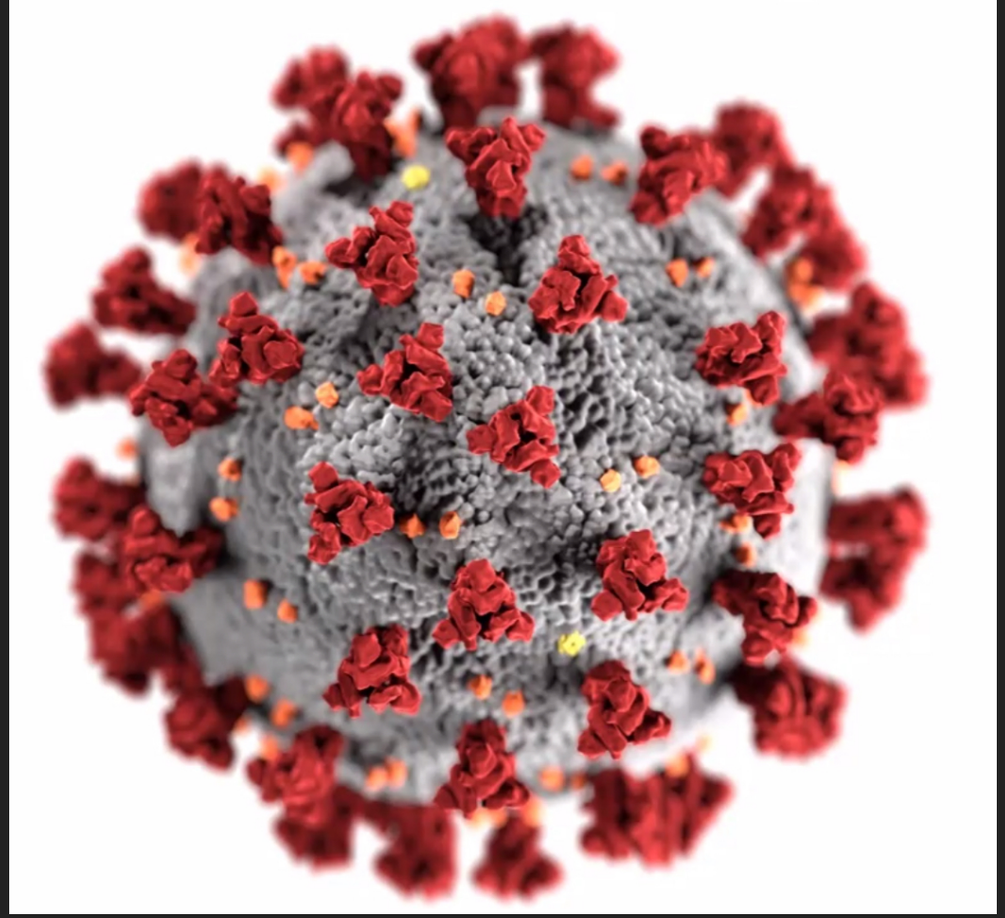
William J. Bommer, MD, FACP, FACC

Chairman, Right Care Initiative Capital Region University of Best Practices; Executive Committee, American College of Cardiology, California Chapter; Professor, Division of Cardiovascular Medicine, University of California, Davis

Dr. Bommer's service to the American College of Cardiology includes his current role on the California Executive Committee; as well as former roles as President, Vice-President, Governor, and Member of the Board of Governors. As an accomplished UC Davis Clinical Professor of Medicine, he directs UC Davis Cardiology's Noninvasive Services; directs the Cardiology Fellowship Training Program and sees patients in the CCU. As the longest-tenured UCD Training Director, he has trained over 200 practicing cardiologists. Dr. Bommer has been the Principal Investigator or Co-Investigator of multiple NIH, NHLBI, and international research trials. He is a member of 50 international, national, state, and university education commissions and committees. Dr. Bommer founded and is a Board Member of numerous hardware and software startup companies and is an inventor or co-inventor of patents for xerography, color-flow ultrasound imaging, and contrast echocardiography. His public service includes consulting with the State of California and directs multiple programs including CA Pilot PCI (offsite) Program, CA Elective PCI (offsite) Program, and CA Cardiac Surgery and Intervention Outcomes Program. He has authored over 250 scientific publications, received over 100 Honors and Awards, presented over 1000 papers at International, National, and Statewide meetings, and coauthored California Legislation including SB 357 and SB 906. A Physics and Chemistry graduate of Cornell University, he received his medical degree from the State University of New York. He is an Honorary Lifetime Member of the British Cardiovascular Society and an accomplished marathon runner.

