



# 30<sup>th</sup> IUA World Congress 2022

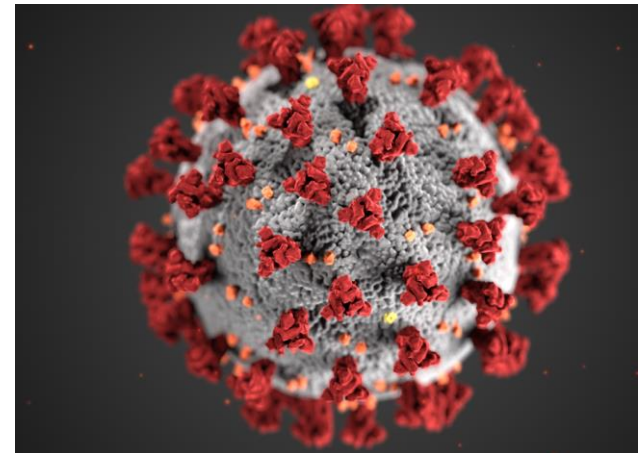
## Covid-19 and Stroke

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# What is COVID-19?



- At the end of 2019, a novel coronavirus was identified as the cause of a cluster of pneumonia cases in Wuhan China
- In February 2020, the World Health Organization designated the disease COVID-19, which stands for coronavirus disease 2019
- The virus that causes COVID-19 is designated severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)



# What is COVID-19? (cont'd)



- COVID-19 is mainly recognized as a viral pneumonia, with a dry cough, high fever, shortness of breath and loss of taste and smell as its characteristic features.
- However, COVID-19 is not just a respiratory disease and can affect other organs, including the brain causing stroke.



# What is stroke?



- The term stroke is used to describe a variety of conditions in which blood flow to part or all of the brain is reduced, resulting in tissue damage.
- Ischemic stroke: A blood clot is obstructing the flow of blood.
- Hemorrhagic Stroke: The blood vessel ruptures.

