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5-21-2020

Covid-19 Clinical Update 5/21/2020

George Washington University

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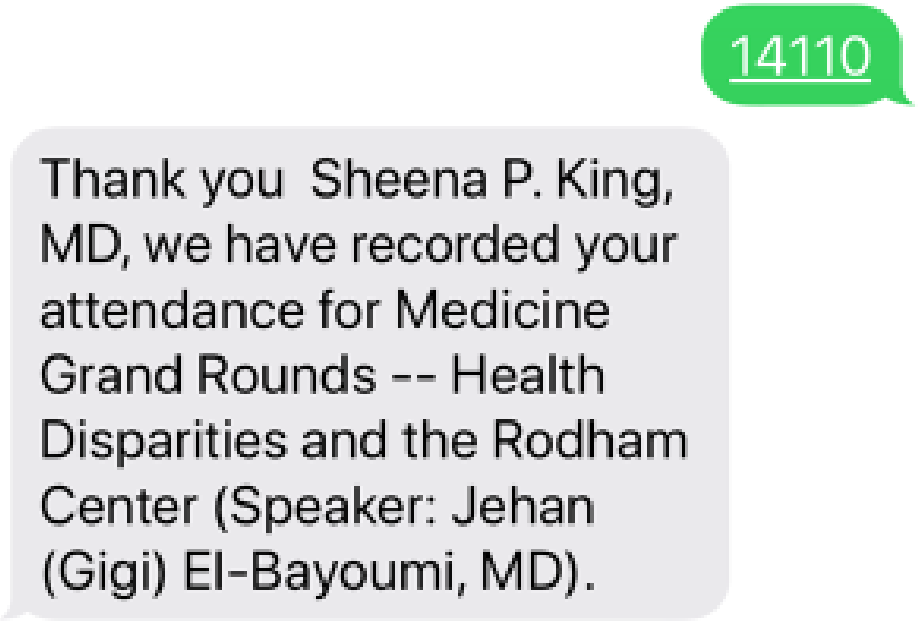
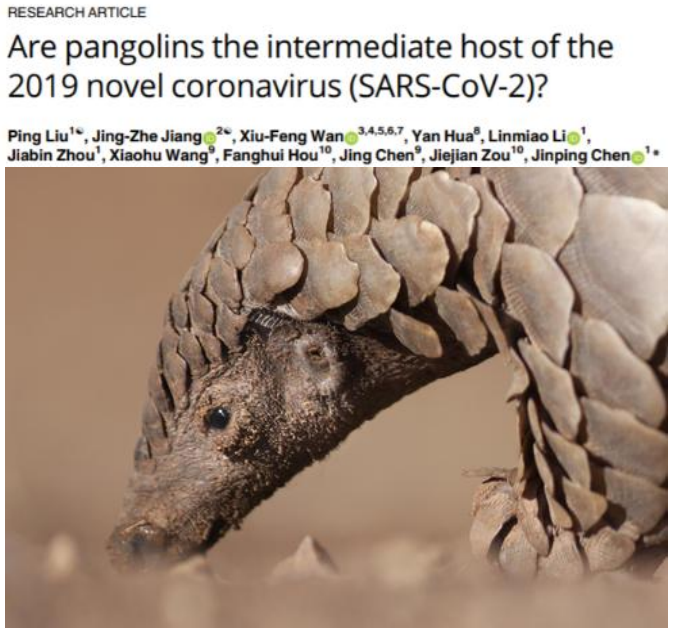




1. EPIDEMIOLOGY
2. TRANSMISSION
3. PATHOPHYSIOLOGY
4. TREATMENT
5. GW UPDATES

COVID-19 UPDATE

HANA AKSELROD, MD, MPH
GW DIVISION OF INFECTIOUS DISEASES
5/21/2020

https://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1008421
defenseone.com/ideas/2020/05/miners-canary-covid-19-and-rise-non-traditional-security-threats/165446/

EPIDEMIOLOGY

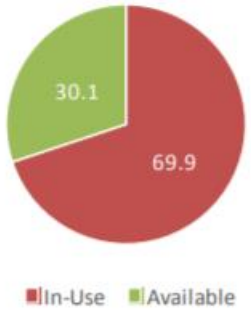
5/21/2020

There are a total of **3,604 deaths** and **82,782 cases** confirmed in the region.

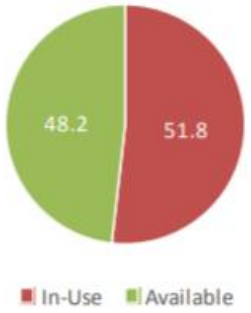
District of Columbia	Maryland	Virginia
407	2,123	1,074
7,551 cases	42,323 cases	32,908 cases

By Rebecca Tan, Fenit Nirappil, Kevin Uhrmacher, Gabriel Florit and Danielle Rindler
Updated May 20 at 12:20 p.m.

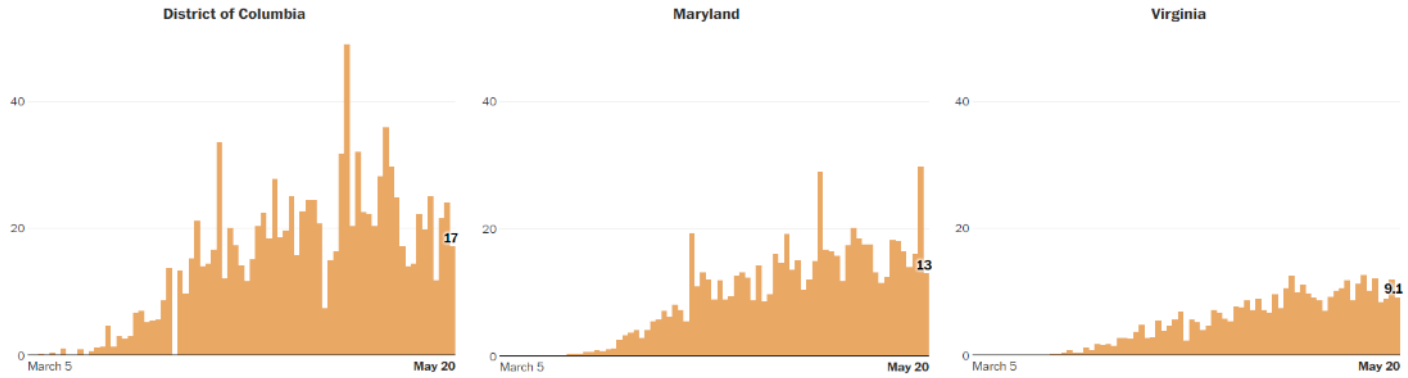
DC ICU Bed Capacity
(By %, as of 5/17/20)



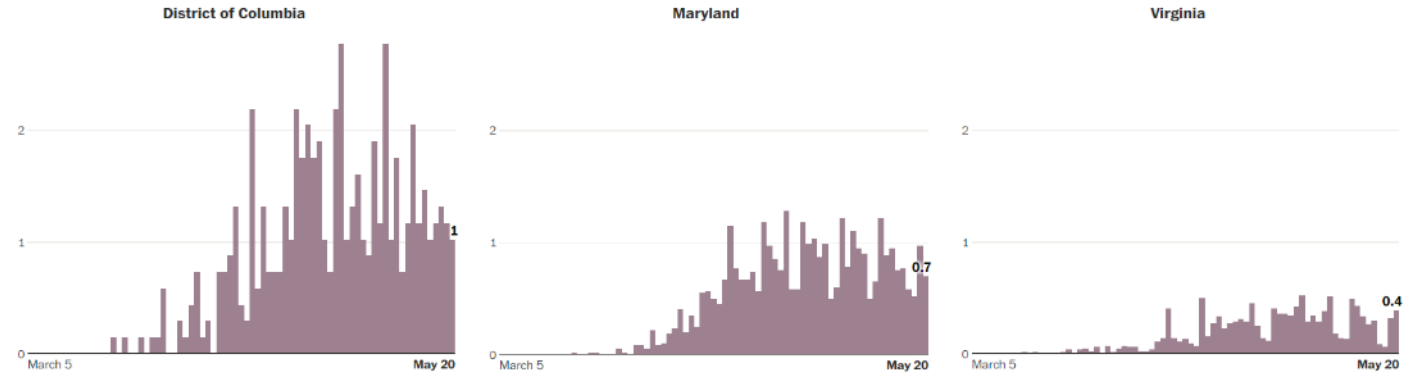
DC Ventilator Capacity
(By %, as of 5/17/20)



