

Supplementary Appendix:**Supplement to:** Global Impact of the COVID-19 Pandemic on Subarachnoid Hemorrhage.

This appendix has been provided by the authors to give readers additional information about their work.

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Table S1. Subarachnoid Hemorrhage hospitalization volumes across the world immediately before and during the COVID-19 pandemic.

	Overall volume				P	N	Monthly volume			P
	N	n1	n2	Relative (%) change			Immediately before n= 2,838	During COVID-19 n= 1,645	Difference* (95% CI)	
	% (95% CI)					Median (IQR)				
Overall	118	2,044	1,585	-22.5 (-24.3 - -20.7)	<0.0001	124	4.5 (2.5-7.1)	3.3 (1.3-6.3)	-0.88 (-1.1 - -0.58)	<0.0001
Asia	47	717	540	-24.7 (-28.0 - -21.7)	<0.0001	48	4.0 (1.8-6.3)	2.3 (1.2-6.0)	-0.79 (-1.4 - -0.08)	0.003
North America	46	762	602	-21.0 (-24.0 - -18.3)	<0.0001	49	4.5 (2.8-7.0)	3.7 (2.0-5.7)	-1.0 (-1.6 - -0.33)	<0.0001
Europe	11	224	159	-29.0 (-35.3 - -23.5)	0.001	12	6.4 (5.3-7.9)	4.7 (3.5-6.5)	-0.96 (-2.1 - 0.0)	0.019
South America	8	223	175	-21.5 (-27.4 - -16.6)	0.012	9	3.8 (2.0-14.3)	3.7 (1.3-13.0)	-1.0 (-5.8 - 0.92)	0.164
Oceania	4	55	56	1.8 (0.32 - 9.6)	0.971	4	4.4 (2.5-6.5)	4.2 (3.8-5.5)	0.54 (-1.9 - 1.5)	1.0
Africa	2	63	53	-15.9 (-26.8 - -8.9)	0.324	2	11.4 (9.5-13.3)	8.8 (8.0-9.7)	-2.5 (-5.3 - 0.17)	1.0

Abbreviations: N= number of hospitals; n= number of admissions; CI= confidence interval; IQR= interquartile range

Note: The n1 is based on 3 months before pandemic (December 2019 to February 2020). Immediately before is based on 4 months before pandemic (November 2019 to February 2020). The n2 and During COVID-19 are based on March 2020 to May 2020.

P-value is from Poisson means test (overall volume analysis) and Wilcoxon signed-rank test (monthly volume analysis)

*Difference denotes the median difference between the two time periods

Table S2. Ruptured aneurysm coil embolization volumes across the world immediately before and during the COVID-19 pandemic.

	Overall volume				P	Monthly volume				
	N	n1	n2	Relative (%) change		N	Immediately before n= 1,670	During COVID-19 n= 1,075	Difference* (95% CI)	P
	% (95% CI)					Median (IQR)				
Overall	125	1,170	1,035	-11.5 (-13.5 - -9.8)	0.002	133	1.8 (1.0-4.0)	1.7 (0.67-3.3)	-0.25 (-0.58 - -0.08)	0.0004
Asia	52	357	284	-20.5 (-24.9 - -16.6)	0.003	54	1.5 (1.0-2.8)	1.0 (0.33-2.0)	-0.42 (-0.83 - 0.0)	0.007
North America	43	340	306	-10.0 (-13.7 - -7.2)	0.140	45	1.8 (1.3-3.8)	2.0 (1.0-3.0)	-0.17 (-0.75 - 0.08)	0.081
Europe	14	242	205	-15.3 (-20.4 - -11.3)	0.062	17	4.5 (1.8-7.5)	3.0 (2.0-5.7)	-0.67 (-1.5 - 0.0)	0.085
South America	9	141	145	2.8 (1.1 - 7.1)	0.886	10	2.8 (0.75-9.5)	3.3 (0.33-9.3)	-0.25 (-1.9 - 2.2)	0.414
Oceania	4	18	32	77.8 (54.8 - 91.0)	0.055	4	1.1 (0.63-2.5)	2.7 (2.2-3.2)	1.4 (-0.17 - 1.8)	0.250
Africa	3	72	63	-12.5 (-22.1 - -6.7)	0.402	3	9.5 (4.8-12.0)	9.7 (1.7-9.7)	-2.3 (-3.1 - 0.17)	0.50

Abbreviations: N= number of hospitals; n= number of procedures; CI= confidence interval; IQR= interquartile range

Note: The n1 is based on 3 months before pandemic (December 2019 to February 2020). Immediately before is based on 4 months before pandemic (November 2019 to February 2020). The n2 and During COVID-19 are based on March 2020 to May 2020.

