No ‘Season’ for Strokes

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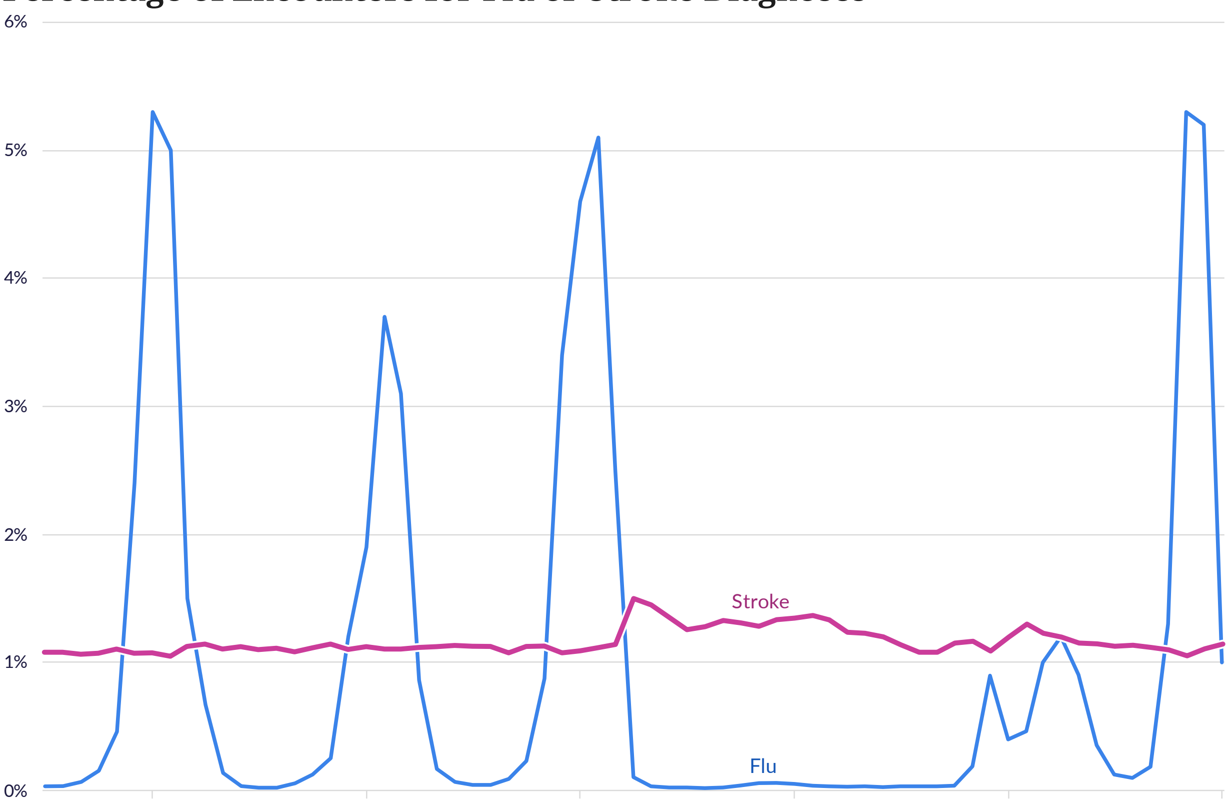
Key Finding:

- Our data show no evidence of a seasonal increase in stroke diagnoses following flu season.

Previous studies have shown that patients can have an elevated risk of stroke after a hospital admission or emergency department (ED) visit for influenza-like illness.[1,2] Some have suggested that this increased risk may cause a “stroke season” in the three to four weeks following flu season, which typically extends from October to March each year in the United States.[3]

To evaluate this claim, we analyzed 149 million hospital admissions and emergency department visits for influenza and stroke from July 2017 through January 2023. We found that while admissions and ED visits for influenza have a clear seasonal trend, the incidence of stroke remains consistent throughout the year, with no evidence of a “stroke season” following influenza season, as shown in Figure 1.