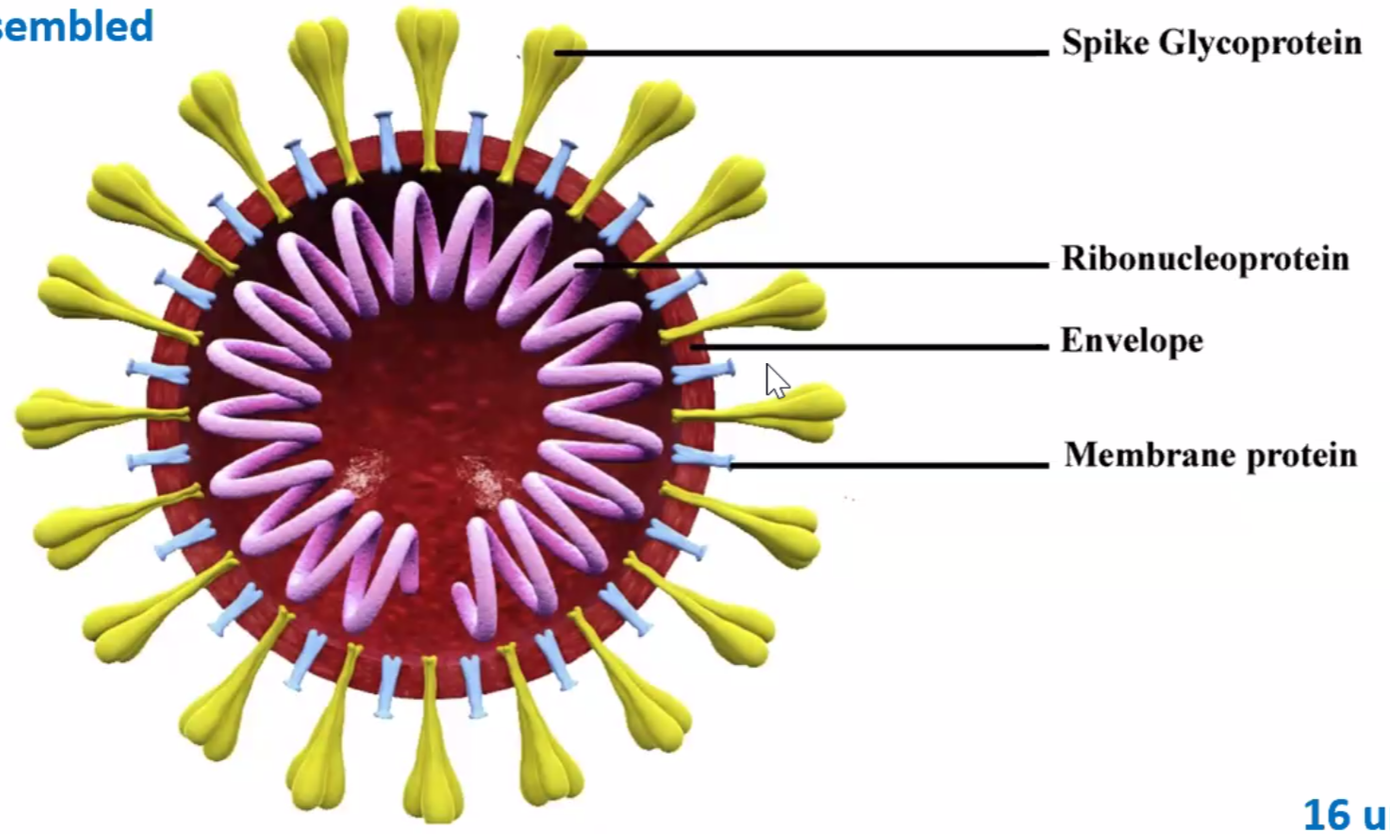


COVID-19: THE MOST LETHAL PANDEMIC IN 102 YEARS
RIGHT CARE INITIATIVE
MAY 11, 2020

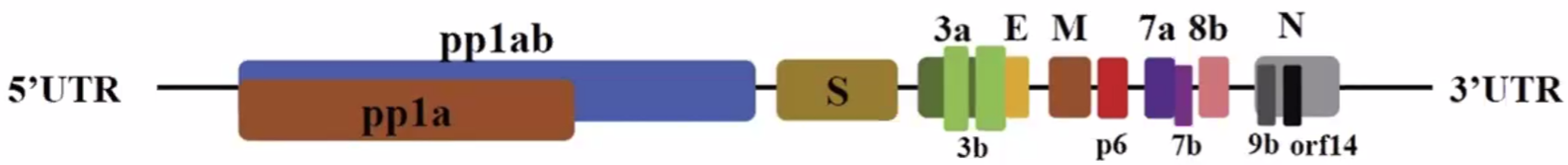
WILLIAM BOMMER, MD FACC
UNIVERSITY OF CALIFORNIA, DAVIS

Structural and genetic organization of SARS CoV2

SARS CoV-2 fully assembled



SARS CoV-2 gene structure

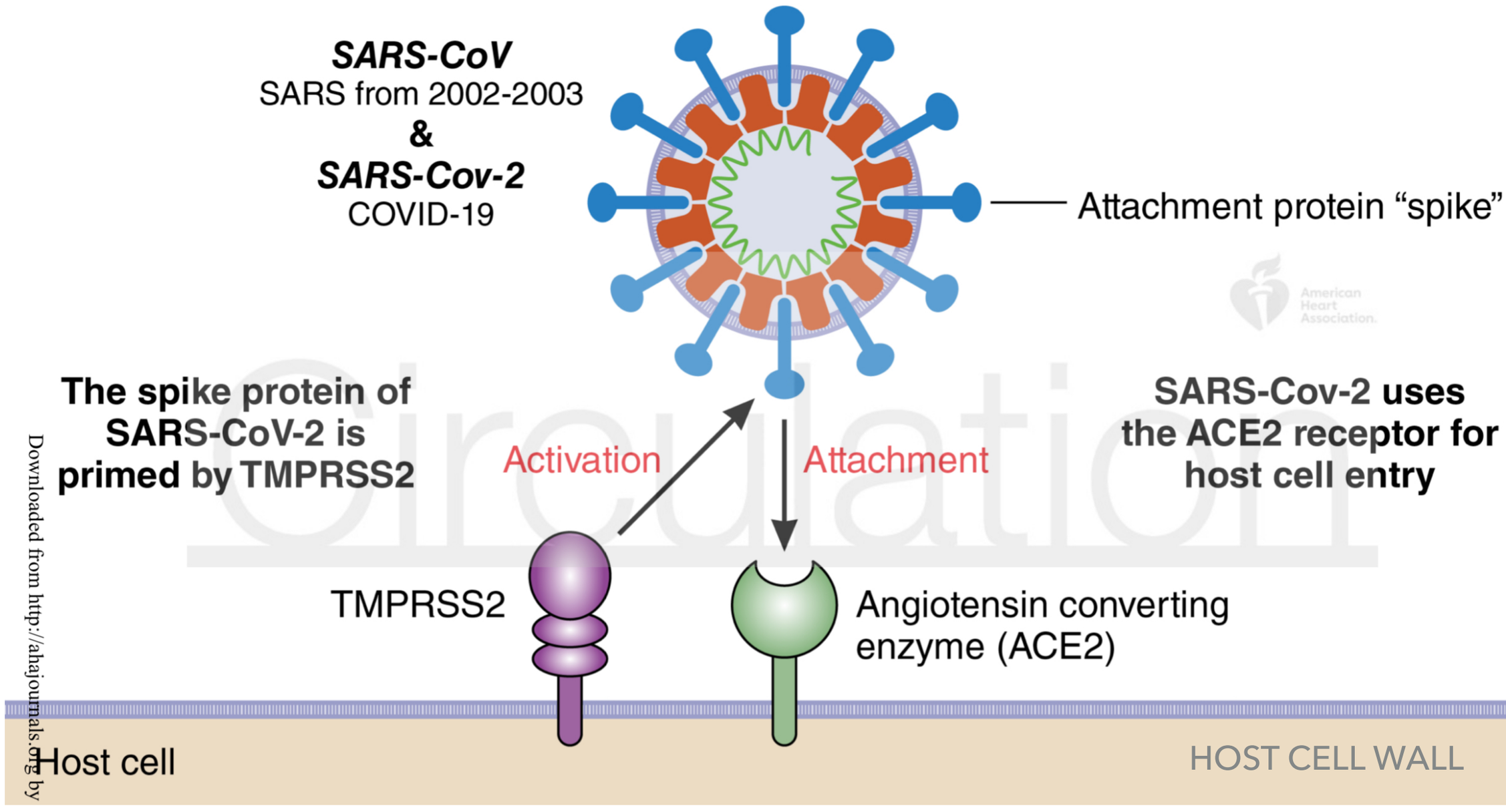


16 untranslated regions
4 translated regions: S, E, M, N

156 mutations are known

© 2020 UCDavis Health

WHAT ARE SOME OF THE THINGS PEOPLE LIVING WITH CHRONIC CONDITIONS CAN DO TO PROTECT THEMSELVES AGAINST THIS VIRUS?