New daily cases per 100,000 residents



New daily deaths per 100,000 residents



- **DC** stay-at-home order extended through June 8.
- **Maryland** Re-opening Phase One started 5/15.
  However, stay-at-home orders continue in Montgomery County, Prince George's County, and Baltimore.
- **Virginia** commenced re-opening on 5/15 but Northern Virginia is continuing stay-at-home order for another two weeks

https://www.washingtonpost.com/graphics/local/dc-maryland-virginia-coronavirus-cases/
https://coronavirus.dc.gov/page/hospital-status-data

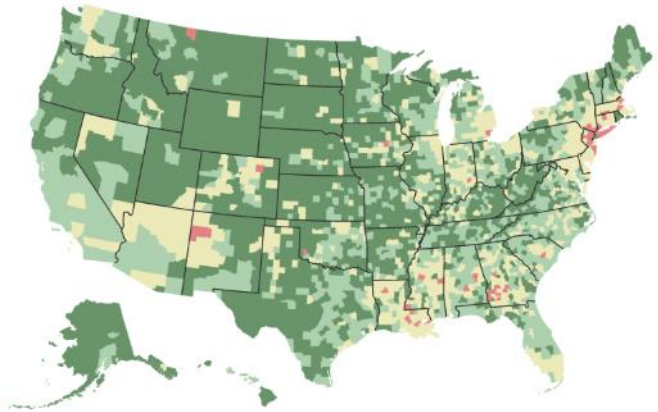
TOTAL CASES

1.5 million+

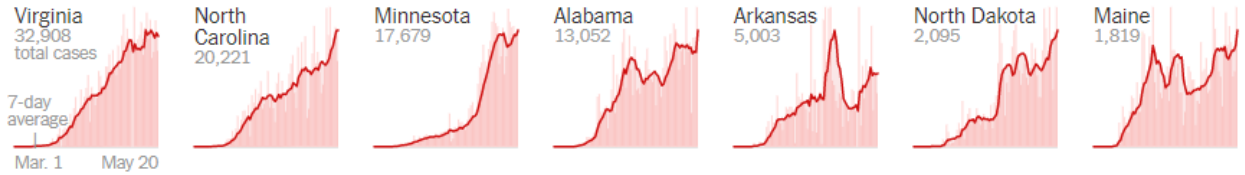
DEATHS

93,408

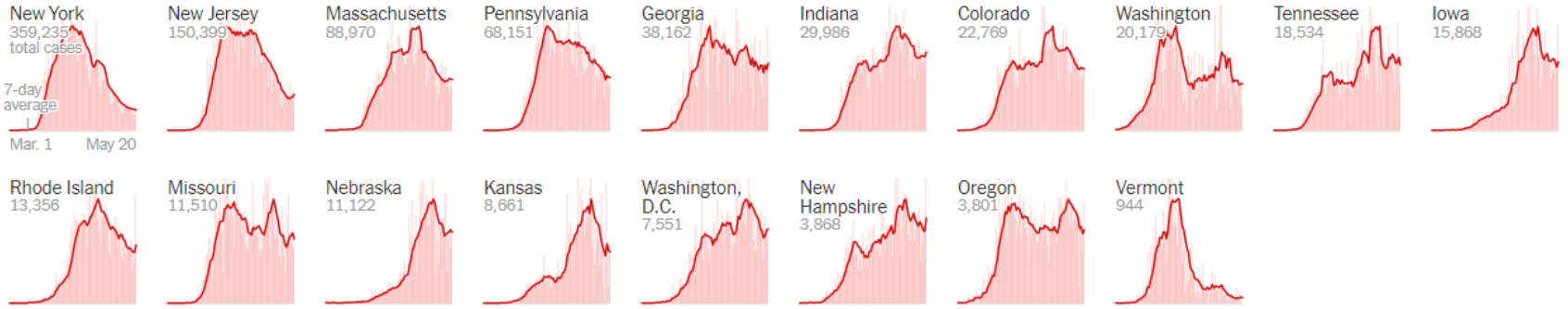
Includes confirmed and probable cases where available



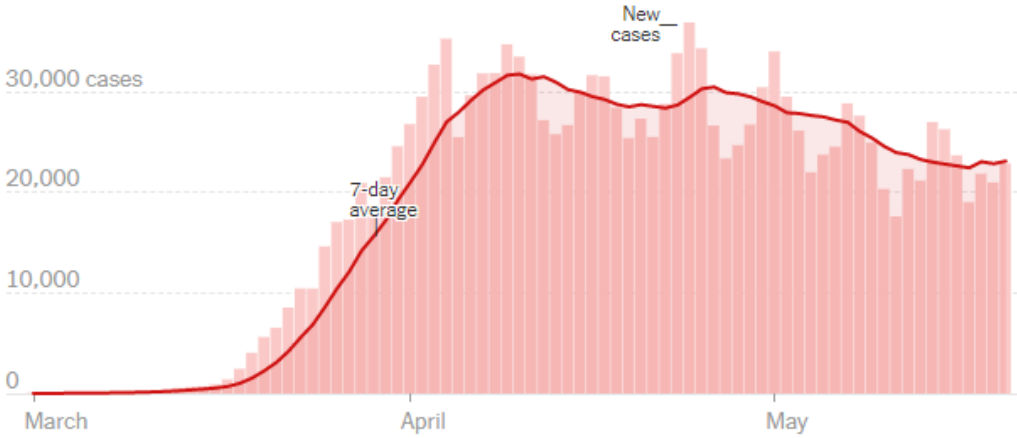
Where new cases are increasing



Where new cases are decreasing

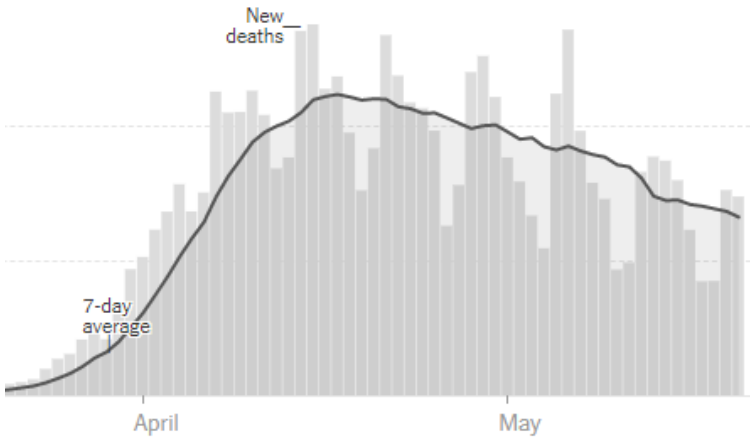


New reported cases by day in the United States



Note: The seven-day average is the average of a day and the previous six days of data.

