Multidimensional Challenge of COVID-19, Including COVID-19 and HIV

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Disclosures: scientific advisory board for Merck

Multidimensional Challenge of Treating COVID-19

Clinical Manifestations	• Respiratory illness • Multisystem involvement • Thromboinflammation
Stage and Severity	• Early vs. late infection • Mild, moderate, severe, critical disease
Intervention	• Antivirals • Immunomodulators • Combination therapy • Rx complications: anticoagulation, ventilation

Covid-19: Testing and Isolation

Diagnosis and Testing:

- Diagnostic testing usually based on RT PCR of NP or nasal swab
- Antigen testing (less expensive and more rapid than PCR) may be helpful in identifying infected individuals who are asymptomatic to prevent transmission
- Serology usually + >=2 wks after sx onset; not useful in dx of acute infection

Isolation:

- PCR may remain + for wk to mo. but duration of infectivity <=10 d after sx onset in pts with mild-to-moderate disease; <15-20 d in those with severe illness or immunocompromise
- Isolation can generally be discontinued 10 d after symptom onset and resolution of fever for at least 24 hours (without use of anti-pyretics) and improvement of other symptoms

Wyllie A et al, NEJM 2020; Caulley L et al, Ann Int Med, 2020; Rhee C, CID, 25 Aug 2020
https://www.cdc.gov/coronavirus/2019-ncov/hcp/duration-isolation.html

Covid-19: Clinical Manifestations

Symptoms

- Fever, cough, sore throat, malaise, myalgias
- Gastrointestinal symptoms: anorexia, nausea, diarrhea
- Taste and smell disturbances
- Shortness of breath develops in some people; median 5-8 days after symptom onset

Lab findings

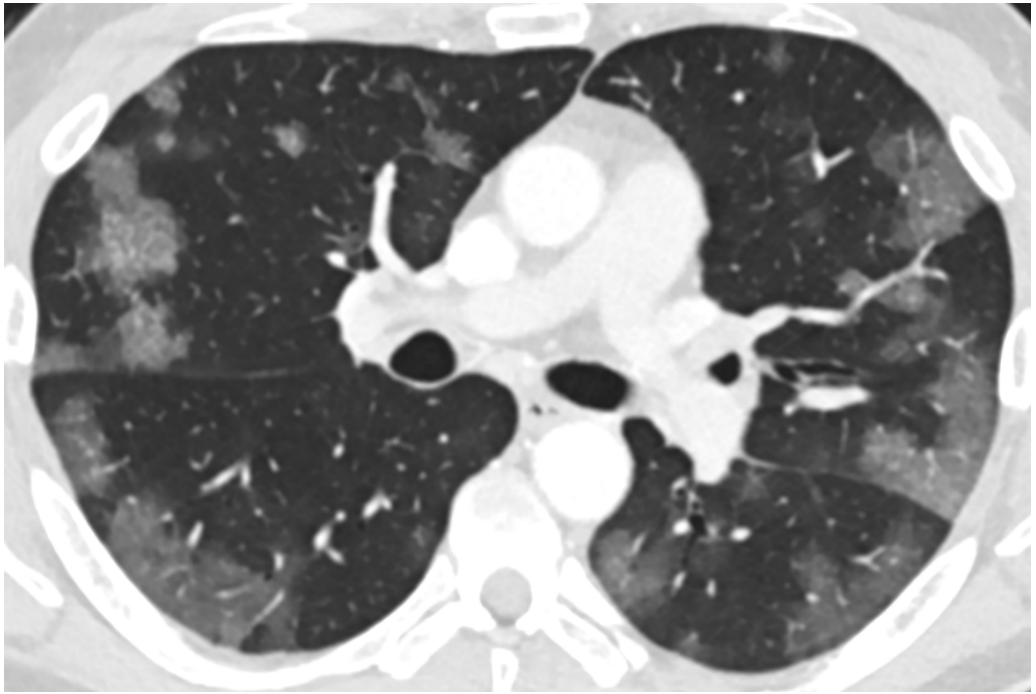
- Lymphopenia
- Elevated D-dimer, LDH, CRP, ferritin, liver enzymes, interleukin-6

Gandhi RT, