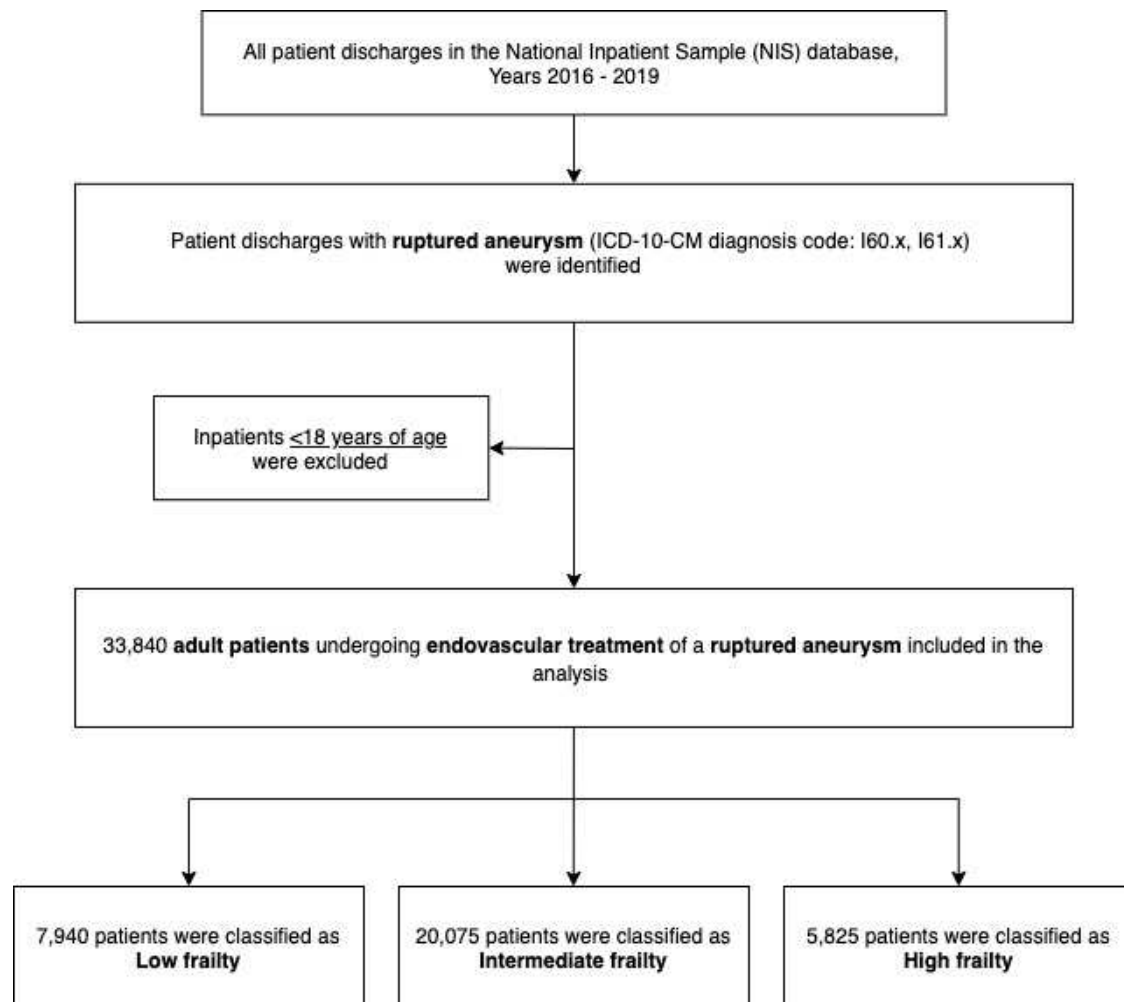


## SUPPLEMENTAL MATERIAL

Supplemental Figure 1: Flow chart showing algorithm used to identify patient cohort