P-value is from Poisson means test (overall volume analysis) and Wilcoxon signed-rank test (monthly volume analysis)

*Difference denotes the median difference between the two time periods

Table S3. Country-specific relative changes in Subarachnoid Hemorrhage admissions and Coil embolization procedures over the COVID-19 Pandemic.

Continent	Country	Subarachnoid Hemorrhage admissions				SAH Coil embolization procedures			
		N	n1	n2	Relative (%) change % (95% CI)	N	n1	n2	Relative (%) change % (95% CI)
Asia	Japan	29	294	208	-29.3 (-34.7 - -24.3)	29	120	98	-18.3 (-26.2 - -12.4)
	China	2	26	33	+26.9 (13.7 - 46.1)	6	16	20	+25.0 (10.2 - 49.5)
	South Korea	3	55	76	+38.2 (26.5 - 51.4)	3	30	41	+36.7 (21.9 - 54.5)
	India	3	43	15	-65.1 (-77.6 - -50.2)	3	24	6	-75.0 (-88.0 - -55.1)
	Vietnam	N/A				1	26	25	-3.9 (-18.9 - -0.68)
	Saudi Arabia	1	8	1	-87.5 (-97.8 - -52.9)	1	6	3	-50.0 (-81.2 - -18.8)
	Turkey	2	44	30	-31.8 (-46.6 - -20.0)	2	16	6	-62.5 (-81.5 - -38.6)
	Indonesia	1	20	9	-55.0 (-74.2 - -34.2)	1	8	2	-75.0 (-92.9 - -40.9)
	Israel	N/A				1	10	11	+10.0 (1.8 - 40.4)
	Oman	1	16	10	-37.5 (-61.4 - -18.5)	1	3	5	+66.7 (20.8 - 93.9)
	Pakistan	1	81	61	-24.7 (-35.1 - -16.6)	1	53	38	-28.3 (-41.6 - -18.0)
	Qatar	1	72	42	-41.7 (-53.2 - -31.0)	N/A			
	Thailand	1	14	18	+28.6 (11.7 - 54.7)	1	5	8	+60.0 (23.1 - 88.2)
	United Arab Emirates	1	31	33	+6.5 (1.8 - 20.7)	1	30	18	-40.0 (-57.7 - -24.6)
	Lebanon	1	13	4	-69.2 (-87.3 - -42.4)	1	10	3	-70.0 (-89.2 - -39.7)
North America	United States	41	681	532	-21.9 (-25.1 - -18.9)	38	290	259	-10.7 (-14.8 - -7.6)
	Canada	5	81	70	-13.6 (-22.7 - -7.8)	5	50	47	-6.0 (-16.2 - -2.1)
Europe	France	2	39	30	-23.1 (-38.3 - -12.7)	4	94	64	-31.9 (-41.9 - -23.4)
	Switzerland	2	35	16	-54.3 (-69.5 - -38.2)	2	9	6	-33.3 (-64.6 - -12.1)
	Spain	1	27	9	-66.7 (-81.4 - -47.8)	1	5	2	-60.0 (-88.2 - -23.1)
	Germany	1	17	12	-29.4 (-53.1 - -13.3)	1	10	8	-20.0 (-51.0 - -5.7)
	Austria	1	18	13	-27.8 (-50.9 - -12.5)	N/A			
	Greece	1	2	2	0.0 (0.0 - 65.8)	N/A			
	Ireland	1	44	38	-13.6 (-26.7 - -6)	1	33	28	-15.2 (-30.9 - -6.7)
	Italy	1	18	18	0.0 (0.0 - 17.6)	1	17	14	-17.7 (-41.0 - -6.2)
Portugal	1	24	21	-12.5 (-31.0 - -4.3)	1	5	8	+60.0 (23.1 - 88.2)	

Table S3. Country-specific relative changes in Subarachnoid Hemorrhage admissions and Coil embolization procedures over the COVID-19 Pandemic continued.