Percentage of Encounters for Flu or Stroke Diagnoses



“Percentage of Encounters with Flu or Stroke Diagnoses,” 2022. EpicResearch.or

Figure 1. Monthly influenza and stroke hospital admissions and ED visits as a percentage of total hospital admissions and ED visits over time. The slight increase in the percentage of hospital admissions and ED visits for stroke in early 2020 aligns with the period when there were fewer non-COVID hospitalizations and ED visits overall due to the pandemic.

These data come from Cosmos, a HIPAA-defined Limited Data Set of more than 180 million patients from 190 Epic organizations including 1,123 hospitals and more than 22,500 clinics, serving patients in all 50 states and Lebanon. This study was completed by two teams that worked independently, each composed of a clinician and data scientists. The two teams came to similar conclusions.

References

1. Boehme AK, Luna J, Kulick ER, Kamel H, Elkind MSV. Influenza-like illness as a trigger for ischemic stroke. Ann Clin Transl Neurol. 2018;5(4):456-463. Published 2018 Mar 14. doi:10.1002/acn3.545
2. Kulick ER, Alvord T, Canning M, Elkind MSV, Chang BP, Boehme AK. Risk of stroke and myocardial infarction after influenza-like illness in New York State. BMC Public Health. 2021;21(1):864. Published 2021 May 5. doi:10.1186/s12889-021-10916-4
3. Mackinnon J. Doctor tells Canadian State Media That After Flu Season Comes 'Stroke Season.' Blaze Media. https://www.theblaze.com/news/doctor-tells-canadian-state-media-that-after-flu-season-comes-stroke-season Published 2023 Jan 21. Accessed on 2023 Mar 1.

Data Definitions

Term	Definition
Stroke encounter	An admission, emergency to inpatient, or emergency encounter with a clinical diagnosis mapped to any of the following ICD-10-CM codes: • I60* • I61.* • I63.* • I67.*
Influenza encounter	An admission, emergency to inpatient, or emergency encounter with a clinical diagnosis mapped to any of the following ICD-10-CM codes: • J09.* • J10.* • J11.*

Table 1: Percentage of Patients with Flu or Stroke Encounters

Month	Percentage with Stroke Diagnosis (Clinical) (%)	Percentage with Flu Diagnosis (Clinical) (%)	All Encounters	Stroke Encounters	Flu Encounters
7/1/2017	1.0802%	0.0310%	1,640,563	17,721	509
8/1/2017	1.0794%	0.0340%	1,675,495	18,086	570
9/1/2017	1.0638%	0.0660%	1,666,523	17,729	1,100
10/1/2017	1.0720%	0.1540%	1,735,082	18,600	2,672
11/1/2017	1.1044%	0.4580%	1,726,898	19,072	7,909
12/1/2017	1.0722%	2.4000%	1,821,414	19,529	43,714
1/1/2018	1.0748%	5.3000%	1,932,189	20,767	102,406
2/1/2018	1.0488%	5.0000%	1,775,252	18,618	88,763