**Supplemental Table 1: ICD-10-CM Diagnostic Codes**

Variable	ICD-10-CM Code
Ruptured aneurysm	I60.x, I61.x
Seizure	R56.9
Neurological deficit associated with SAH	I69.00, I69.01x, I69.03x, I69.04x, I69.05x, I69.06x, I69.09x
Coma	R40.20, R40.243, R40.244
Aphasia	R47.01, I69.02, I69.020, I69.022, I69.023, I69.028
Dysphagia	R13.1x, I69.021
Cranial nerve palsy	H49.0x, H49.1x, H49.2x, H49.3x
Diplopia	H53.2
Hypertensive chronic kidney disease	I12.x
Personal history of TIA	Z86.73
Headache	R51.x
Affective disorder	F30.x, F31.x, F32.x, F33.x, F34.x, F39, F41.x
Smoking	F17.210, F17.213, F17.290, F17.293
Current aspirin use	Z79.82
Current anticoagulant use	Z79.01
Vasospasm	I65.x, I66.x, I67.848
Hydrocephalus	G91.0, G91.1, G91.3, G91.4, G91.8, G91.9
UTI	N39.0
Post-procedural fever	R50.82
Pressure ulcer	L89.x
Sepsis	A41.x
Cardiogenic shock	R57.0
Cerebral infarction	I63.20, I63.21x, I63.22, I63.23x, I63.29, I63.50, I63.51x, I63.52x, I63.53x, I63.54x, I63.8x, I63.9, I67.82
SIADH	E22.2
Hypo-osmolar hyponatremia	E87.1
Pulmonary embolism	I26.x
Phlebitis	I80.x
Acute deep vein thrombosis	I82.210, I82.220, I82.290, I82.4x, I82.6x, I82.A1x, I82.B1x, I82.C1x, I82.890, I82.90
Periprocedural stroke	I97.8x1
Acute myocardial infarction	I21.0x, I21.1x, I21.2x, I21.3, I21.4, I21.9, I97.191, I97.711
Acute respiratory failure	J81.0, J95.2, J95.82x, J95.831, J96.0x, J96.2x
Acute kidney injury	N17.x

**Supplemental Table 2: ICD-10-PCS Procedural Codes Included**

<b>Variable</b>	<b>ICD-10-PCS Code</b>
Endovascular treatment	03VG3BZ, 03VG3DZ, 03LG3BZ, 03LG3DZ, 03VK3BZ, 03VK3DZ, 03LK3BZ, 03LK3DZ, 03VL3BZ, 03VL3DZ, 03LL3BZ, 03LL3DZ, 03VP3BZ, 03VP3DZ, 03LP3BZ, 03LP3DZ, 03VQ3BZ, 03VQ3DZ, 03LQ3BZ, 03LQ3DZ
External ventricular drain	0W9130Z, 009530Z, 009600Z, 00960ZZ, 009630Z, 009640Z, 00964ZZ
Ventriculoperitoneal shunt	00163J6, 00160J6, 0W110JG, 0016076
Central venous catheter placement	02HV33Z
Arterial monitoring	4A133B1, 4A133J1, 4A13XB1
Fluoroscopy of cerebral arteries with contrast	B313xZZ, B314xZZ, B315xZZ, B316xZZ, B317xZZ, B318xZZ, B31DxZZ, B31FxZZ, B31GxZZ
Vasospasm treatment	037Gxxx, 037Kxxx, 037Lxxx
Video-EEG monitoring	4A10X4Z
Mechanical ventilation	09HNxBZ, 0BH13xZ, 5A19xxx
Tracheostomy	0B11xF4, 0B11xZ4
Gastrostomy	0DH6xUZ

**Supplemental Table 3:** Logistic Multivariate Regression Analysis on Prolonged Length of Stay

	Univariate Model	Multivariate Model	P - Value
Frailty Risk Category			
Low	REFERENCE		
Intermediate	<b>6.08 (4.81, 7.68)</b>	<b>2.38 (1.84, 3.09)</b>	<0.001
High	<b>18.07 (14.03, 23.28)</b>	<b>4.49 (3.36, 6.00)</b>	<0.001
Age	1.00 (1.00, 1.01)	<b>0.99 (0.99, 0.99)</b>	0.038
Female sex	1.01 (0.90, 1.13)	0.91 (0.79, 1.04)	0.172
Race			
White	REFERENCE		
Black	<b>1.32 (1.15, 1.53)</b>	<b>1.35 (1.13, 1.60)</b>	<0.001
Hispanic	1.10 (0.93, 1.30)	0.99 (0.81, 1.22)	0.956
Other	1.24 (1.04, 1.50)	1.20 (0.98, 1.48)	0.082
Seizure	<b>1.46 (1.21, 1.77)</b>	<i>Removed</i>	-
Coma	<b>1.71 (1.36, 2.17)</b>	<i>Removed</i>	-
Aphasia	<b>2.45 (2.07, 2.89)</b>	<b>1.63 (1.32, 2.01)</b>	<0.001
Dysphagia	<b>5.49 (4.75, 6.34)</b>	<b>3.00 (2.55, 3.52)</b>	<0.001
Diplopia	<b>0.32 (0.18, 0.55)</b>	<b>0.45 (0.25, 0.81)</b>	0.008
Smoking	<b>0.79 (0.69, 0.91)</b>	0.85 (0.72, 1.01)	0.059
Headache	<b>0.50 (0.36, 0.71)</b>	0.72 (0.49, 1.07)	0.101
Current aspirin use	<b>0.70 (0.57, 0.85)</b>	0.82 (0.65, 1.04)	0.106
Aneurysm Location			
Anterior	REFERENCE		
Posterior	0.96 (0.83, 1.11)	1.02 (0.87, 1.20)	0.824
Unspecified	0.97 (0.85, 1.11)	1.00 (0.85, 1.17)	0.954
Number of Adverse Events			
0	REFERENCE		
1	<b>5.39 (3.42, 8.50)</b>	<b>4.20 (2.61, 6.76)</b>	<0.001
>1	<b>37.70 (24.84, 57.24)</b>	<b>19.75 (12.73, 30.65)</b>	<0.001