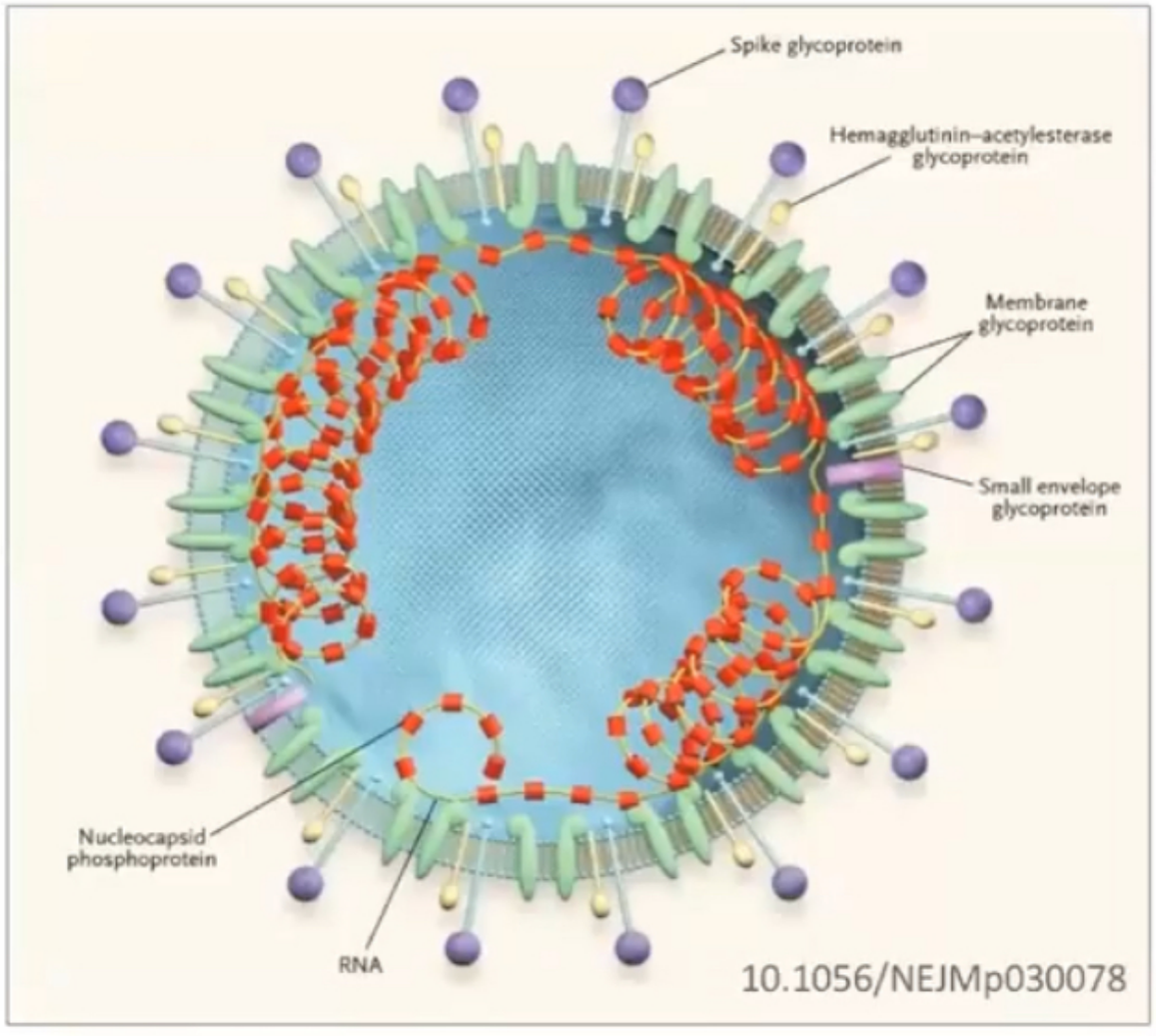


Downloaded from http://ahajournals.org by

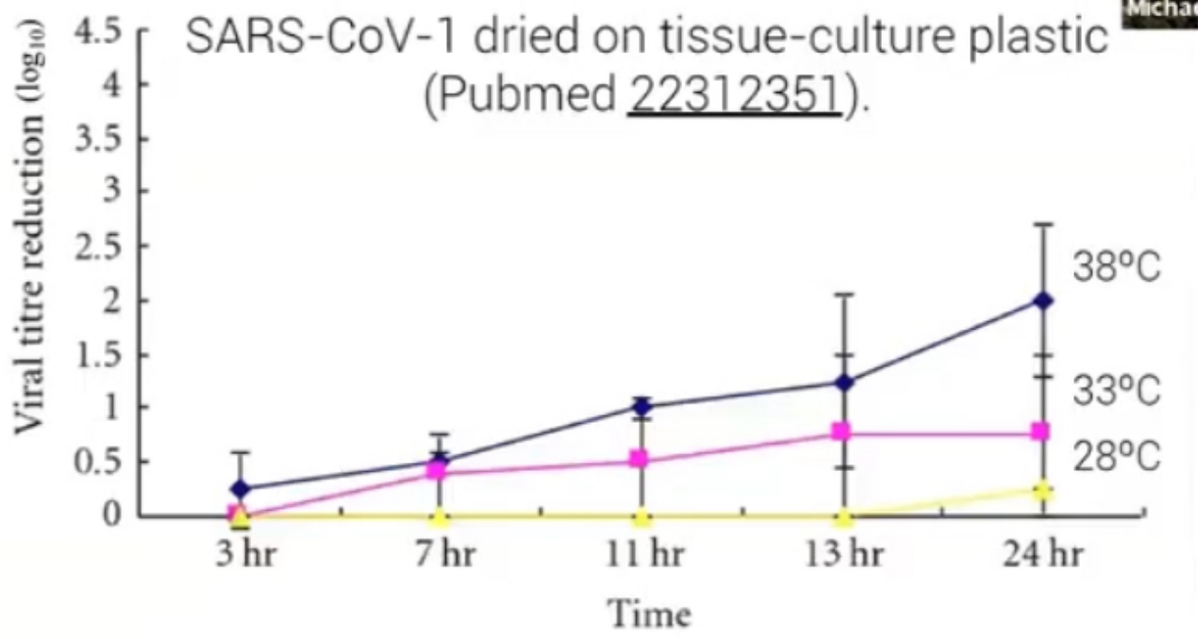
HOST CELL

© 2020 UCDavis Health

SARS-CoV-1/2 environmental sensitivity

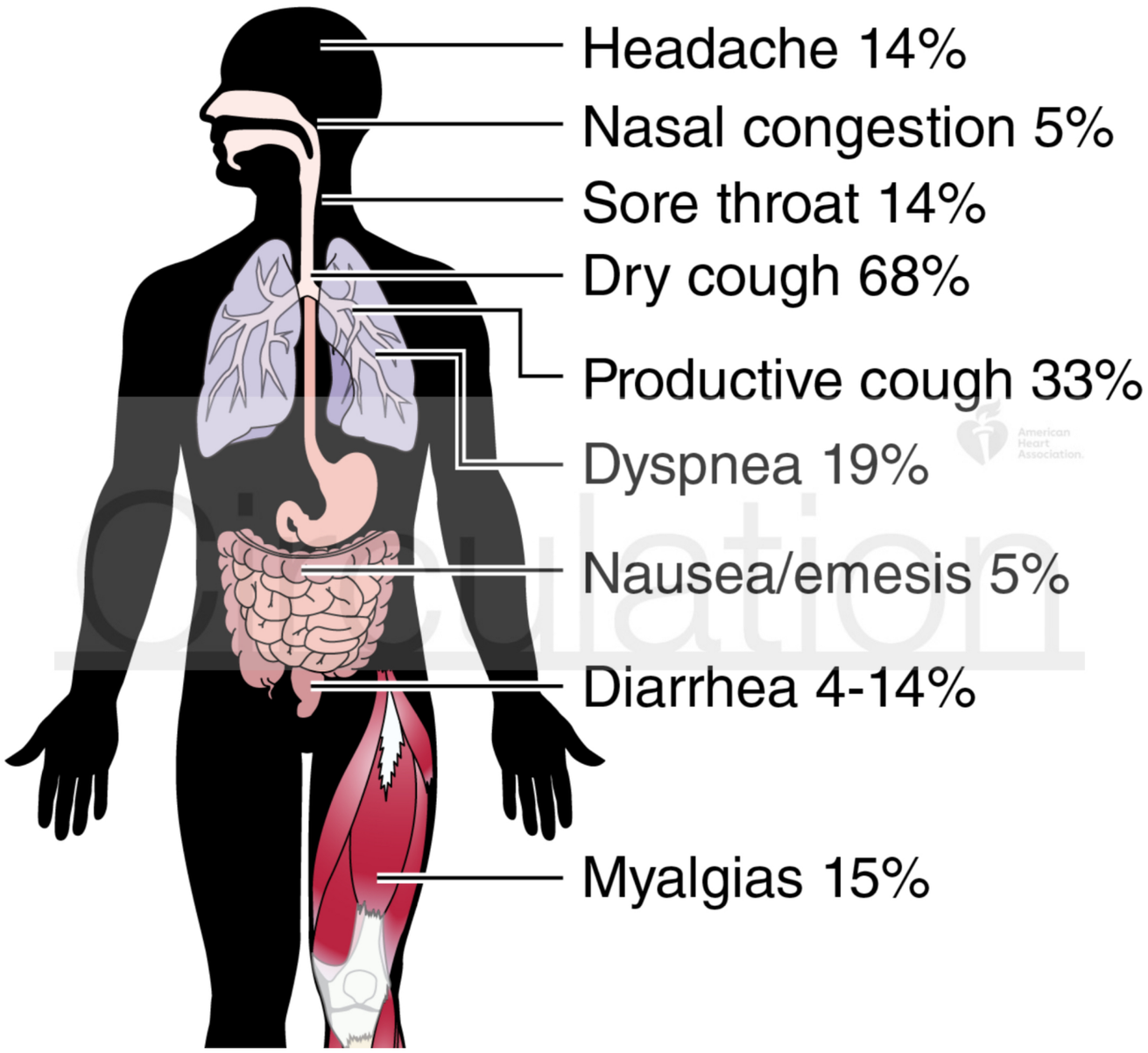


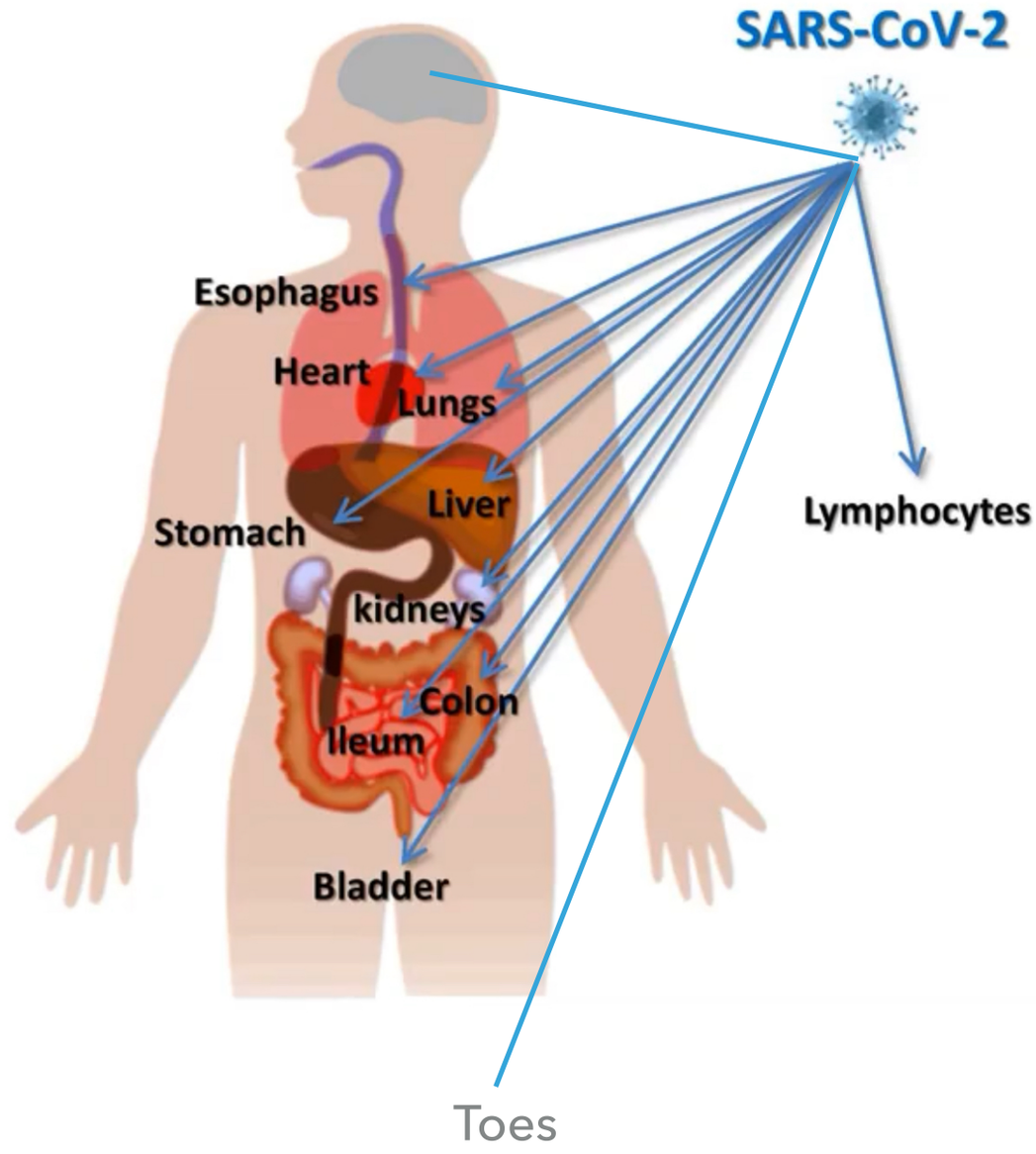
- Enveloped virus (with a plasma membrane), disrupted by surfactants/detergents, 60-80% alcohol, bleach.