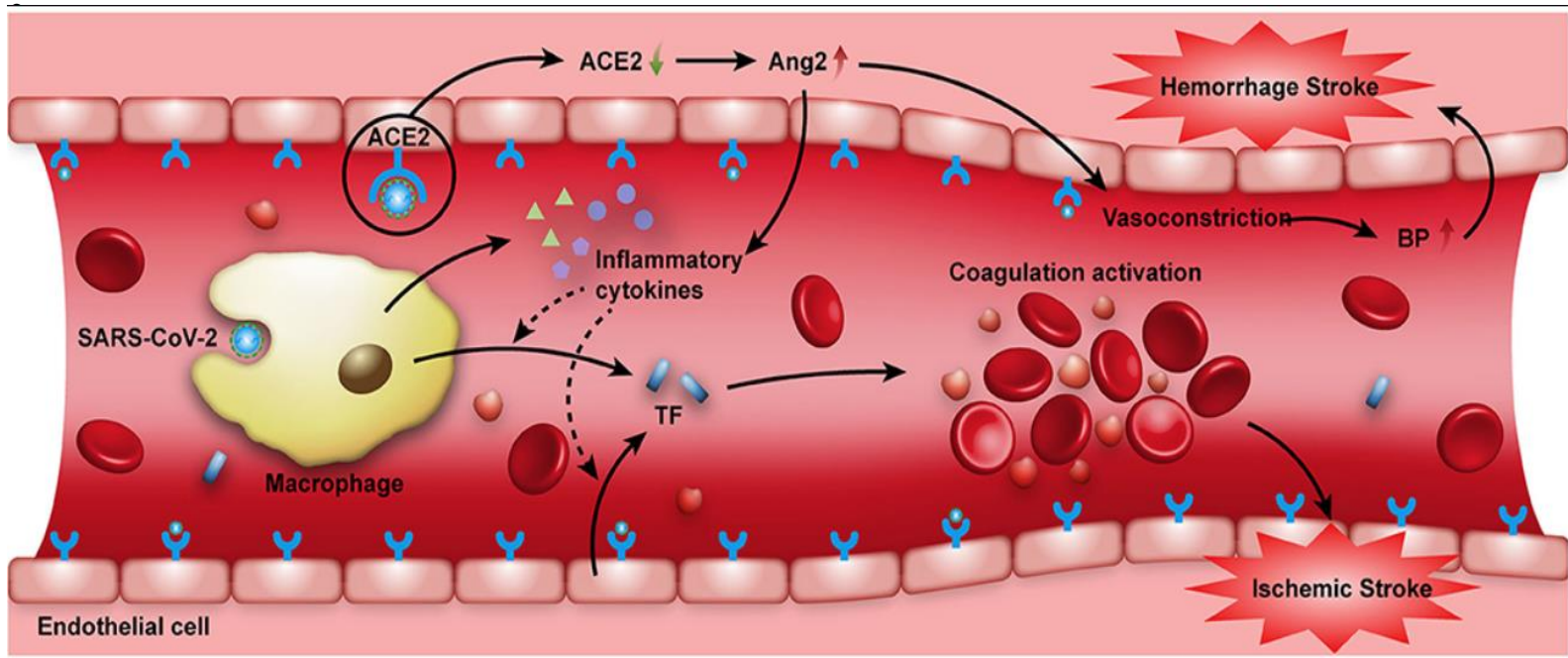


# Mechanism of stroke in Covid-19 Patients



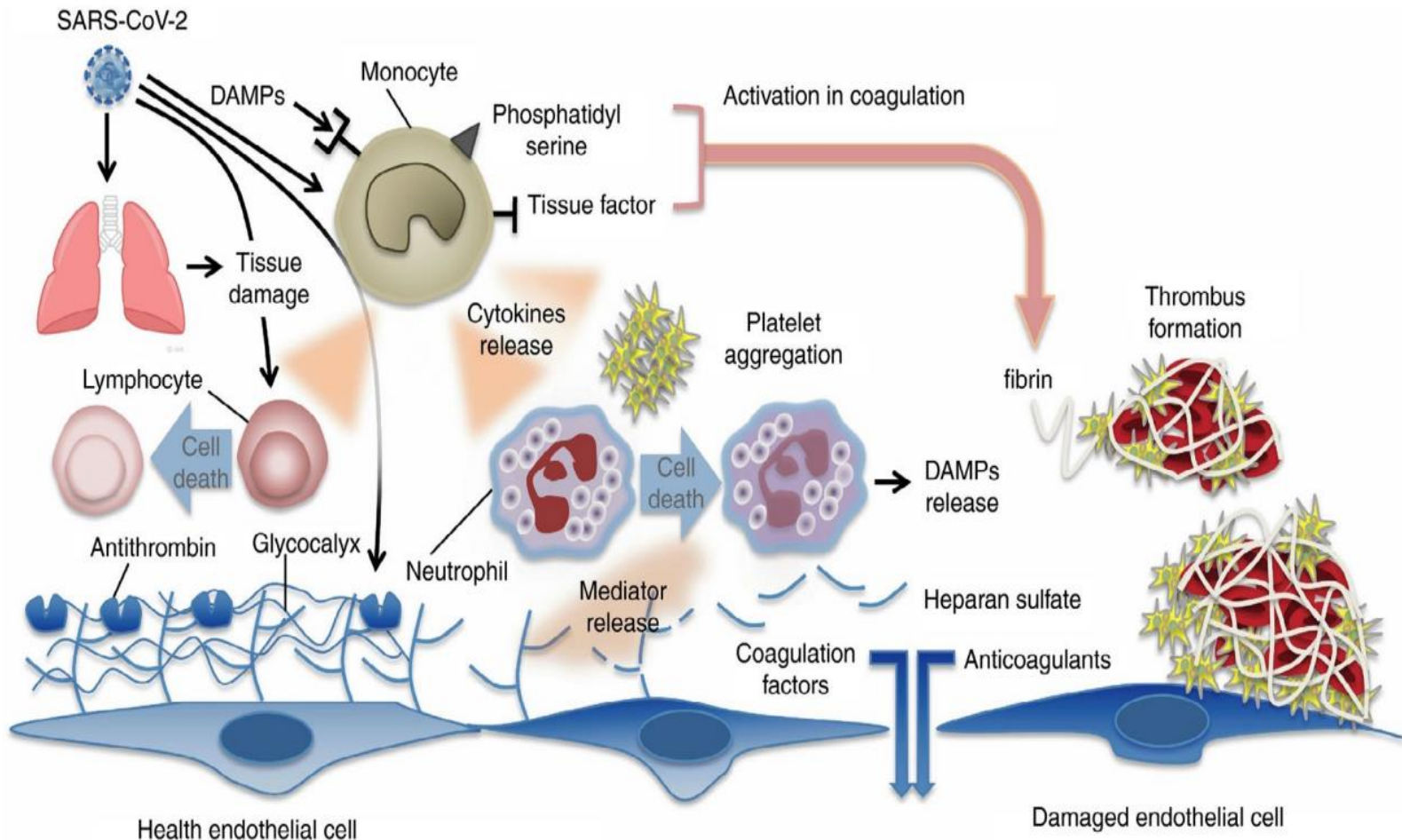
- COVID-19 may provoke the onset of an ischemic stroke through a variety of thrombotic and inflammatory mechanisms
- The hyper-reactive immune response leads to an exaggerated inflammatory reaction in COVID-19 patients.
- The hyperinflammatory state is called “cytokine storm” or “cytokine release syndrome (CRS)”