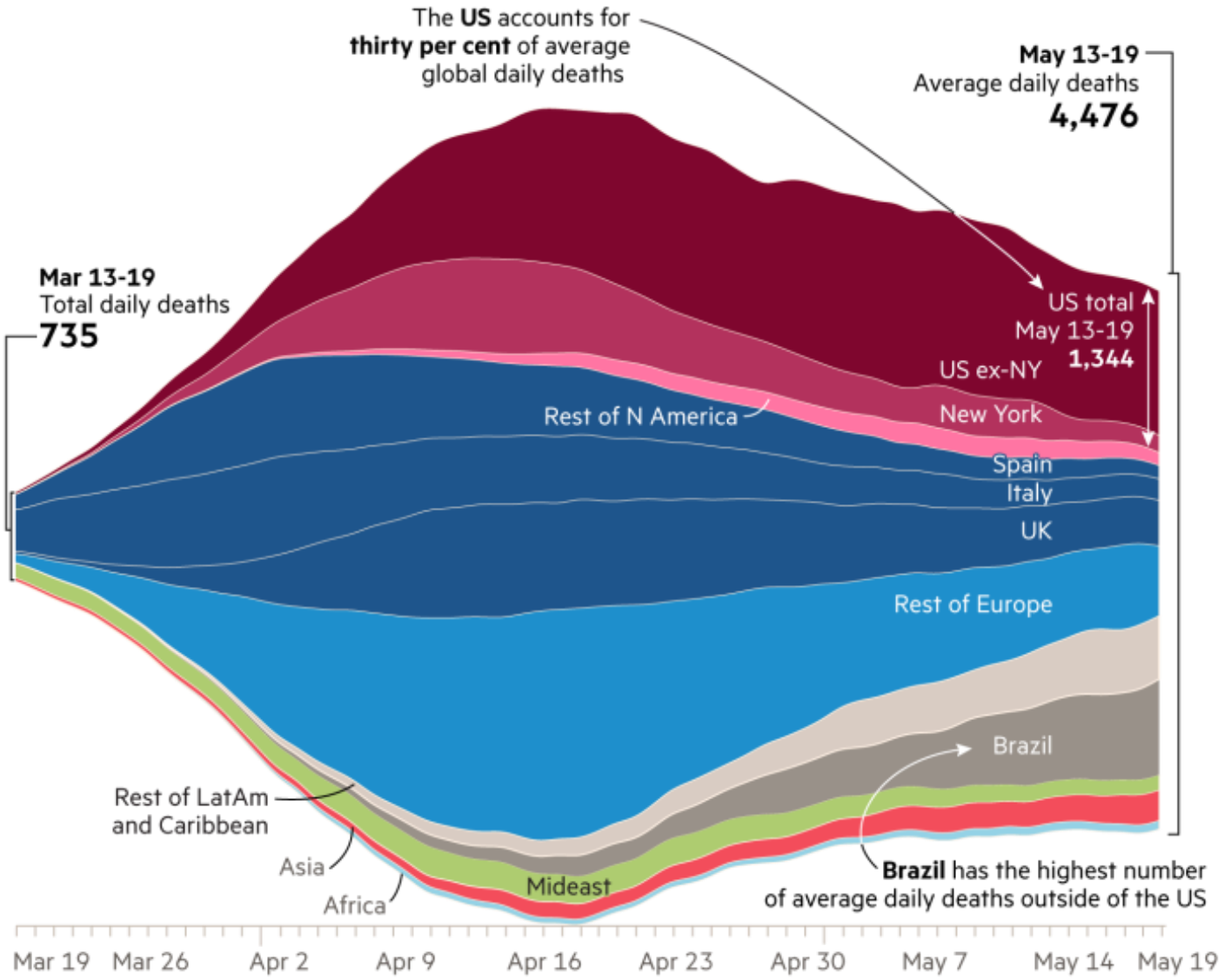
New reported deaths by day in the United States



https://www.nytimes.com/interactive/2020/us/coronavirus-us-cases.html
https://www.theguardian.com/world/ng-interactive/2020/may/15/coronavirus-map-us-latest-cases-state-by-state

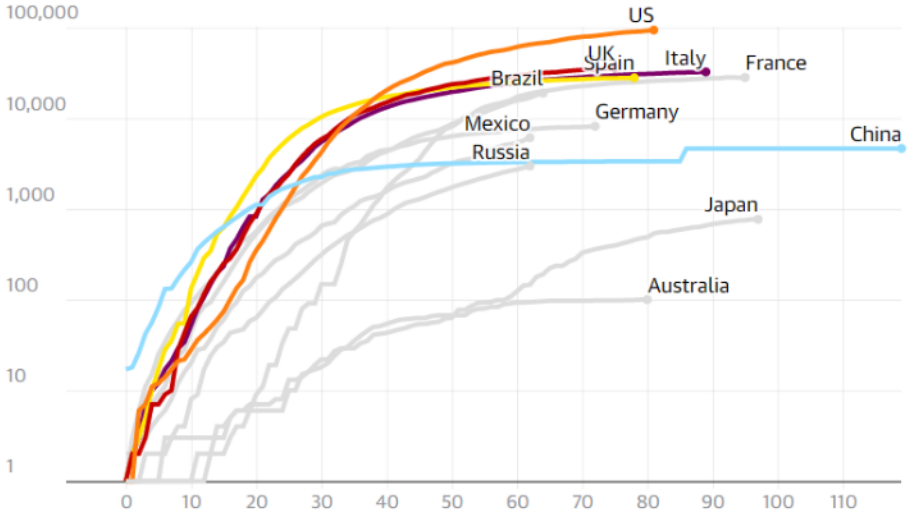
The global Covid-19 death toll is continuing to ease slowly

Daily deaths of patients diagnosed with coronavirus (7-day rolling average)



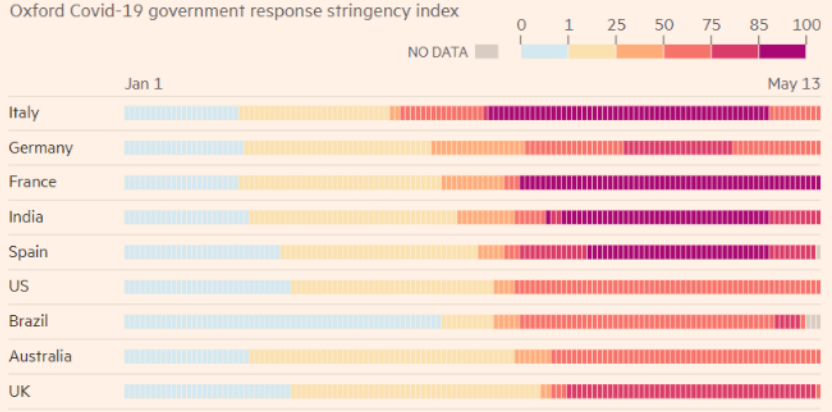
Confirmed deaths of Covid-19 for selected countries

Showing the number of deaths since the day of the first one, using a log scale.
Data correct at 23.59 UTC 20 May



Global responses to the pandemic

Oxford Covid-19 government response stringency index



Graphic: Max Harlow, Caroline Nevitt and Aleksandra Wisniewska
Source: Blavatnik School of Government, University of Oxford
© FT

https://www.ft.com/content/a26fbf7e-48f8-11ea-aeb3-955839e06441
https://www.theguardian.com/world/ng-interactive/2020/may/15/coronavirus-map-us-latest-cases-state-by-state

TRANSMISSION

5/21/2020

Covid Patients Testing Positive After Recovery Aren't Infectious, Study Shows

By Heesu Lee and Jason Gale
May 18, 2020, 11:15 PM EDT *Updated on May 19, 2020, 5:19 AM EDT*

https://www.bloomberg.com/news/articles/2020-05-19/covid-patients-testing-positive-after-recovery-aren-t-infectious