3/1/2018	1.1250%	1.5000%	1,917,277	21,570	28,759
4/1/2018	1.1441%	0.6690%	1,887,998	21,600	12,631
5/1/2018	1.1047%	0.1360%	2,030,104	22,427	2,761
6/1/2018	1.1232%	0.0340%	1,940,365	21,794	660
7/1/2018	1.1003%	0.0210%	2,022,788	22,256	425
8/1/2018	1.1107%	0.0210%	2,044,653	22,710	429
9/1/2018	1.0824%	0.0550%	2,034,182	22,019	1,119
10/1/2018	1.1144%	0.1230%	2,088,965	23,280	2,569
11/1/2018	1.1436%	0.2520%	1,980,733	22,651	4,991
12/1/2018	1.1012%	1.2000%	2,118,861	23,333	25,426
1/1/2019	1.1225%	1.9000%	2,112,699	23,714	40,141
2/1/2019	1.1050%	3.7000%	1,987,605	21,963	73,541
3/1/2019	1.1043%	3.1000%	2,224,531	24,565	68,960
4/1/2019	1.1168%	0.8600%	2,124,731	23,728	18,273
5/1/2019	1.1228%	0.1680%	2,202,469	24,729	3,700
6/1/2019	1.1325%	0.0660%	2,097,066	23,749	1,384
7/1/2019	1.1261%	0.0430%	2,212,762	24,918	951
8/1/2019	1.1247%	0.0430%	2,225,005	25,025	957
9/1/2019	1.0746%	0.0900%	2,284,568	24,551	2,056
10/1/2019	1.1253%	0.2290%	2,324,140	26,154	5,322
11/1/2019	1.1280%	0.8730%	2,225,926	25,108	19,432
12/1/2019	1.0745%	3.4000%	2,427,599	26,085	82,538
1/1/2020	1.0906%	4.6000%	2,456,276	26,788	112,989
2/1/2020	1.1148%	5.1000%	2,310,996	25,763	117,861
3/1/2020	1.1406%	2.5000%	2,048,018	23,360	51,200
4/1/2020	1.4991%	0.1030%	1,341,278	20,107	1,382
5/1/2020	1.4481%	0.0320%	1,640,146	23,751	525
6/1/2020	1.3510%	0.0220%	1,888,772	25,517	416
7/1/2020	1.2556%	0.0220%	2,090,895	26,253	460
8/1/2020	1.2791%	0.0170%	2,059,921	26,349	350
9/1/2020	1.3270%	0.0230%	2,016,266	26,756	464
10/1/2020	1.3079%	0.0380%	2,124,214	27,782	807
11/1/2020	1.2827%	0.0560%	2,080,229	26,683	1,165
12/1/2020	1.3339%	0.0590%	2,056,270	27,429	1,213
1/1/2021	1.3458%	0.0510%	2,065,024	27,791	1,053
2/1/2021	1.3657%	0.0360%	1,852,626	25,302	667
3/1/2021	1.3317%	0.0310%	2,229,393	29,688	691
4/1/2021	1.2347%	0.0280%	2,327,135	28,733	652
5/1/2021	1.2275%	0.0320%	2,445,829	30,022	783
6/1/2021	1.1998%	0.0250%	2,485,841	29,826	621
7/1/2021	1.1371%	0.0310%	2,655,918	30,201	823

8/1/2021	1.0798%	0.0310%	2,738,285	29,568	849
9/1/2021	1.0788%	0.0320%	2,601,444	28,064	832
10/1/2021	1.1512%	0.0360%	2,578,085	29,679	928
11/1/2021	1.1648%	0.1880%	2,511,796	29,257	4,722
12/1/2021	1.0884%	0.8970%	2,749,841	29,930	24,666
1/1/2022	1.1978%	0.3980%	2,525,056	30,245	10,050
2/1/2022	1.2984%	0.4610%	2,140,637	27,795	9,868
3/1/2022	1.2273%	1.0000%	2,591,044	31,801	25,910
4/1/2022	1.1979%	1.2000%	2,605,620	31,213	31,267
5/1/2022	1.1515%	0.9030%	2,854,951	32,876	25,780
6/1/2022	1.1450%	0.3530%	2,741,930	31,394	9,679
7/1/2022	1.1260%	0.1230%	2,849,275	32,082	3,505
8/1/2022	1.1341%	0.0970%	2,908,021	32,981	2,821
9/1/2022	1.1164%	0.1840%	2,815,119	31,427	5,180
10/1/2022	1.0986%	1.3000%	2,891,716	31,767	37,592
11/1/2022	1.0517%	5.3000%	2,887,624	30,369	153,044
12/1/2022	1.1062%	5.2000%	2,795,590	30,925	145,371
1/1/2023	1.1438%	1.0000%	2,631,584	30,099	26,316