- Sensitive to UV
  - 2–3x more sensitive than influenza virus to UV (Pubmed 17880524, 16254359).
  - Estimated 10-fold survival decrease after 2–3h direct sunlight
- Sensitive to temperature
  - 10-fold survival decrease with 5°C temperature increase (Pubmed 22312351)
  - Killed by 30min 75°C heat (Pubmed 14631830).

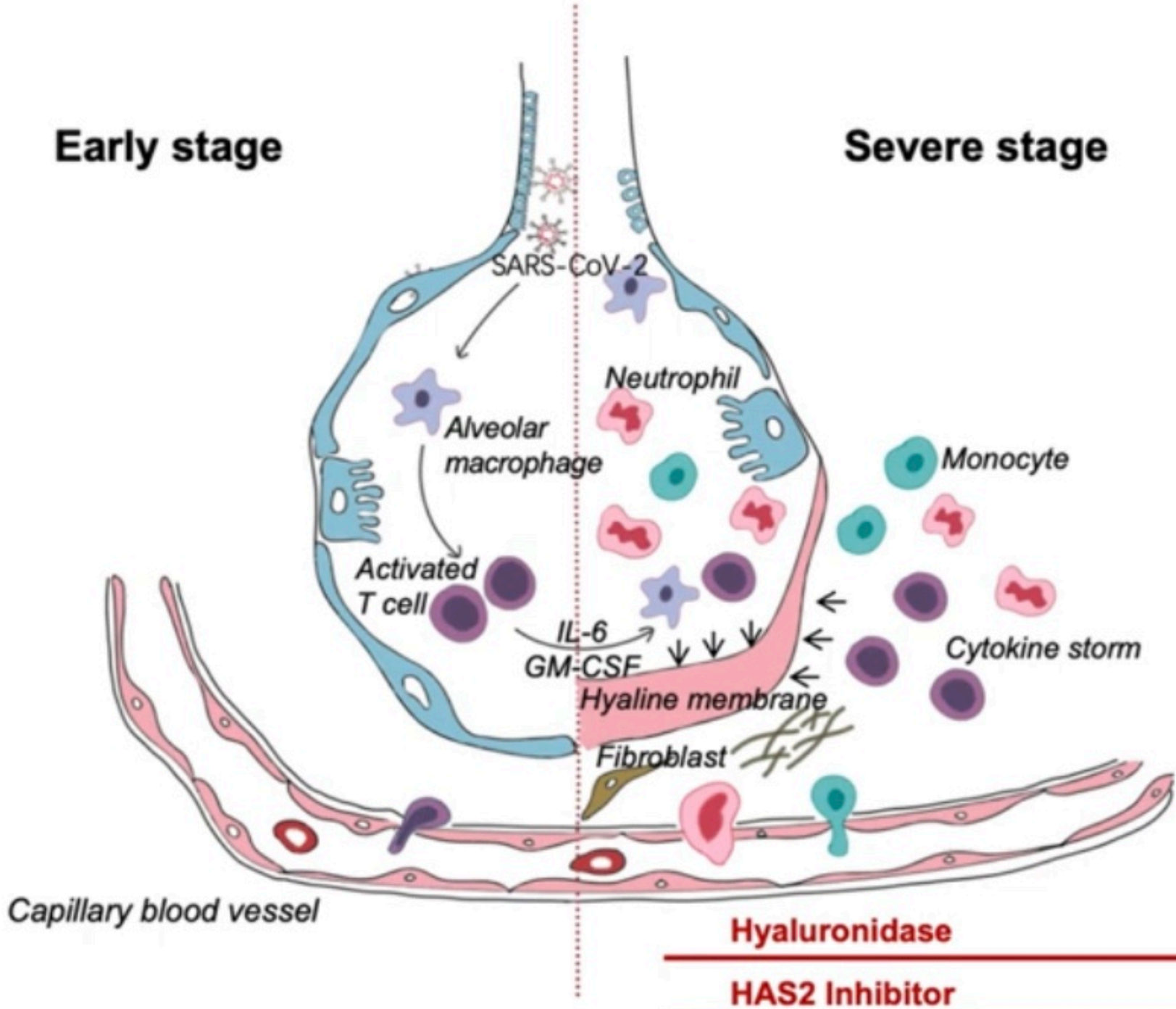
WHAT TO DO AND BE AWARE OF IF A HIGH-RISK INDIVIDUAL CONTRACTS THE VIRUS





FEVER: Contact your Healthcare Provider

LUNGS



Hyaluronidase

HAS2 Inhibitor

Activated MSCs

Immune Boosting (IFNα or antisera)

Vitamin B3

COVID-19 Progression

Non-severe

Severe

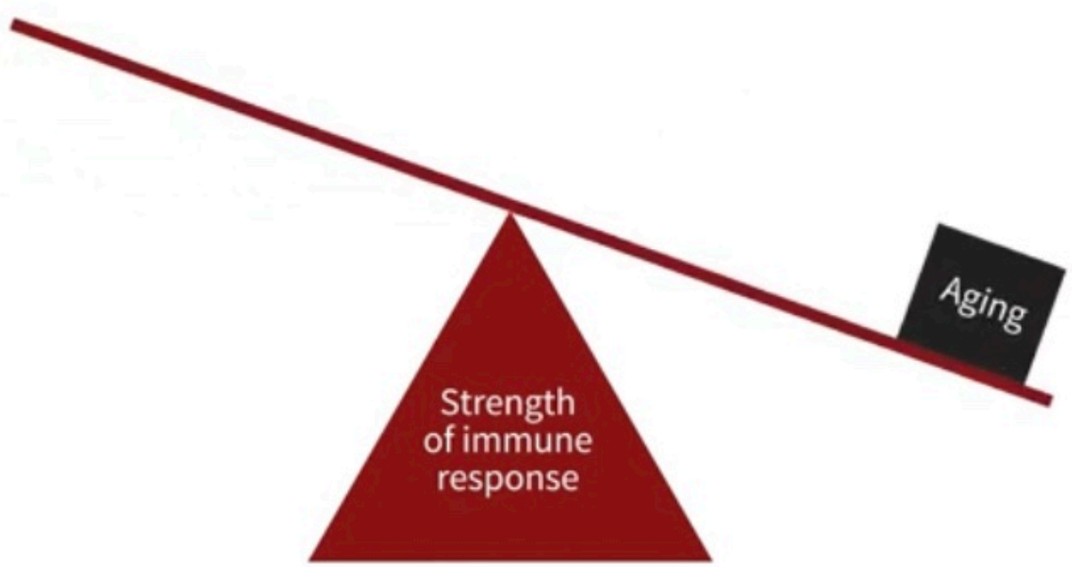
Progression to late disease varies by age

B cells
Robust secretion of
high-avidity antibodies

CD8+ CD28+ T cells
Diverse repertoire
Robust response to antigens

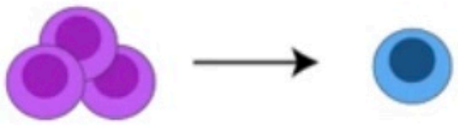
CD4+ T cells
Diverse repertoire
Robust response to antigens