High SARS-CoV-2 Attack Rate Following Exposure at a Choir Practice — Skagit County, Washington, March 2020

Weekly / May 15, 2020 / 69(19);606–610

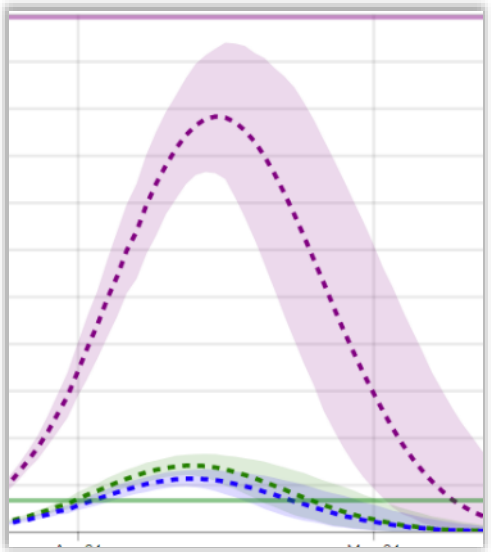
On May 12, 2020, this report was posted online as an MMWR *Early Release.*

Transmission Risk

- "Super-spreader events" linked to indoor exposure, close quarters
- MMWR:
  - "Following a 2.5-hour choir practice attended by 61 persons, including a symptomatic index patient, 32 confirmed and 20 probable secondary COVID-19 cases occurred (attack rate = 53.3% to 86.7%); three patients were hospitalized, and two died."
  - "Transmission was likely facilitated by **close proximity** (within 6 feet) during practice and **augmented by the act of singing**."
- CDC update: SARS-CoV-2 "does not spread easily by touching objects or surfaces"
  - **Frequent handwashing and disinfecting high-touch surfaces still recommended**

Transmission Reduction

- Drexel University modeling study estimating the impact of stay-at-home measures and social distancing in 30 metropolitan areas
- Estimate >232,000 deaths and 2,100,000 hospitalizations averted



https://www.bigcitieshealth.org/press-releasenew-estimates

Annals of Internal Medicine®

Original Research | 5 May 2020

The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application

Stephen A. Lauer, MS, PhD, Kyra H. Grantz, BA, Qifang Bi, MHS, Forrest K. Jones, MPH, ... View all authors +

Table 1. Characteristics of Patients With Confirmed COVID-19 Included in This Analysis (n = 181)*

Characteristic	Value
Median age (interquartile range), y	44.5 (34.0-55.5)
Sex, n (%)	
Female	69 (38.1)
Male	108 (59.7)
Unknown	4 (2.2)
Exposure to Wuhan, n (%)	
Resident of Hubei province	84 (46.4)
Known travel to Wuhan	77 (42.5)
None/unknown	20 (11.0)

Figure 2. Cumulative distribution function of the COVID-19 incubation period estimate from the log-normal model.

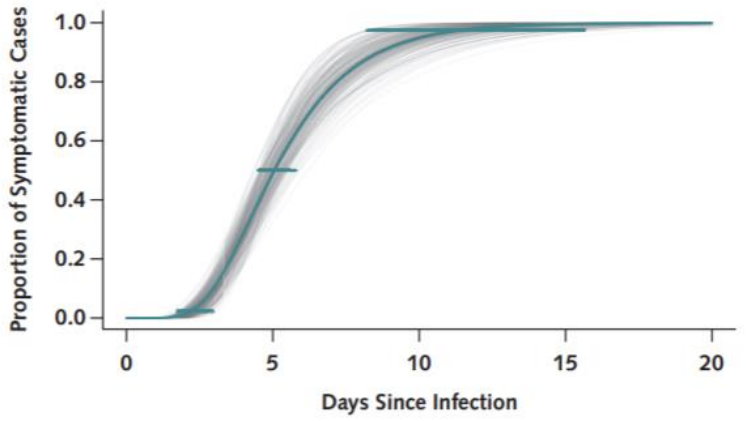
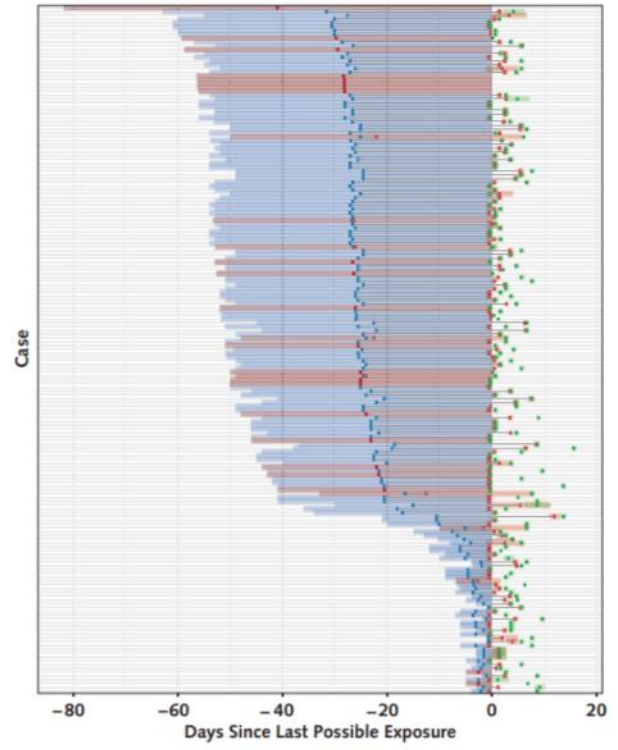


Figure 1. SARS-CoV-2 exposure (*blue*), symptom onset (*red*), and case detection (*green*) times for 181 confirmed cases.



- Median incubation is 5.1 days
- 97.5% of infected persons who have symptoms will do so within 12 days
- “The current period of active monitoring recommended by the U.S. Centers for Disease Control and Prevention (14 days) is well supported by evidence”