Continent	Country	Subarachnoid Hemorrhage admissions				Coil embolization procedures			
		N	n1	n2	Relative (%) change	N	n1	n2	Relative (%) change
		% (95% CI)				% (95% CI)			
Europe (continued)	England	N/A				2	41	56	+36.6 (23.6 – 51.9)
	Croatia	N/A				1	28	19	-32.1 (-50.7 - -17.9)
South America	Brazil	6	160	120	-25.0 (-32.2 - -18.9)	6	74	74	0.0 (0.0 - 4.9)
	Chile	1	3	1	-66.7 (-93.9 - -20.8)	1	1	0	-100 (-100 - -20.7)
	Argentina	1	60	54	-10.0 (-20.2 - -4.7)	1	56	51	-8.9 (-19.3 - -3.9)
	Uruguay	N/A				1	10	20	+100 (72.3 - 100)
Oceania	Australia	3	47	45	-4.3 (-14.3 - -1.2)	3	14	23	+64.3 (38.8 – 83.7)
	New Zealand	1	8	11	+37.5 (13.7 - 69.4)	1	4	9	+125 (NaN)
Africa	Egypt	1	42	24	-42.9 (-57.8 - -29.1)	1	15	5	-66.7 (-84.8 - -41.7)
	Tunisia	1	21	29	38.1 (20.8 - 59.1)	1	21	29	38.1 (20.8 - 59.1)
	South Africa	N/A				1	36	29	-19.4 (-35.0 - -9.8)
Total	37	118	2,044	1,585	-22.5 (-24.3 - -20.7)	125	1,170	1,035	-11.5 (-13.5 - -9.8)

Abbreviations: N= number of hospitals; n= number of procedures/admissions; CI= confidence interval; N/A= not available;

NaN = confidence interval could not be computed

Note: The n1 is based on 3 months before pandemic (December 2019 to February 2020). The n2 is based on March 2020 to May 2020.

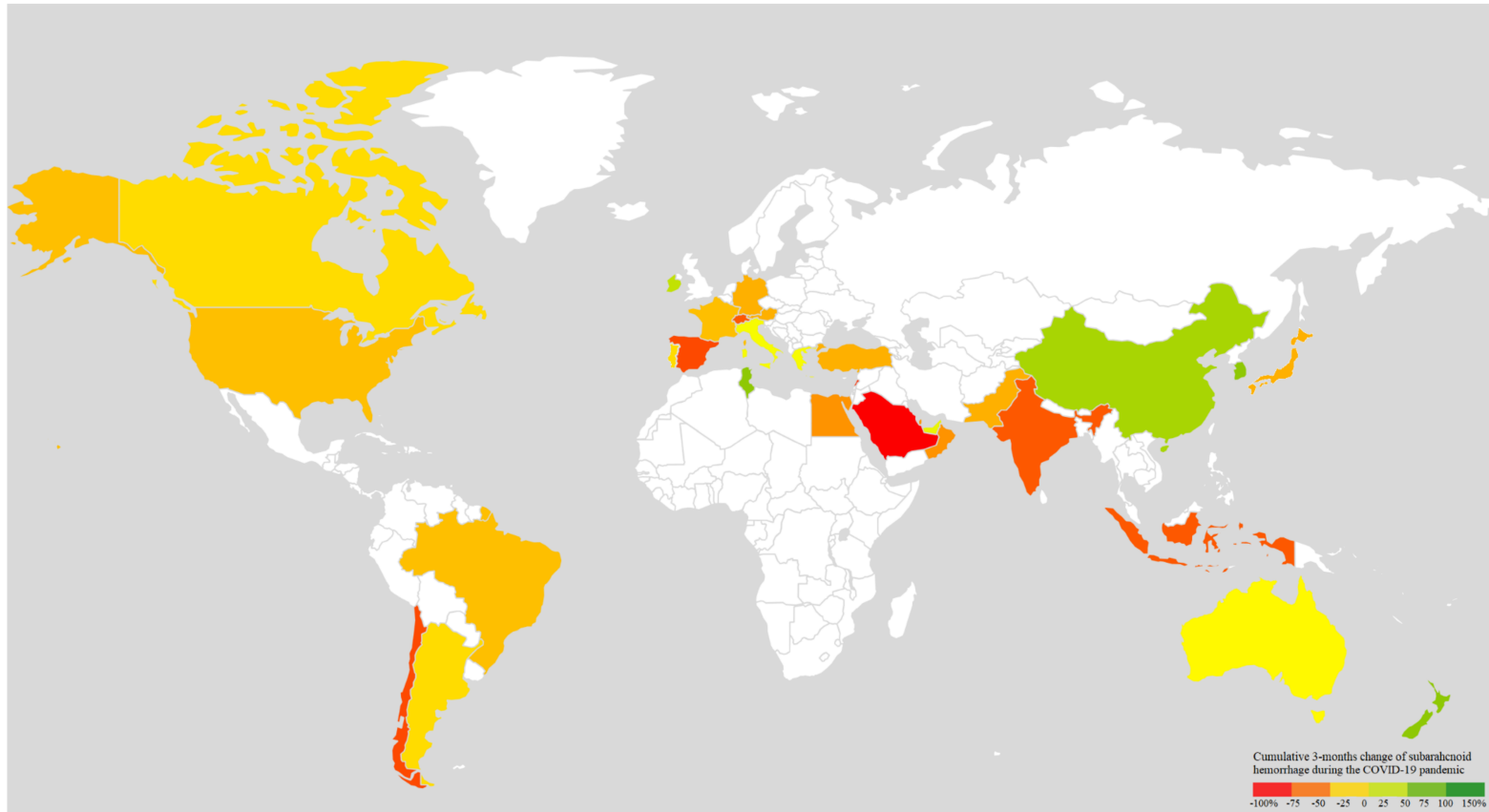


Figure S1. Cumulative 3-Month Percentage Changes in SAH Hospitalizations Over the COVID-19 Pandemic