Salutary environment



B cells
Reduced antibody avidity and/or
number of responding cells

CD8+ T cells
Expansion of CD8+ CD28- cells
Skewed repertoire



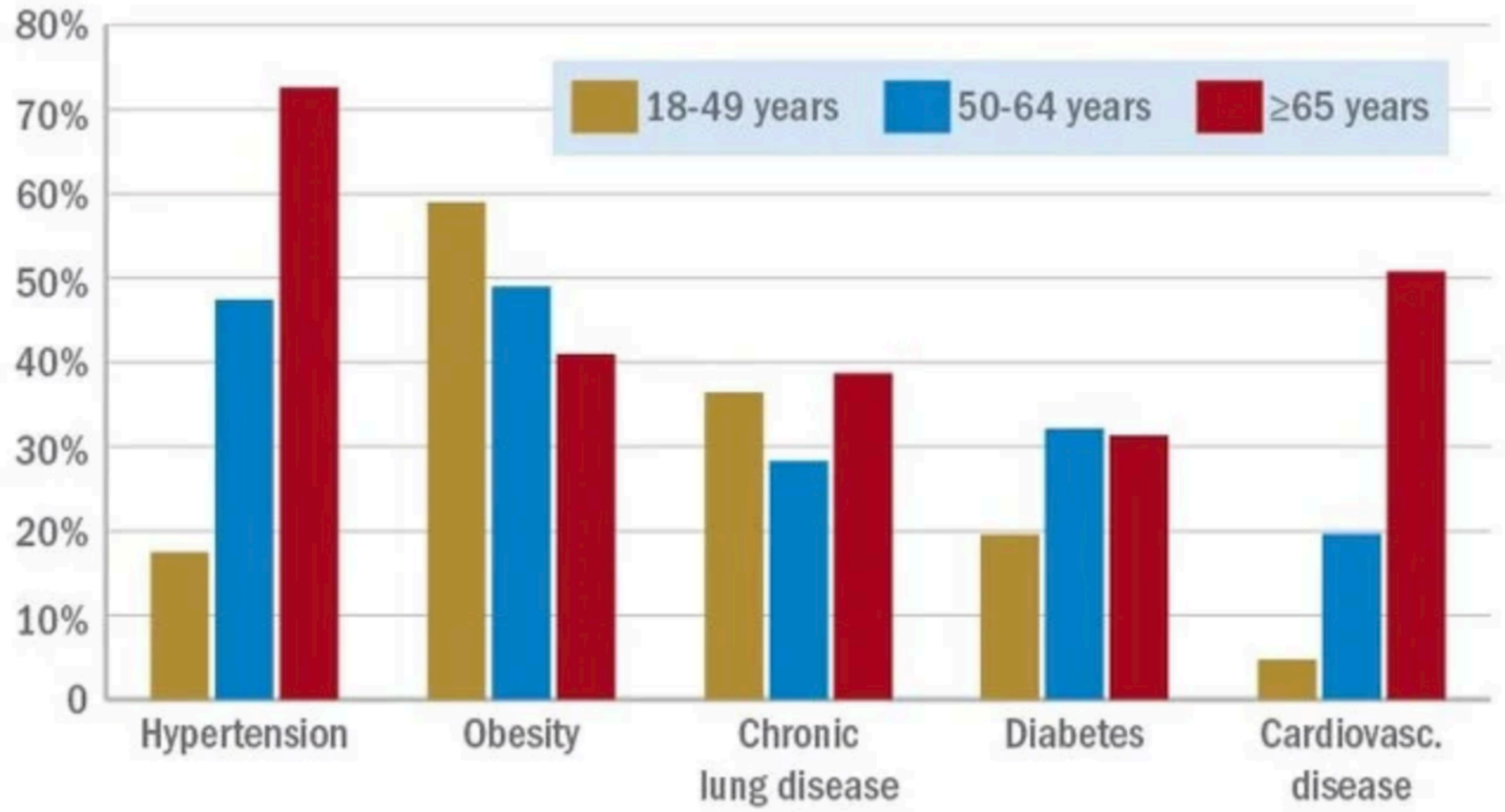
CD4+ T cells
Increase differentiation
into Th17 cells

Inflammatory environment

to respiratory viruses,
such as flu and SARS.

https://doi.org/10.1098/rsp

Underlying conditions among adults hospitalized with COVID-19



Note: Based on data from the COVID-19–Associated Hospitalization Surveillance Network for patients hospitalized in 99 counties in 14 states from March 1-30, 2020.

Source: MMWR. 2020 Apr 8:69(early release):1-7

WHAT MAKES AN INDIVIDUAL HIGH-RISK FOR CORONAVIRUS COMPLICATIONS ?

WHY ARE PEOPLE WITH CERTAIN CHRONIC CONDITIONS MORE SEVERELY AFFECTED THAN OTHERS?

	Total (n=191)	Non-survivor (n=54)	Survivor (n=137)	p value
Demographics and clinical characteristics				
Age, years	56·0 (46·0–67·0)	69·0 (63·0–76·0)	52·0 (45·0–58·0)	<0·0001
Sex	..	..	..	0·15
Female	72 (38%)	16 (30%)	56 (41%)	..
Male	119 (62%)	38 (70%)	81 (59%)	..
Exposure history	73 (38%)	14 (26%)	59 (43%)	0·028
Current smoker	11 (6%)	5 (9%)	6 (4%)	0·21
Comorbidity	91 (48%)	36 (67%)	55 (40%)	0·0010
Hypertension	58 (30%)	26 (48%)	32 (23%)	0·0008
Diabetes	36 (19%)	17 (31%)	19 (14%)	0·0051
Coronary heart disease	15 (8%)	13 (24%)	2 (1%)	<0·0001
Chronic obstructive lung disease	6 (3%)	4 (7%)	2 (1%)	0·047
Carcinoma	2 (1%)	0	2 (1%)	0·37
Chronic kidney disease	2 (1%)	2 (4%)	0	0·024
Other	22 (12%)	11 (20%)	11 (8%)	0·016

WHAT MAKES AN INDIVIDUAL HIGH-RISK FOR CORONAVIRUS COMPLICATIONS ?

- Hypertension is associated with a higher risk of severe COVID-19 disease and greate

mortality rates.

- Until further studies reveal the impact of pre-existing or de novo RAS blockade on

COVID-19 disease progression or severity, there is no justification to omit RAS blockers in

COVID-19 patients.

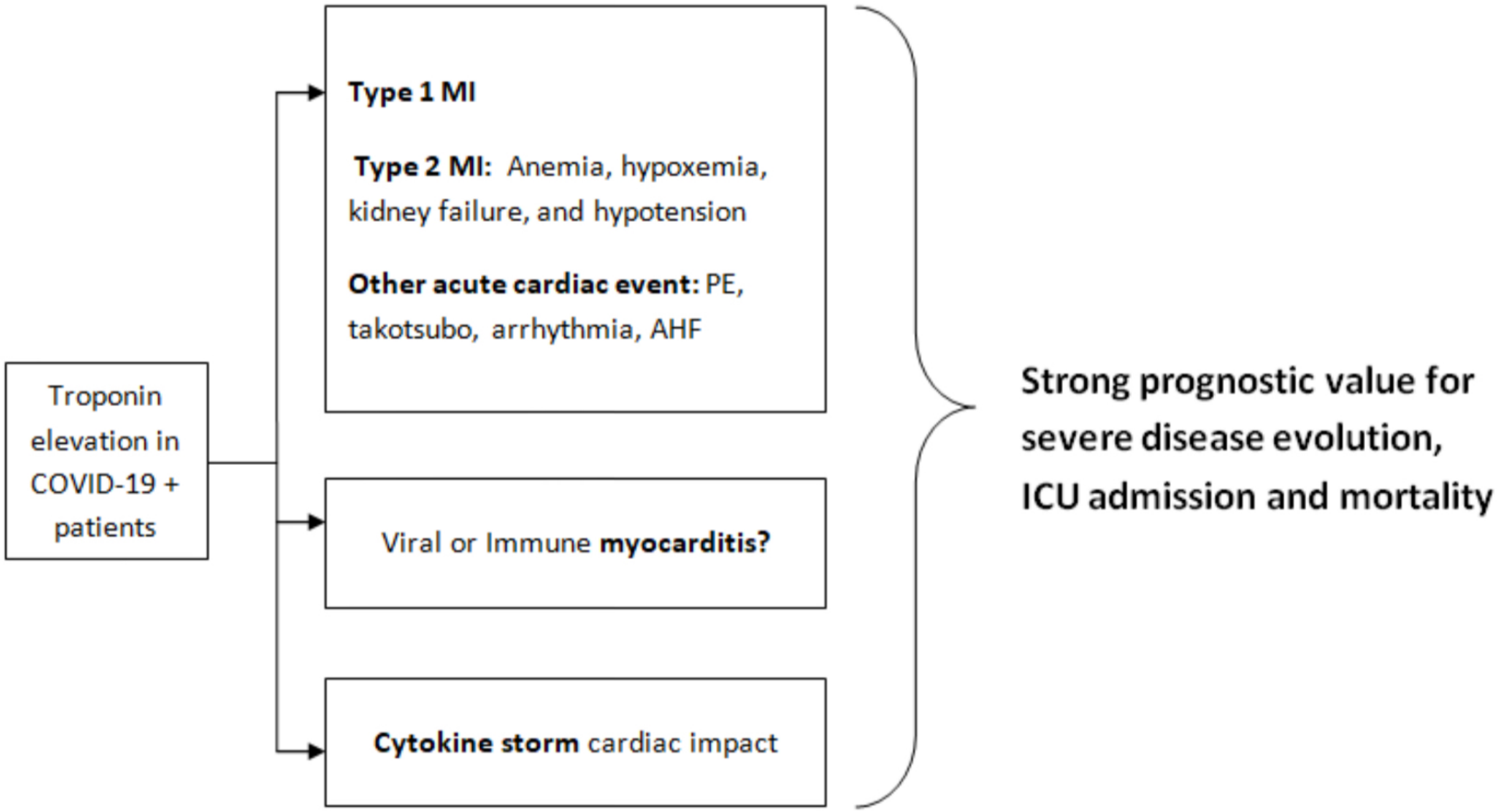
protective.[31, 32] Recent retrospective data may be consistent with this hypothesis.[33] In this

study, the use of ARBs in hypertensive patients with COVID-19 was associated with lower

risk of adverse outcomes (OR of severe disease=0·343). Another study in their retrospective