PATHOPHYSIOLOGY

5/21/2020

https://www.nytimes.com/2020/05/17/climate/pollution-poverty-coronavirus.html

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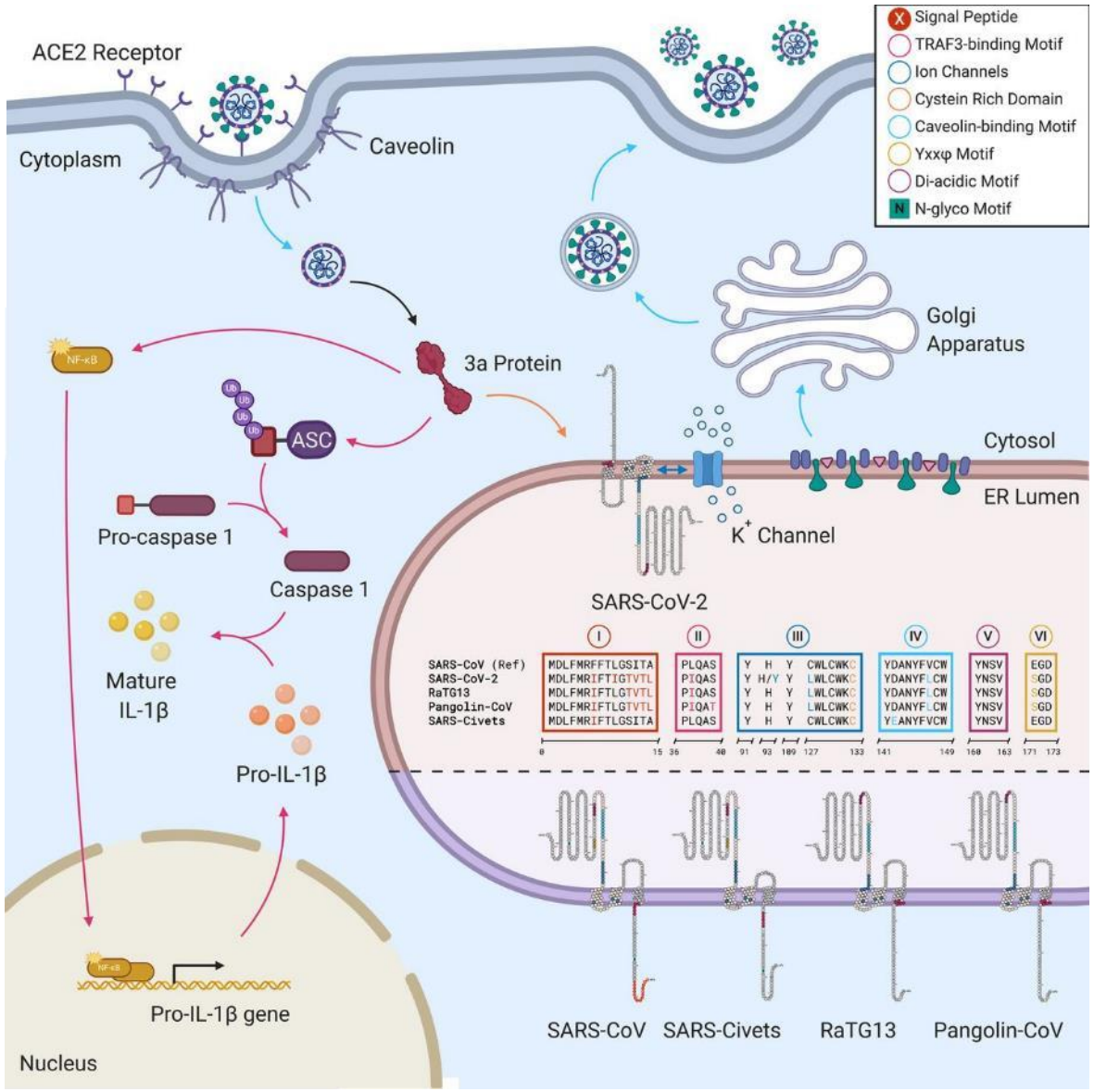
Observation | Clinical Science and Epidemiology

SARS-CoV-2 and ORF3a: Nonsynonymous Mutations, Functional Domains, and Viral Pathogenesis

Elio Issa, Georgi Merhi, Balig Panossian, Tamara Salloum, Sima Tokajian

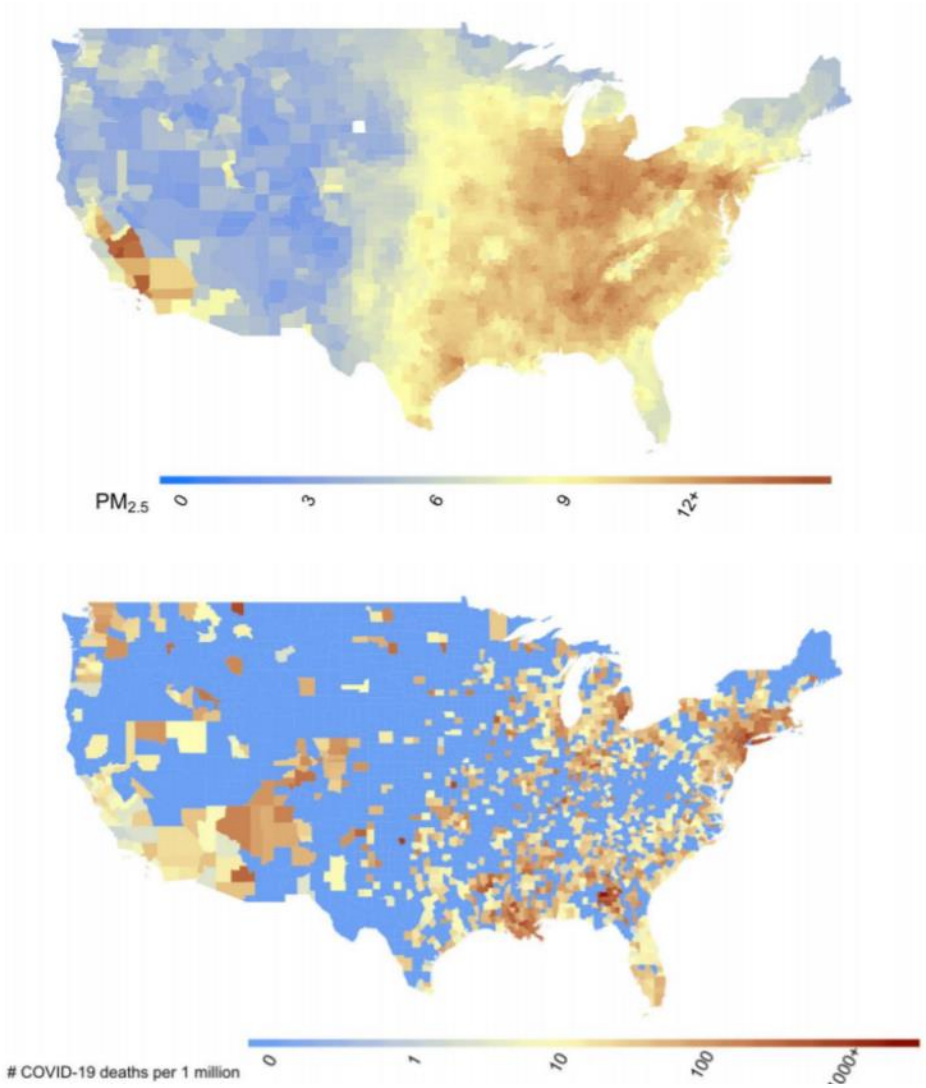
Jack A. Gilbert, Editor

- Detected and identified six functional domains in the SARS-CoV-2 3a protein, linked to virulence, infectivity, ion channel formation, and virus release
- Minor structural protein of 274 AA residues
- Analyze conserved vs. variable domains to identify unique targets and explain cross-species transmission
- Propose a key functional pathway of 3a protein in facilitating viral reproduction and release from cell
- Needs experimental confirmation