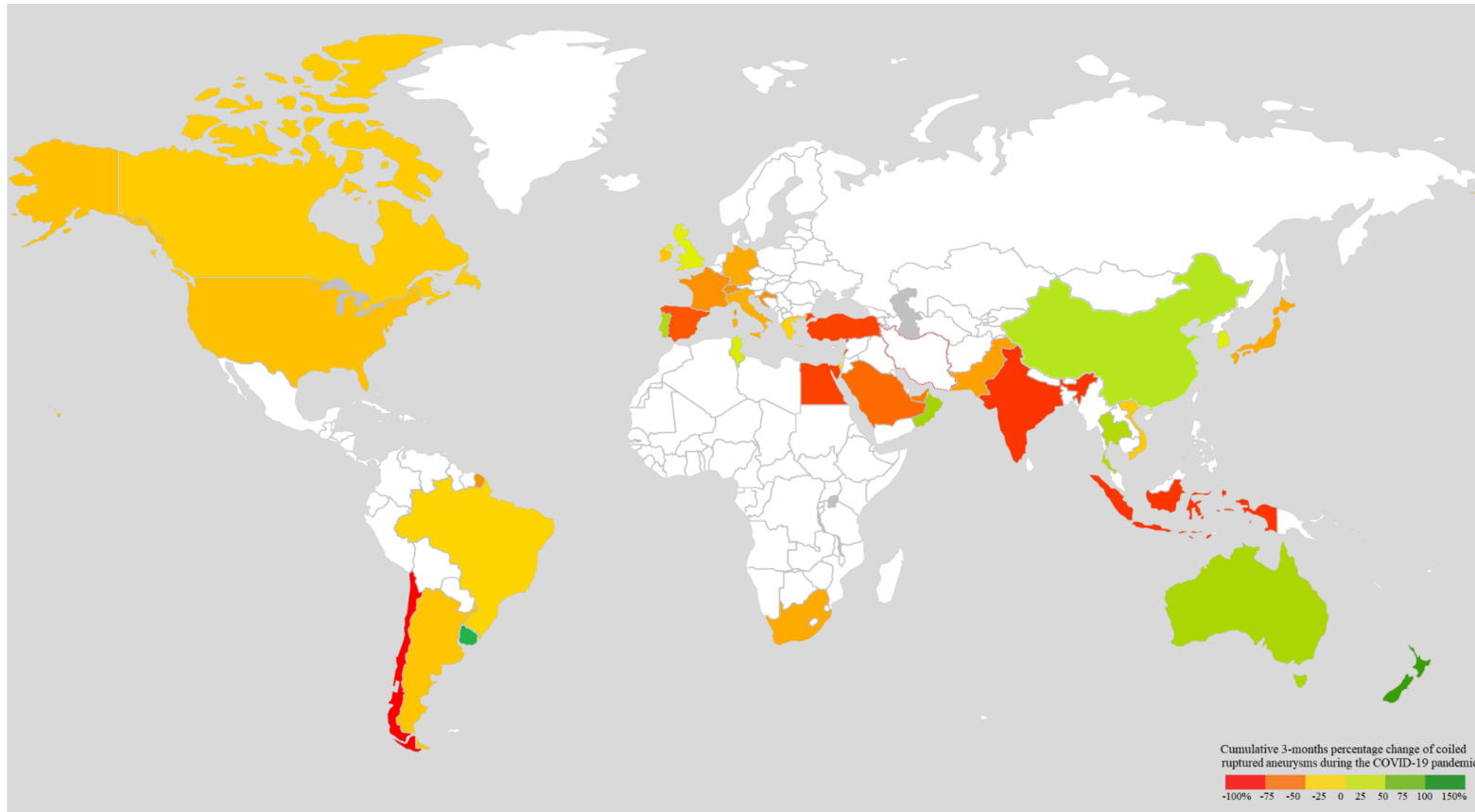


Figure S2: Cumulative 3-Month Percentage Changes in Ruptured Aneurysm Embolization Volumes Over the COVID-19 Pandemic