C 2020 JAMA editors

Figure 1: Etiology of troponin elevation in patients with SARS-COV-2 infection and its prognostic implication



AMI: Acute myocardial infarction, PE: pulmonary embolism, AHF: acute heart failure, MI: myocardial infarction, ICU: intensive care unit

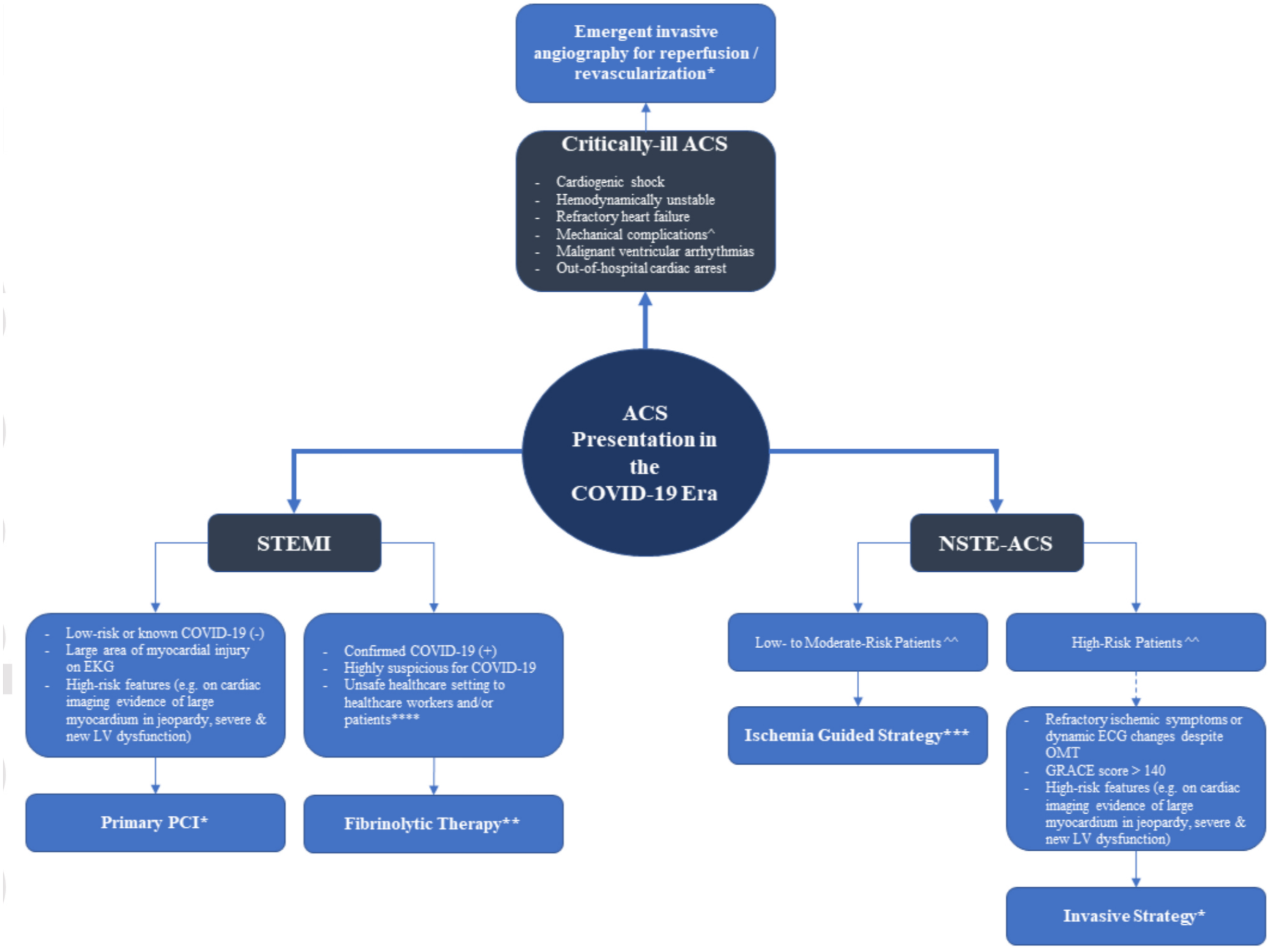
© 2020 JAMA editors

Take Home Points:

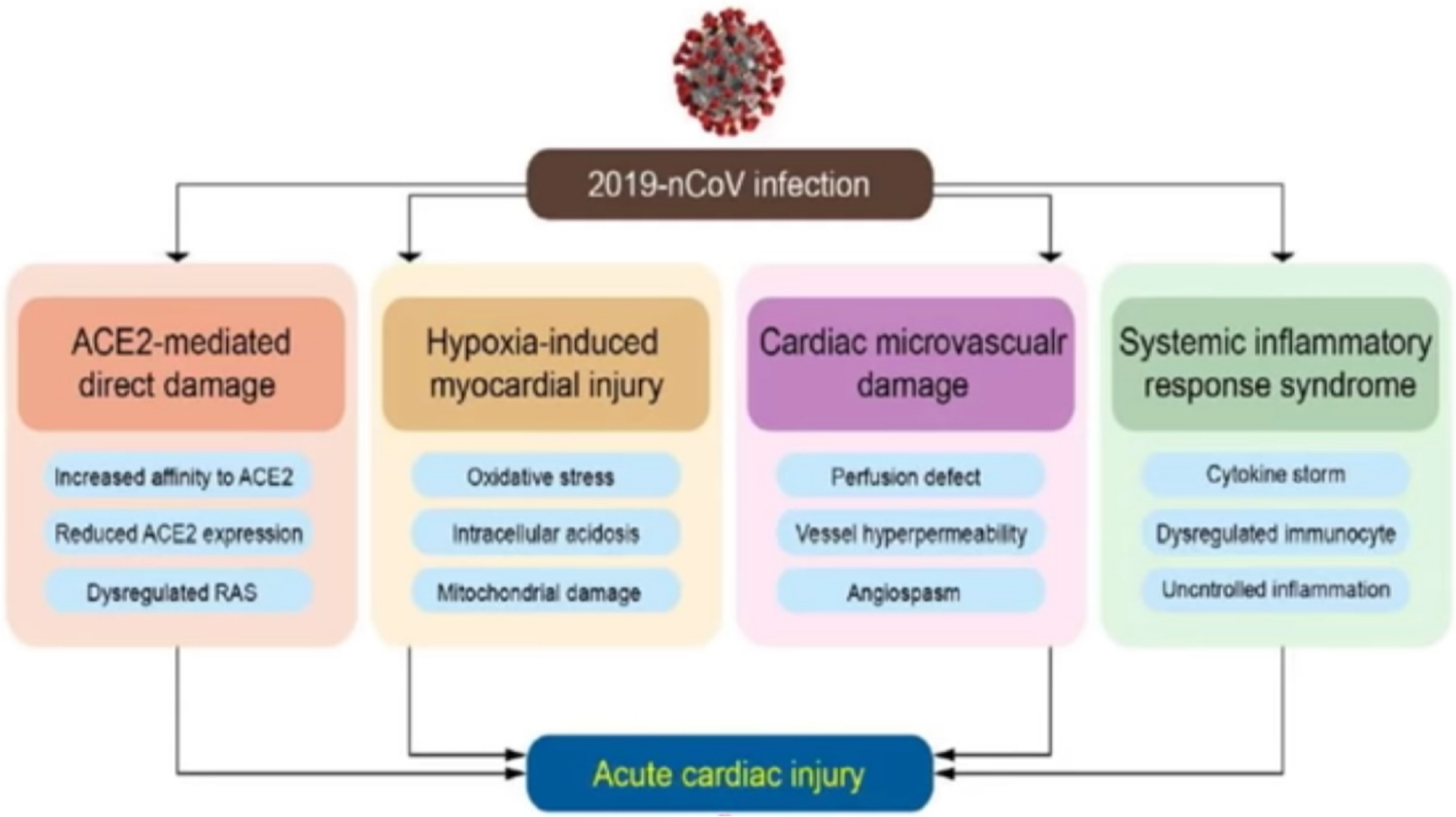
- Timely primary percutaneous coronary intervention (PCI) remains the mainstay treatment for ST-elevation myocardial infarction (STEMI).
- In case of patient- or system-related delays in mechanical reperfusion in the contemporary COVID-19 era, fibrinolytic therapy within door-to-balloon of 30 minutes may be an alternative treatment for STEMI in the absence of contraindications.
- An invasive strategy is highly recommended for patients with non-ST-elevation acute coronary syndrome (NTE-ACS) who are at high risk.
- In the COVID-19 era, and especially when the local community outbreak is increasing and the healthcare system is overwhelmed, moderate- and low-risk patients with NSTE-ACS can be treated with an ischemia-guided approach.