Air Pollution and COVID-19 Mortality

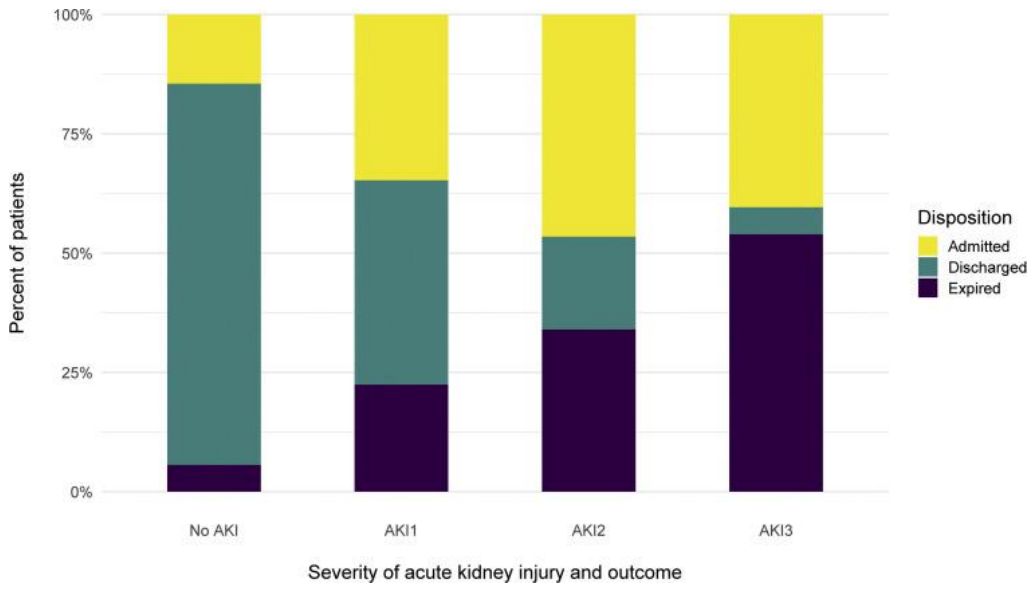
- Particulate matter air pollution correlates with higher rates of chronic lung and heart disease
- COVID-19 deaths up to 4/22/2020 analyzed by county
- Adjusted by 20 potential confounding factors including population size, age distribution, population density, time since the beginning of the outbreak, time since state's issuance of stay-at-home order, hospital beds, number of individuals tested, weather, and socioeconomic and behavioral variables such as obesity and smoking.
- An increase of 1 $\mu g/m^3$ in $PM_{2.5}$ is associated with an 8% increase in the COVID-19 death rate (95% CI: 2%, 15%)



https://projects.iq.harvard.edu/covid-pm

Renal Injury

- 5,449 patients (NYC, Mar-Apr, 2020)
- Among patients with AKI, 694 died (35%), 519 (26%) were discharged and 780 (39%) were still hospitalized

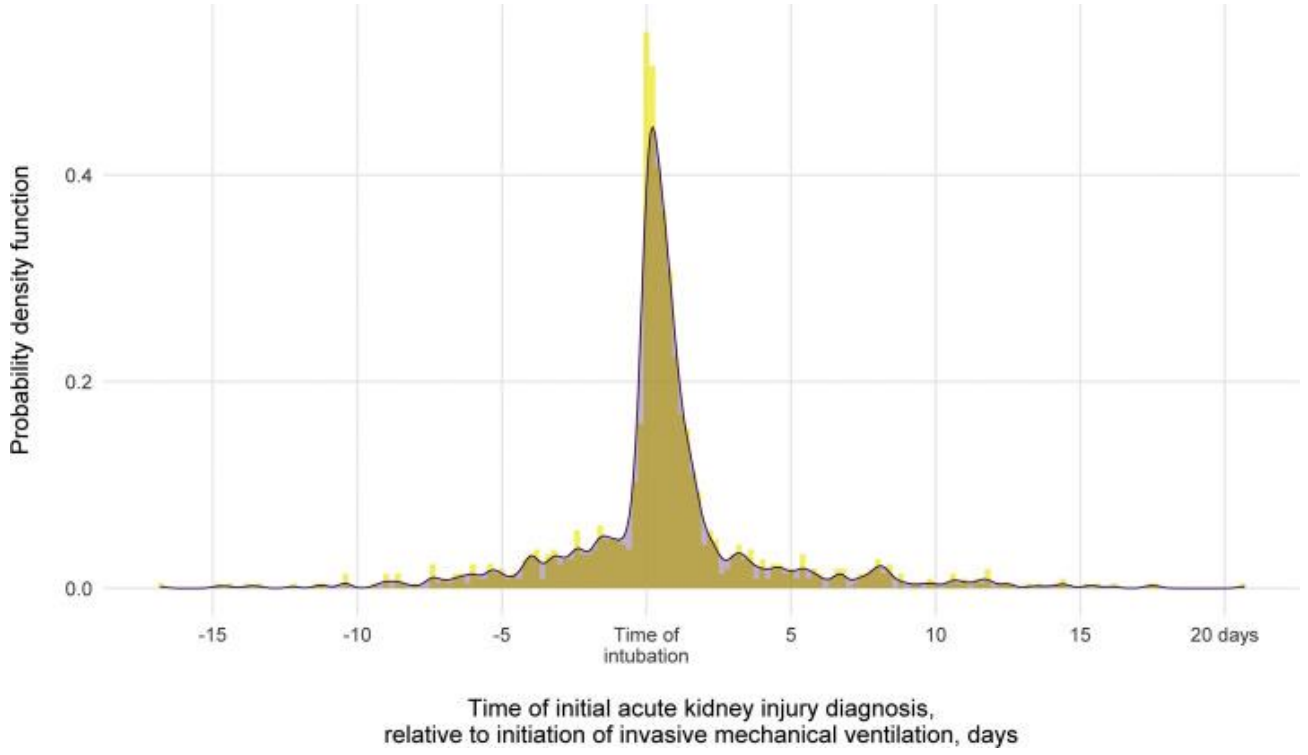


KIDNEY INTERNATIONAL
Elsevier

Kidney Int. 2020 May 16
doi: 10.1016/j.kint.2020.05.006 [Epub ahead of print]
PMCID: PMC7229463
PMID: 32416116

ACUTE KIDNEY INJURY IN PATIENTS HOSPITALIZED WITH COVID-19

Jamie S. Hirsch,[1,2,3,*] Jia H. Ng,[1,*] Daniel W. Ross,[1] Purva Sharma,[1] Hitesh H. Shah,[1] Richard L. Barnett,[1] Azzour D. Hazzan,[1] Steven Fishbane,[1] Kenar D. Jhaveri,[1,*] and Northwell COVID-19 Research Consortium and the Northwell Nephrology COVID-19 Research Consortium, on behalf of the



