



KANSAS INITIATIVE FOR  
STROKE SURVIVAL  
A PROJECT BY AND FOR KANSANS

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# COVID-19, Stroke, and Other Neurological Complications

“First Tuesdays” Lecture Series  
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# Introduction and Goal of “First Tuesdays”

- Didactic lecture series as part of the Kansas Initiative for Stroke Survival (KISS)
- Updates in Practice and FAQ's on Acute Stroke Care
- 20 minute didactic, 10 minutes for questions/discussion

# Studies on COVID-19 patients and chronic conditions

- History of cerebrovascular diseases appears to be associated with more severe disease/mortality in COVID-19

Age, years	
Mean (SD)	55.5 (13.1)
Range	21–82
≤39	10 (10%)
40–49	22 (22%)
50–59	30 (30%)
60–69	22 (22%)
≥70	15 (15%)
Sex	
Female	32 (32%)
Male	67 (68%)
Occupation	
Agricultural worker	2 (2%)
Self-employed	63 (64%)
Employee	15 (15%)
Retired	19 (19%)
Exposure to Huanan seafood market*	
Long-term exposure history	47 (47%)
Short-term exposure history	2 (2%)
Chronic medical illness	
Cardiovascular and cerebrovascular diseases	40 (40%)
Digestive system disease	11 (11%)
Endocrine system disease†	13 (13%)
Malignant tumour	1 (1%)
Nervous system disease	1 (1%)
Respiratory system disease	1 (1%)
Admission to intensive care unit	
Clinical outcome	
Remained in hospital	57 (58%)
Discharged	31 (31%)
Died	11 (11%)

Data are n (%) unless specified otherwise. 2019-nCoV=2019 novel coronavirus.

\*Long-term exposure is having worked at or lived in or around Huanan seafood market, whereas short-term exposure is having been to Huanan seafood market occasionally. †12 were diabetic.

**Table 1: Demographics, baseline characteristics, and clinical outcomes of 99 patients admitted to Wuhan Jinyintan Hospital (Jan 1–20, 2020) with 2019-nCoV pneumonia**

Chen et al, *Lancet* 2020

**Table 1. Baseline Characteristics of Patients Infected With 2019-nCoV**

	No. (%)			P Value <sup>a</sup>
	Total (N = 138)	ICU (n = 36)	Non-ICU (n = 102)	
Age, median (IQR), y	56 (42-68)	66 (57-78)	51 (37-62)	<.001
Sex				
Female	63 (45.7)	14 (38.9)	49 (48.0)	.34
Male	75 (54.3)	22 (61.1)	53 (52.0)	
Huanan Seafood Wholesale Market exposure	12 (8.7)	5 (13.9)	7 (6.9)	.30
Infected				
Hospitalized patients	17 (12.3)	9 (25.0)	8 (7.8)	.02
Medical staff	40 (29)	1 (2.8)	39 (38.2)	<.001
Comorbidities	64 (46.4)	26 (72.2)	38 (37.3)	<.001
Hypertension	43 (31.2)	21 (58.3)	22 (21.6)	<.001
Cardiovascular disease	20 (14.5)	9 (25.0)	11 (10.8)	.04
Diabetes	14 (10.1)	8 (22.2)	6 (5.9)	.009
Malignancy	10 (7.2)	4 (11.1)	6 (5.9)	.29
Cerebrovascular disease	7 (5.1)	6 (16.7)	1 (1.0)	.001
COPD	4 (2.9)	3 (8.3)	1 (1.0)	.054
Chronic kidney disease	4 (2.9)	2 (5.6)	2 (2.0)	.28
Chronic liver disease	4 (2.9)	0	4 (3.9)	.57
HIV infection	2 (1.4)	0	2 (2.0)	>.99

	Survivors (n=20)	Non-survivors (n=32)	All patients (n=52)
Age, years	51.9 (12.9)	64.6 (11.2)	59.7 (13.3)
Age range, years			
30-39	6 (30%)	0	6 (11.5%)
40-49	3 (15%)	3 (9%)	6 (11.5%)
50-59	4 (20%)	9 (28%)	13 (25%)
60-69	6 (30%)	11 (34%)	17 (33%)
70-79	1 (5%)	7 (22%)	8 (15%)
≥80	0	2 (6%)	2 (4%)
Sex			
Female	6 (30%)	11 (34%)	17 (33%)
Male	14 (70%)	21 (66%)	35 (67%)
Exposure			
Exposure to Huanan seafood market	9 (45%)	8 (25%)	17 (33%)
Exposure to patients*	2 (10%)	8 (25%)	10 (19%)
Chronic medical illness			
Chronic cardiac disease	2 (10%)	3 (9%)	5 (10%)
Chronic pulmonary disease	2 (10%)	2 (6%)	4 (8%)
Cerebrovascular disease	0	7 (22%)	7 (13.5%)
Diabetes	2 (10%)	7 (22%)	9 (17%)
Malignancy	1 (5%)	1 (3%)	2 (4%)
Dementia	0	1 (3%)	1 (2%)
Malnutrition	0	1 (3%)	1 (2%)
Smoking	2 (10%)	0	2 (4%)