**Supplemental Table 4: Logistic Multivariate Regression Analysis on Increased Cost**

	Univariate Model	Multivariate Model	P - Value
Frailty Risk Category			
Low	REFERENCE		
Intermediate	<b>4.97 (3.96, 6.24)</b>	<b>2.15 (1.66, 2.77)</b>	<0.001
High	<b>11.65 (9.04, 15.01)</b>	<b>3.62 (2.71, 4.83)</b>	<0.001
Age	1.00 (0.99, 1.00)	<b>0.99 (0.98, 0.99)</b>	0.003
Female sex	0.92 (0.82, 1.04)	<b>0.86 (0.74, 0.99)</b>	0.035
Income Quartile			
0-25 <sup>th</sup>	REFERENCE		
26-50 <sup>th</sup>	1.16 (0.99, 1.37)	<b>1.24 (1.03, 1.49)</b>	0.022
51-75 <sup>th</sup>	<b>1.40 (1.19, 1.64)</b>	<b>1.22 (1.02, 1.47)</b>	0.034
76-100 <sup>th</sup>	<b>1.65 (1.39, 1.95)</b>	<b>1.48 (1.21, 1.82)</b>	<0.001
Healthcare Coverage			
Medicare	REFERENCE		
Medicaid	<b>1.33 (1.14, 1.55)</b>	<b>1.26 (1.01, 1.57)</b>	0.044
Private insurance	1.01 (0.89, 1.15)	1.15 (0.95, 1.39)	0.153
Other	<b>0.66 (0.53, 0.83)</b>	0.78 (0.59, 1.03)	0.082
Race			
White	REFERENCE		
Black	1.03 (0.89, 1.21)	1.18 (0.98, 1.42)	0.076
Hispanic	<b>1.33 (1.11, 1.58)</b>	1.04 (0.84, 1.28)	0.727
Other	<b>1.44 (1.19, 1.73)</b>	1.09 (0.87, 1.36)	0.457
Hospital Region			
Northeast	REFERENCE		
Midwest	<b>0.60 (0.48, 0.74)</b>	<b>0.53 (0.41, 0.69)</b>	<0.001
South	<b>0.53 (0.44, 0.64)</b>	<b>0.51 (0.40, 0.64)</b>	<0.001
West	<b>1.60 (1.31, 1.95)</b>	<b>1.64 (1.28, 2.09)</b>	<0.001
Seizure	<b>1.56 (1.29, 1.89)</b>	<i>Removed</i>	-
Coma	<b>2.35 (1.87, 2.97)</b>	<i>Removed</i>	-
Aphasia	<b>2.01 (1.69, 2.39)</b>	<b>1.35 (1.09, 1.66)</b>	0.005
Dysphagia	<b>3.38 (2.92, 3.91)</b>	<b>2.04 (1.72, 2.41)</b>	<0.001
Diplopia	<b>0.37 (0.22, 0.62)</b>	<b>0.55 (0.31, 0.96)</b>	0.034
Smoking	<b>0.75 (0.65, 0.86)</b>	<i>Removed</i>	-
Personal history of a transient ischemic attack	<b>0.73 (0.53, 1.01)</b>	<i>Removed</i>	-
Headache	<b>0.40 (0.27, 0.61)</b>	<b>0.51 (0.32, 0.83)</b>	0.006
Aneurysm Location			
Anterior	REFERENCE		
Posterior	0.98 (0.85, 1.13)	1.05 (0.89, 1.23)	0.587
Unspecified	1.05 (0.91, 1.21)	1.10 (0.93, 1.30)	0.254
Number of Adverse Events			
0	REFERENCE		
1	<b>3.42 (2.32, 5.03)</b>	<b>2.81 (1.87, 4.24)</b>	<0.001
>1	<b>22.32 (15.97, 31.20)</b>	<b>14.40 (9.99, 20.73)</b>	<0.001