# Mechanism of Stroke in Covid-19 patients (cont'd)





# Mechanism of stroke in Covid-19 patients (cont'd)



# Mechanism of stroke in Covid-19 patients (cont'd)



- A shutdown and impairment of the fibrinolytic system, which degrades and removes clots in the bloodstream, have been reported in Covid-19 patients.
- The clots can thus become stuck in the blood vessel and restrict the flow of blood to the brain, causing a stroke.



# Risk Factors for Stroke



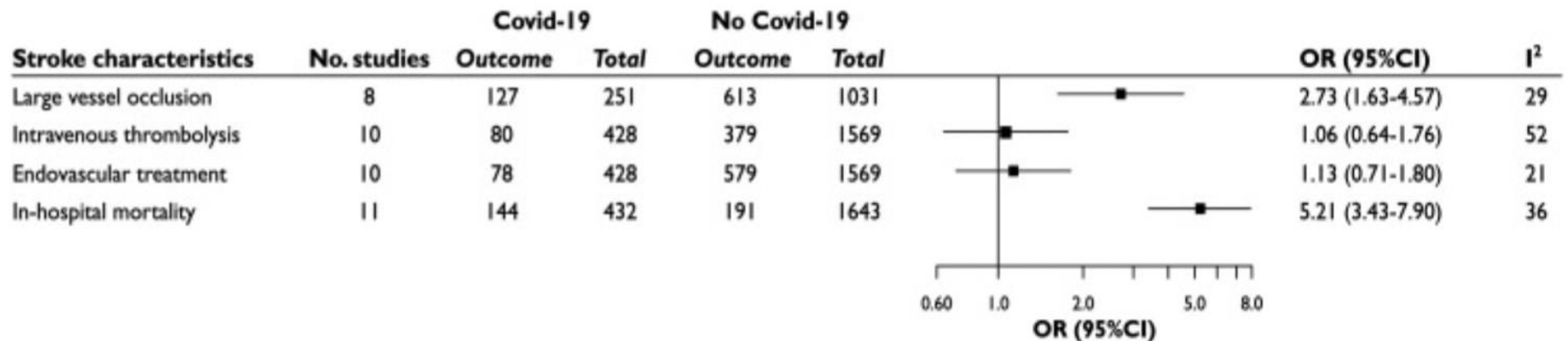
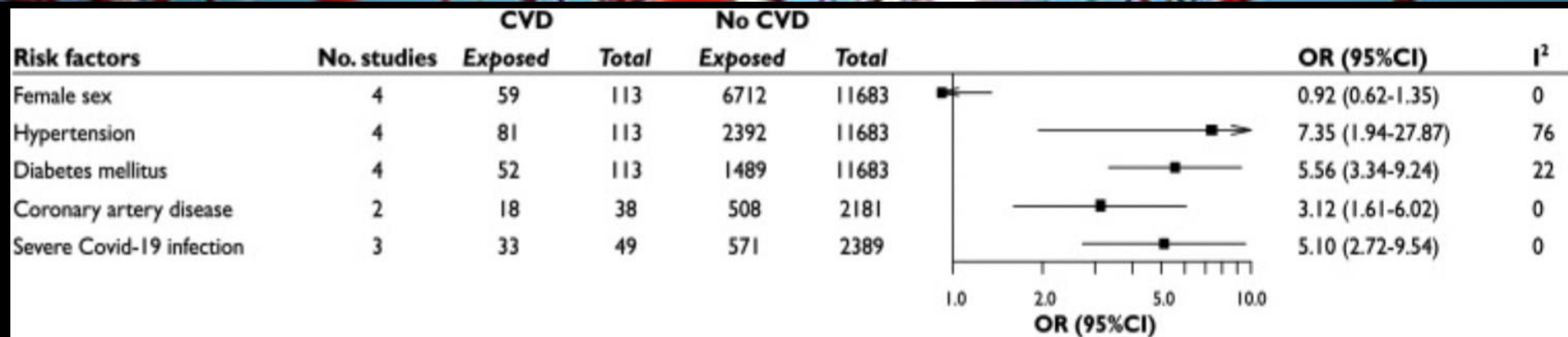
Major stroke risk factors include:

- Diabetes
- Heart disease
- High blood pressure
- Hyperlipidemia
- Obesity
- Brain aneurysms or arteriovenous malformations
- Certain medical conditions like sickle cell disease, vasculitis and other bleeding disorders

Other risk factors for stroke are:

- Lack of physical activity
- Smoking
- Alcohol and illegal drug use

# Risk Factors for Acute CVD in patients with COVID-19



# Characteristics of COVID-19 Patients Developing Stroke



- Risk of stroke is more than twice as high for COVID-19 patients as compared to non COVID-19 patients
- Risk of stroke may vary according to the severity of COVID-19.
  - Patients with mild illness: risk <1 percent
  - Patients in intensive care: risk as high as 6 percent
- Strokes may occur several weeks after a COVID-19 diagnosis



# Characteristics of COVID-19 Patients Developing Stroke



- Although stroke is usually seen in older population, in patients with COVID19, even the younger patients developed stroke as a complication. One study showed a greater risk of stroke in 65-74 year olds than in patients ages 85 and older
- In older patients, a greatest risk of stroke was observed during first three days after COVID-19 diagnosis
- There were no differences in stroke risk related to sex, or race and ethnicity.

# Outcome of Stroke in COVID-19 Patients



Variable	N of valid studies	N of events	Pooled values
Discharge outcomes			
In-hospital death	44	521/1655	31.5 [27.3; 36.0]
Discharged home	30	379/1315	19.1 [13.2; 26.8]
Discharged to rehabilitation	25	228/744	25.7 [18.9; 33.8]
Not discharged at time of publication	20	170/901	11.1 [4.7; 23.8]

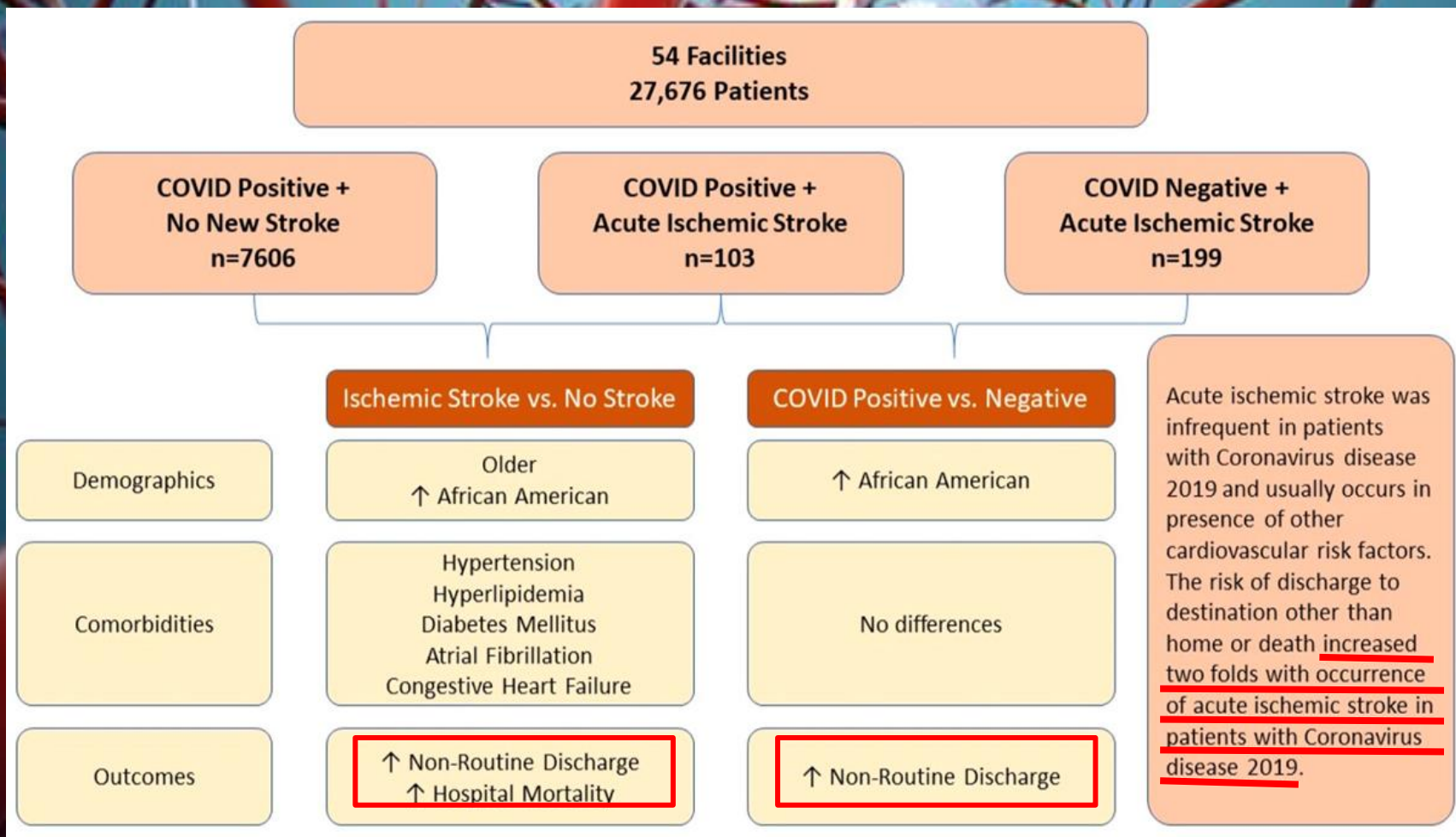
# Outcome of Stroke in COVID-19 Patients