Data are n (%) or mean (SD), unless otherwise specified. SARS-CoV-2=severe acute respiratory syndrome coronavirus 2. \*Patients who have confirmed SARS-CoV-2 infection or are highly suspected of being infected.

**Table 1: Demographics and baseline characteristics of patients with severe SARS-CoV-2 pneumonia**

Yang et al, *Lancet* 2020



# Interpretation of observational studies

- No multivariate analysis controlling for age – patients with stroke are likely older. Older populations also have more severe disease/mortality.
- Patients with stroke may be at higher risk of developing severe disease and mortality.

# Anosmia

- In Germany, > 66% of cases with confirmed COVID-19 have developed anosmia/hyposmia
- In South Korea, with one of the most widespread testing, 30% of patients with otherwise mild cases has anosmia as a presenting symptom



# Neurological complications of COVID-19

- 56 yo M with COVID-19 positive had symptoms of decreased level of consciousness, was found to have virus in his spinal fluid<sup>1</sup>
- Late 50's F airline worker with COVID-19 positive had altered mental status, developed acute necrotizing encephalopathy<sup>2</sup>
- Cytokine storm can lead to breakdown in blood-brain-barrier<sup>2</sup>
- CNS has ACE2 receptors similar to the lung, which the virus uses as entry to cells<sup>3</sup>

1. [http://www.xinhuanet.com/english/2020-03/05/c\\_138846529.htm](http://www.xinhuanet.com/english/2020-03/05/c_138846529.htm)

2. Poyiadji et al, *Radiology* 2020

3. Baig et al, *ACS Chem Neurosci* 2020

# Neurological complications of COVID-19

- One study showing 36.4% of 214 hospitalized patients had neurological symptoms.
- Most common were dizziness (16.8%), headache (13.1%), impaired consciousness (7.5%), loss of taste (5.6%), and loss of smell (5.1%).
- 6 patients (2.8%) also had concurrent acute stroke. Out of severe group of 88 patients, 5 (5.7%) had acute stroke.

# Protected Code Stroke

+ Positive Screen for COVID-19



**Pre-notification screening: communication with paramedics or sending facility prior to arrival - Positive infection screen:**

patient is exhibiting or has close contacts with infectious symptoms and/or travel history



**Unclear or unable to obtain history:** patient is obtunded or not able to communicate. History or exam features suggestive of an alternate diagnosis

## INSIDE Room



MD1



RN1



Mask  
On Patient



RN2/RT  
(Optional)

DO NOT use stethoscope (contamination)

## OUTSIDE Room



MD2



Safety  
Lead

- Safety Lead to monitor PPE
- All charting OUTSIDE ROOM



**EXPERIENCED STAFF — MD1 (ATTENDING OR SR. TRAINEE)**

### Required PPE (use donning/doffing checklist):

1. Full-sleeve gown
2. Surgical Mask
3. +/- Head covering (optional)
4. Face Shield
5. Gloves



### Intubate EARLY for increasing O<sub>2</sub> requirements

Airway management for deteriorating patients OR increasing oxygen requirements  $FiO_2 > 0.5$  - Preoxygenate with facemask, with filter, BVM WITHOUT MANUAL VENTILATIONS. AVOID BiPAP, CPAP, Nasal High Flow Therapy

# Suggested guidelines of COVID-19 and Stroke Intervention

- No alteration of guidelines for IV tPA and thrombectomy selection.
- Maximum PPE for aerosolizing procedures, including intubation, extubation, suction, bag-valve-mask ventilation, and CPR.
- Patients with dominant hemisphere LVO, very high NIHSS or low GCS, or posterior circulation occlusion should be considered for prophylactic intubation prior to EVT.

# Conclusions

- Patients with history of stroke and acute COVID-19 appear to have an increased risk of hospitalization, ICU needs, and mortality.
- Be aware of other atypical neuro symptoms in cases, including dizziness, headache, anosmia.
- Need extra precautions during stroke interventions in all patients.



# Questions?

- Call for help anytime!
- <http://www.kissnetwork.us/>
- email at [sslavin2@kumc.edu](mailto:sslavin2@kumc.edu)