**Supplemental Table 5:** Logistic Multivariate Regression Analysis on Non-Routine Discharge Disposition

	Univariate Model	Multivariate Model	P - Value
Frailty Risk Category			
Low	REFERENCE		
Intermediate	<b>4.83 (4.16, 5.61)</b>	<b>2.13 (1.79, 2.55)</b>	<0.001
High	<b>15.37 (12.51, 18.90)</b>	<b>4.17 (3.26, 5.33)</b>	<0.001
Age	<b>1.05 (1.04, 1.05)</b>	<b>1.04 (1.03, 1.05)</b>	<0.001
Female sex	1.08 (0.97, 1.21)	<b>0.76 (0.65, 0.88)</b>	<0.001
Income Quartile			
0-25 <sup>th</sup>	REFERENCE		
26-50 <sup>th</sup>	0.99 (0.86, 1.14)	<i>Removed</i>	-
51-75 <sup>th</sup>	1.12 (0.98, 1.29)	<i>Removed</i>	-
76-100 <sup>th</sup>	<b>1.17 (1.01, 1.35)</b>	<i>Removed</i>	-
Healthcare Coverage			
Medicare	REFERENCE		
Medicaid	<b>0.29 (0.25, 0.34)</b>	<b>0.49 (0.38, 0.63)</b>	<0.001
Private insurance	<b>0.32 (0.28, 0.36)</b>	<b>0.55 (0.45, 0.67)</b>	<0.001
Other	<b>0.16 (0.13, 0.19)</b>	<b>0.28 (0.20, 0.37)</b>	<0.001
Race			
White	REFERENCE		
Black	0.88 (0.77, 1.01)	1.06 (0.88, 1.27)	0.535
Hispanic	<b>0.72 (0.62, 0.84)</b>	<b>0.76 (0.62, 0.93)</b>	0.009
Other	0.98 (0.81, 1.18)	0.94 (0.74, 1.19)	0.592
Hospital Region			
Northeast	REFERENCE		
Midwest	0.86 (0.73, 1.01)	<b>0.76 (0.61, 0.95)</b>	0.016
South	<b>0.66 (0.57, 0.76)</b>	<b>0.59 (0.49, 0.72)</b>	<0.001
West	0.80 (0.67, 0.95)	<b>0.67 (0.53, 0.84)</b>	<0.001
Seizure	<b>1.61 (1.33, 1.96)</b>	<i>Removed</i>	-
Coma	<b>5.89 (3.96, 8.77)</b>	<b>2.57 (1.62, 4.09)</b>	<0.001
Aphasia	<b>3.03 (2.54, 3.62)</b>	<b>1.68 (1.35, 2.11)</b>	<0.001
Dysphagia	<b>8.52 (7.06, 10.28)</b>	<b>3.95 (3.20, 4.87)</b>	<0.001
Diplopia	<b>0.54 (0.31, 0.91)</b>	0.63 (0.39, 1.01)	0.057
Smoking	<b>0.65 (0.57, 0.73)</b>	<b>0.77 (0.65, 0.90)</b>	<0.001
Headache	<b>0.38 (0.29, 0.50)</b>	<b>0.50 (0.34, 0.73)</b>	<0.001
Aneurysm Location			
Anterior	REFERENCE		
Posterior	0.90 (0.79, 1.01)	0.85 (0.72, 0.99)	0.041
Unspecified	<b>1.13 (1.01, 1.28)</b>	<b>1.30 (1.11, 1.53)</b>	<0.001
Number of Adverse Events			
0	REFERENCE		
1	<b>2.06 (1.71, 2.48)</b>	<b>1.89 (1.52, 2.36)</b>	<0.001
>1	<b>9.80 (8.39, 11.45)</b>	<b>6.74 (5.55, 8.18)</b>	<0.001