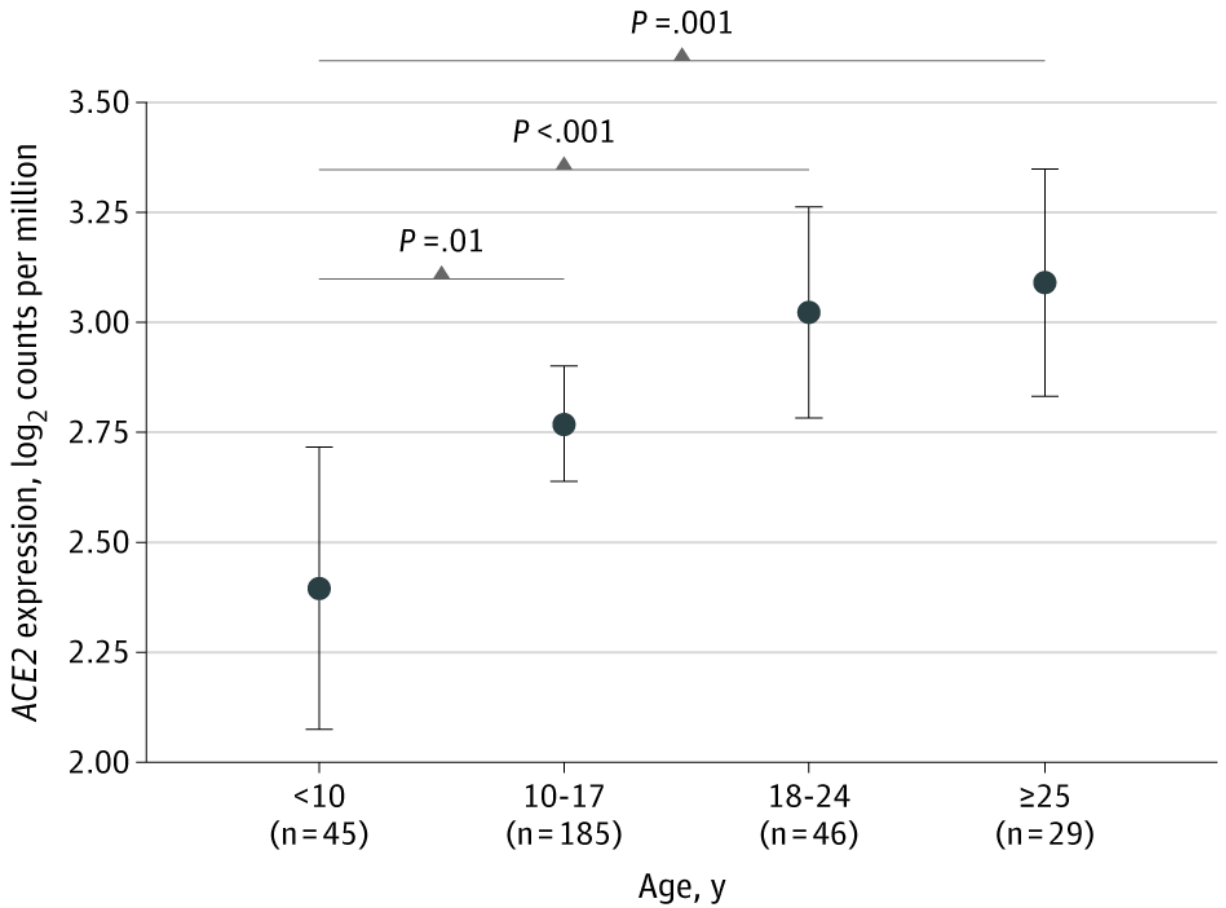
May 20, 2020

Nasal Gene Expression of Angiotensin-Converting Enzyme 2 in Children and Adults

Supinda Bunyavanich, MD, MPH[1]; Anh Do, PhD[2]; Alfin Vicencio, MD[1]

» Author Affiliations | Article Information

JAMA. Published online May 20, 2020. doi:10.1001/jama.2020.8707



Severe Illness in Children

- 177 infected children and young adults, including 44 hospitalized and 9 critically ill patients (3/15-4/30/2020)
- Children <1 year and adolescents >15 years of age were over-represented among hospitalized patients (*P* = .07). Adolescents/young adults were over-represented among the critically ill cohort (*P* = .02).
- Underlying medical conditions:
  - 27/44 (63%) of hospitalized vs. 42/133 (32%) of non-hospitalized (P = 0.001)
  - Asthma (20%), neurologic disease (6%), diabetes (3%), obesity (2%), cardiac (3%), hematologic (3%) and malignancy (1%)
- Symptoms:
  - 134/177 (76%) came with respiratory symptoms ± fever
  - However, only 85/177 (48%) had both fever and respiratory symptoms
  - One critically ill patient with Kawasaki-like syndrome
- Co-infection uncommon (6%; ½ of these with entero/rhinovirus)

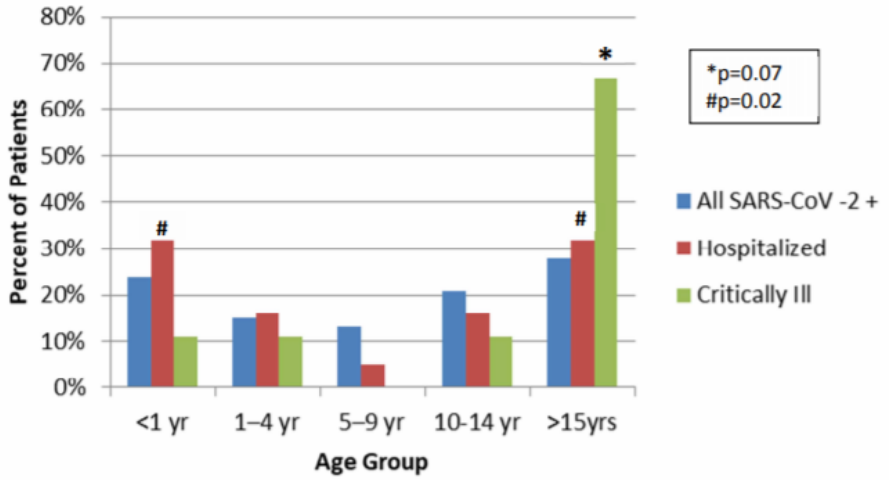
The JOURNAL of PEDIATRICS

Severe COVID-19 in Children and Young Adults in the Washington, DC Metropolitan Region

Roberta L. DeBiasi, MD, MS[1,10,11]; Xiaoyan Song, MBBS, PhD[2,10], Meghan Delaney, MD[3,10], Michael Bell, MD[4,10], Karen Smith, MD[5,10], Jay Pershad MD[6,10], Emily Ansusinha[1,], Andrea Hahn[1,10], Rana Hamdy[1,10], Nada Harik[1,10], Benjamin Hanisch[1,10], Barbara Jantausch [1,10], Adeline Koay[1,10], Robin Steinhorn, MD [7,10], Kurt Newman, MD[8,10] and David Wessel, MD[4,9,10]

[1]Divisions of Pediatric Infectious Diseases, [2]Infection Control and Epidemiology, [3]Laboratory Medicine and Pathology, [4]Critical Care, [5]Hospitalist Medicine, [6]Emergency Department, [7]Neonatology, [8]Chief Executive Officer, [9]Chief Medical Officer; Children's National Hospital, Washington DC and

[10]Department of Pediatrics and [11]Microbiology, Immunology and Tropical Medicine; The George Washington University School of Medicine and Health Sciences, Washington DC

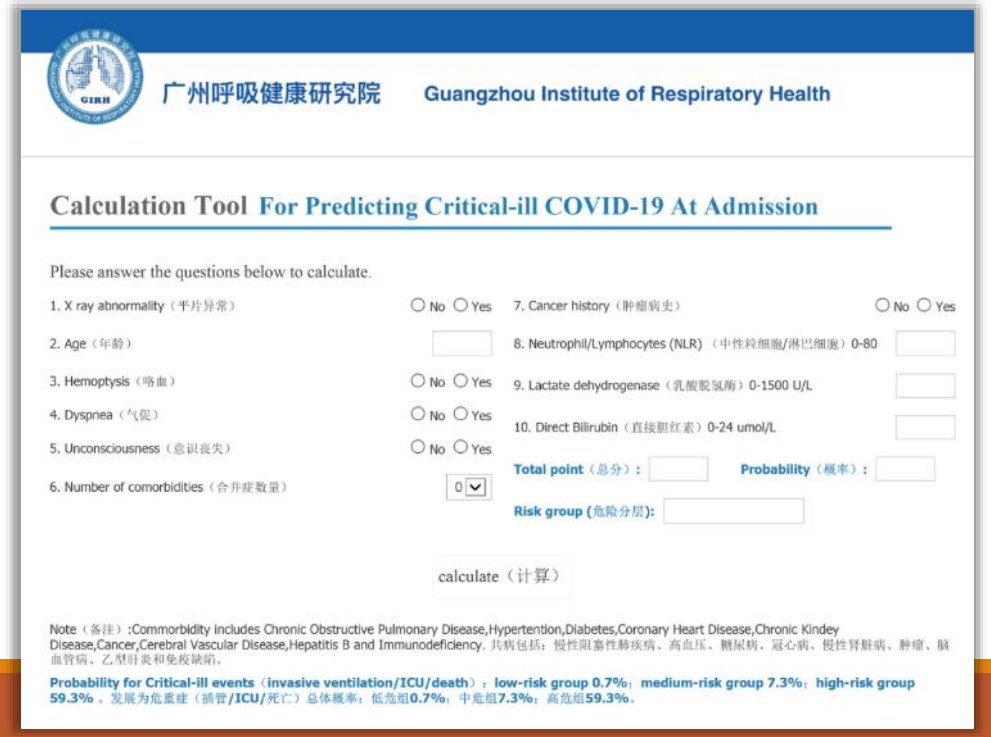


TREATMENT

5/21/2020

Clinical Risk Score

- Based on 1,590 (development) + 710 (validation) patients in 575 hospitals in China, as of 1/31/2020
- Mean age 48.9 (15.7) years; 57.3% male



广州呼吸健康研究院 Guangzhou Institute of Respiratory Health

Calculation Tool For Predicting Critical-ill COVID-19 At Admission

Please answer the questions below to calculate.