- In a study, in-hospital mortality among 160 patients with COVID-19 and stroke was 34 percent
  - Reflects greater stroke severity and greater comorbidity from respiratory and other systemic complications of COVID-19
- Patients recovering from a severe COVID-19 infection with stroke suffered from fatigue, dyspnea, memory impairment, and myalgias



# Outcome of Stroke in COVID-19 Patients



# Clinical Implications



- Clinicians should be vigilant for signs and symptoms of stroke in individuals with COVID-19 to ensure appropriate clinical interventions
- Special attention should be paid in intubated or sedated patients, in whom awareness of potential neurological signs is important

# Clinical Implications



- A systematic review and meta-analysis showed that even though the majority of strokes occurred after a few days of COVID-19 symptoms onset, the neurological symptoms represented the reason of hospital admission in more than one-third of people with COVID-19 and stroke.
- These patients might have mild respiratory symptoms or be completely asymptomatic. Clinical suspicion for underlying COVID19 infection should be high in these patients



# Treatment of Stroke in COVID-19



- The basic principles of management of stroke remain the same in COVID19 patients with stroke
- For eligible patients with acute ischemic stroke, intravenous thrombolysis with rTPA is first-line therapy, provided that treatment is initiated within 4.5 hours of symptom onset
- Mechanical thrombectomy is indicated for patients with acute ischemic stroke due to a large artery occlusion in the anterior circulation who can be treated within 24 hours of symptom onset

# Prevention



- Prevention of COVID19 infection and illness represent the most effective means for disease/morbidity prevention
  - Includes appropriate vaccination or boosting coupled with isolation precautions and minimizing exposure risks
- COVID-19 vaccination (including boosters) is best way to reduce the risk of COVID-19 infection and to prevent severe disease or death, especially among people with cardiovascular disease or other medical conditions.

# Conclusions



- Although COVID-19 infection primarily results in respiratory disease, patients may also have cerebrovascular complications like stroke
- Ischemic stroke is the most common cerebrovascular complications in COVID19 patients
- Pathogenesis of stroke in individuals with COVID-19 seems to be a combination of vascular risk factors and immune responses to the virus



# Conclusions (cont'd)



- Although older patients with risk factors like diabetes, obesity, hypertension are more likely to suffer from stroke, even younger patients with COVID19 can have stroke
- Hence clinicians need to be looking for symptoms and signs of stroke in COVID19 patients
- The basic principles of management of stroke remain the same in COVID19 patients with stroke and include the use of intravenous thrombolysis and mechanical thrombectomy

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