© 2020 JAMA editors

Figure 3. Invasive Therapies for ACS Patients in the COVID-19 Era.



Putative mechanisms of cardiac injury in COVID-19 patients



High IL1-beta,
IL-6,
IFN gamma
IL1-inhibitors

IL6-inhibitors
JAK-inhibitors

WHAT MAKES AN INDIVIDUAL HIGH-RISK FOR CORONAVIRUS COMPLICATIONS ?

- A significant proportion of patients with COVID-19 have evidence of myocardial injury, which portends a higher risk of ICU admission and death.

- Elevated troponin levels are frequently seen in patients with COVID-19 disease; and are associated with increased severity of disease and risk of death.
- In the absence of a specific etiology, elevated levels of troponins are likely due to myocardial injury from inflammation or a direct effect of SARS-CoV-2 infection.

- All patients with COVID-19, where clinically indicated, should be commenced on statins and antiplatelet therapy, if not already on them. Currently, there is no evidence to stop cardioprotective therapy, assuming no contra-indications.

- Cardiovascular healthcare professionals are at risk of contracting COVID-19, and best practices should be implemented to reduce the risk of patient-provider and provider-provider exposure.

C 2020 JAMA editors

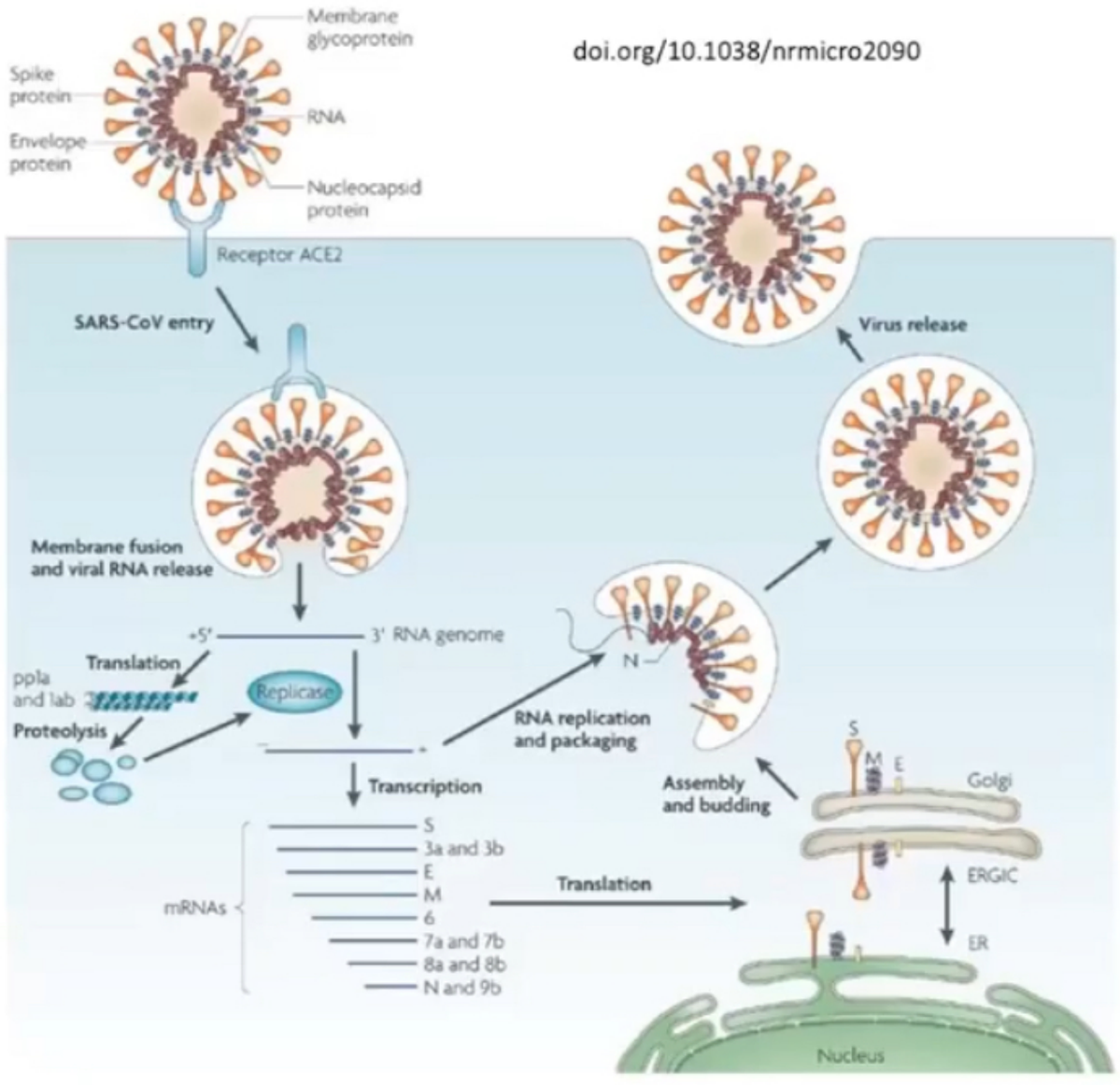
WHAT MAKES AN INDIVIDUAL HIGH-RISK FOR CORONAVIRUS COMPLICATIONS ?

- Vascular events appear to be a common complication of COVID-19 infection.
- The increased burden of vascular comorbidities among people with severe infection is only a partial explanation or such increased risk of events.
- Broad elevations of chemokines and cytokines occur in SARS-CoV2 infection, similar to cytokine release syndrome (CRS) seen in cancer patients on immune-modulating therapy. Yet, some overlap with troponin elevation has been seen.
- COVID-19 is associated with a high inflammatory burden that may cause arrhythmias due to increased metabolic demand, hypoxia and/or sympathetic stimulation in patients with and without pre-existing cardiovascular disease.
- New-onset ventricular arrhythmias combined with elevated troponin-T levels in the setting of COVID-19 should raise suspicion of myocarditis.
- Antiviral therapy for COVID-19 may lead to electrical disturbances (most often QTc prolongation) and increased arrhythmic risk.

C 2020 JAMA editors

WHAT ARE SOME OF THE TREATMENT OPTIONS FOR PEOPLE LIVING WITH CHRONIC CONDITIONS ?

SARS-CoV-1/2 life cycle



1. Spike protein (S) binds to ACE2.
2. The transmembrane protease TMPRSS or endosomal cathepsin L cleaves S to activate membrane fusion.
3. Cellular ribosomes translate a nonstructural polyprotein from the positive-strand RNA.
4. Embedded viral proteases process the polyprotein to create the replicase.
5. The replicase produces full-length copies of both strands and subgenomic mRNAs.
6. Ribosomes translate the subgenomic mRNAs to produce structural proteins.
7. Structural proteins package the positive-strand RNA and bud off into exocytic veicles.