1. X ray abnormality（平片异常） ○ No ○ Yes
2. Age（年龄）
3. Hemoptysis（咯血） ○ No ○ Yes
4. Dyspnea（气促） ○ No ○ Yes
5. Unconsciousness（意识丧失） ○ No ○ Yes
6. Number of comorbidities（合并症数量） 0
7. Cancer history（肿瘤病史） ○ No ○ Yes
8. Neutrophil/Lymphocytes (NLR)（中性粒细胞/淋巴细胞）0-80
9. Lactate dehydrogenase（乳酸脱氢酶）0-1500 U/L
10. Direct Bilirubin（直接胆红素）0-24 umol/L

Total point（总分）: **Probability（概率）:**

Risk group (危险分层):

calculate（计算）

Note（备注）:Commorbidity includes Chronic Obstructive Pulmonary Disease,Hypertention,Diabetes,Coronary Heart Disease,Chronic Kindey Disease,Cancer,Cerebral Vascular Disease,Hepatitis B and Immunodeficiency. 共病包括：慢性阻塞性肺疾病、高血压、糖尿病、冠心病、慢性肾脏病、肿瘤、脑血管病、乙型肝炎和免疫缺陷。

Probability for Critical-ill events（invasive ventilation/ICU/death）: low-risk group 0.7%; medium-risk group 7.3%; high-risk group 59.3% 。发展为危重症（插管/ICU/死亡）总体概率：低危组0.7%；中危组7.3%；高危组59.3%。

Original Investigation ONLINE FIRST FREE

May 12, 2020

Development and Validation of a Clinical Risk Score to Predict the Occurrence of Critical Illness in Hospitalized Patients With COVID-19

Wenhua Liang, MD[1,2]; Hengrui Liang, MD[1,2]; Limin Ou, MD[1]; et al

» Author Affiliations | Article Information

JAMA Intern Med. Published online May 12, 2020. doi:10.1001/jamainternmed.2020.2033

Table 3. Multivariable Logistic Regression Model for Predicting Development of Critical Illness in 1590 Patients Hospitalized With COVID-19 in Wuhan

Variables	Odds ratio (95% CI)	*P* value
X-ray abnormality (yes vs no)	3.39 (2.14-5.38)	<.001
Age, per y	1.03 (1.01-1.05)	.002
Hemoptysis (yes vs no)	4.53 (1.36-15.15)	.01
Dyspnea (yes vs no)	1.88 (1.18-3.01)	.01
Unconsciousness (yes vs no)	4.71 (1.39-15.98)	.01
No. of comorbidities	1.60 (1.27-2.00)	<.001
Cancer history (yes vs no)	4.07 (1.23-13.43)	.02
Neutrophil to lymphocyte ratio	1.06 (1.02-1.10)	.003
Lactate dehydrogenase, U/L	1.002 (1.001-1.004)	<.001
Direct bilirubin, μmol/L	1.15 (1.06-1.24)	.001
Constant	0.001	

Abbreviation: COVID-19, coronavirus disease 2019.

JAMA The Journal of the American Medical Association

Prone Positioning

- Hypoxemia with relatively preserved lung compliance, vs. ARDS
- Pulmonary inflammatory edema, lung microthrombi, V/Q mismatch
- Prone positioning helps recruit new areas of lung
  - Spontaneously breathing vs. intubated
- Study 1:
  - 6 of 15 awake patients who tolerated prone position showed increase in PaO2 of more than 20% from baseline (74 $\pm$ 16 to 95 $\pm$ 28 mmHg; p = 0.006)
  - 3 patients returned to baseline PaO2 after supination
- Study 2:
  - 12 of 15 awake patients, proned in 3-hour sessions, had improved oxygenation (PaO_2:FiO_2 100 to 122) and respiratory rate (28 /min to 24 /min) during and for 1 hour after session.
  - At 14 days, 1 patient was intubated and 1 other died

Hydroxychloroquine

- No significant differences in mortality for patients receiving
  - HCQ + azithromycin (HR, 1.35 [95% CI, 0.76-2.40])
  - HCQ alone (HR, 1.08 [95% CI, 0.63-1.85])
  - Azithromycin alone (HR, 0.56 [95% CI, 0.26-1.21])
- Cardiac arrest was significantly more likely in patients receiving hydroxychloroquine + azithromycin (aOR, 2.13), but not HCQ alone (aOR, 1.91) or azithromycin alone (aOR, 0.64)

Original Investigation ONLINE FIRST FREE

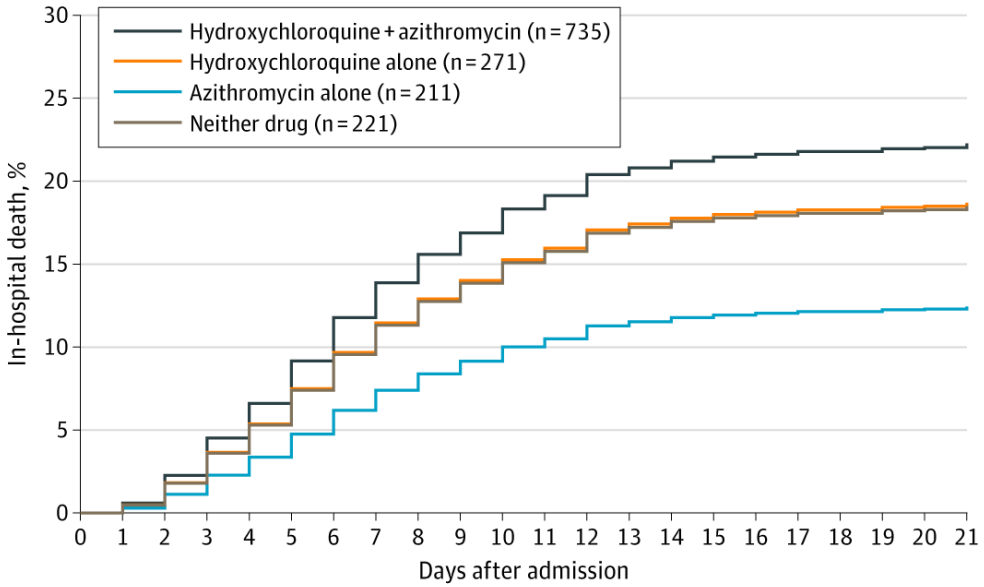
May 11, 2020

Association of Treatment With Hydroxychloroquine or Azithromycin With In-Hospital Mortality in Patients With COVID-19 in New York State

Eli S. Rosenberg, PhD[1]; Elizabeth M. Dufort, MD[2]; Tomoko Udo, PhD[1]; et al

» Author Affiliations | Article Information

JAMA. Published online May 11, 2020. doi:10.1001/jama.2020.8630



No. at risk (in hospital)

	Admission	Day 7	Day 14	Day 21
Hydroxychloroquine + azithromycin	735	653 (384)	568 (106)	557 (47)
Hydroxychloroquine alone	271	245 (136)	226 (59)	220 (28)
Azithromycin alone	211	191 (33)	190 (4)	190 (2)
Neither drug	221	206 (63)	197 (19)	195 (13)