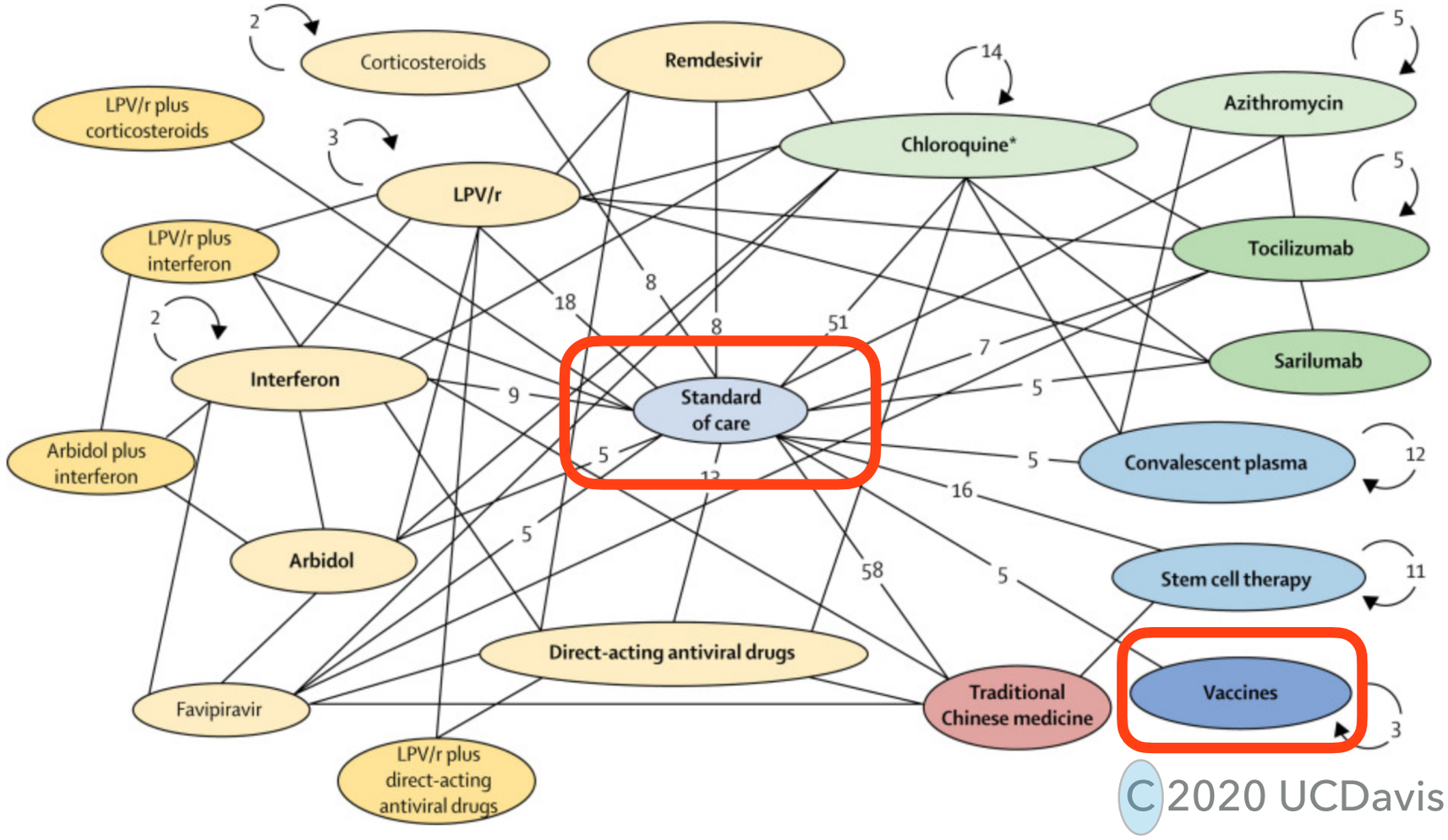
Treatment Protocols

Reopening Stategy: • the ability to monitor and protect communities through testing, tracking positive cases, properly isolate and support individuals who are positive and/or exposed to COVID-19.
• the ability to prevent infection in high-risk groups, including older residents, the homeless and those with underlying health conditions.
• the ability for hospitals and health care systems to handle a potential surge in cases through adequate staffing, hospital beds and supplies including ventilators, masks and other personal protective equipment.
• the ability to develop therapeutics to meet the demand.
• the ability for businesses, schools and child care facilities to support physical distancing guidelines as well as provide supplies and equipment to workforces and customers to keep them safe from illness.

- developing guidelines to determine when to reinstitute certain measures, such as Safer at Home guidelines, if necessary, based on relevant data.

Governor Gavin Newsom

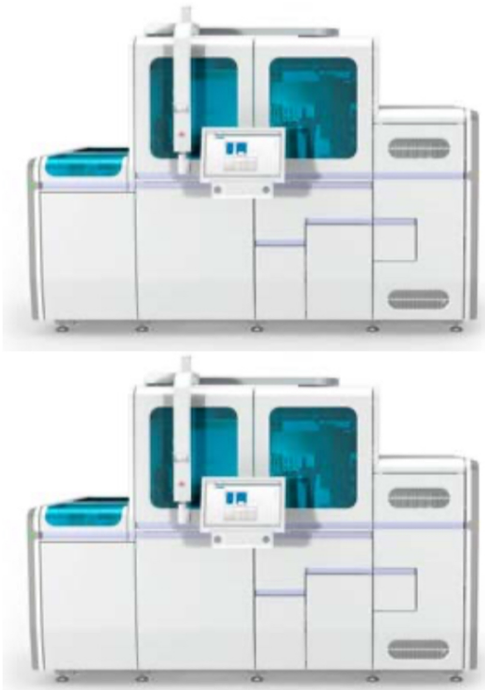
WHAT IT MEANS TO SAFELY RESUME EVERYDAY ROUTINES ONCE "STAY AT HOME" ORDERS BEGIN TO LIFT



C 2020 UCDavis Health

THE STATUS OF TESTING FOR COVID-19 INFECTION AND ANTIBODY TESTING

Testing Window and Workflow – PHASE IV PLAN (April 2020)



1,180 tests/day

Secondary 6800 for increased throughput and back-up

1,034 tests/day

Random Access Testing (no batched testing):
90 tests/hour for IgM and IgG Serology

720 tests/day

TODAY

Complete Clinical Molecular and Serology Solutions → 2 people per shift

©2020 UCDavis Health

QUESTIONS AND ANSWERS BACKUP SLIDES

TELEHEALTH POST-COVID 19

Adult and Pediatric Telehealth Services

We're proud to connect physicians and their patients with specialists at UC Davis Health

Adult Specialties

- Cardiology*
- Dermatology* (Store and Forward)
- Emergency Medicine
- Endocrinology*
- Genomic Medicine*
- Hepatology* (Hepatitis)
- Infectious Disease*
- Nephrology*
- Neurology*
- Neuromuscular Disease Medicine
- Neurosurgery*
- Nutrition*
- Ophthalmology* (Store and Forward)
- Orthopaedics
- Otolaryngology
- Perinatology*
- Plastic and Reconstructive Surgery
- Psychiatry*
- Psychology (Mental Health and Behavior)
- Pulmonary and Critical Care°
- Rheumatology*
- Thoracic Surgery
- Trauma
- Urology
- Vascular Surgery

UC DAVIS HEALTH | Center for Health and Technology

Clinical Telehealth | Connected Health | Education | Research | About Us | Co

20

Telehealth Publications

Research and Development

Collectively, more than 150 articles, abstracts, book chapters and reports have been submitted by faculty exploring various aspects of telemedicine and telehealth services since 1997. We frequently receive requests from other UC Davis departments and outside organizations to collaborate on telehealth research and publications.

Publications 2019

Crossen S, Marcin J, Qi L, Sauers-Ford H, Reggiardo A, Chen S, Tran V, Glaser N. **Video "Home Visits" for Children and Adolescents with Uncontrolled Type 1 Diabetes**. Diabetes Technol Ther. 2019 Aug 26. doi: 10.1089/dia.2019.0214. [Epub ahead of print]. PMID: 31448952

Dayal P, Chang, CH, Benko WS, Pollock BH, Crossen SS, Kissee J, Ulmer AM, Hoch JS, Warner L, Marcin JP. **Hospital Utilization Among Rural Children Served by Pediatric Neurology Telemedicine Clinics**. JAMA Netw Open. 2019 Aug 2;2(8):e199364. doi: 10.1001/jamanetworkopen.2019.9364. PMID: 31418803. PMCID: PMC6704740.

Kissee JL, Huang Y, Dayal P, Yellowlees P, Sigal I, Marcin JP. **Association Between Insurance and the Transfer of Children With Mental Health Emergencies**. Pediatr Emerg Care. 2019 July 1. doi: 10.1097/PEC.0000000000001881. [Epub ahead of print]. PMID: 31274825

Crossen S, Glaser N, Sauers-Ford H, Chen S, Tran V, Marcin J. **Response to 'Home-based video visits for pediatric patients with poorly controlled type 1 diabates**.' J Telemed Telecare. 2019 Jul 18:1357633X19861217. doi: 10.1177/1357633X19861217. [Epub ahead of print] No abstract available. PMID: 31319738

Plant JL, Marcin JP. **Sick, But Not Sick Enough?** Pediatr Crit Care Med. 2019 Jul;20(7):685-686. doi: 10.1097/PCC.0000000000001991. PMID: 31274799

Pediatric Specialties

- Allergy and Immunology
- Behavior and Development*
- Cardiology
- Critical Care
- Dermatology* (Store and Forward)
- Emergency Medicine*
- Endocrinology*
- Gastroenterology
- Genomic Medicine*
- Hematology/Oncology
- Infectious Disease
- Nephrology
- Neonatology*
- Neurology*
- Neuromuscular Disease Medicine
- Otolaryngology (Cleft and Craniofacial)
- Pediatric Hospital Medicine
- Psychiatry*
- Psychology* (Mental Health and Behavior)
- Psychology* (Mental Health and Evaluations)
- Pulmonary
- Urology

C 2020 UCDavis Health

TELEHEALTH POST-COVID 19

C 2020 UCDavis Health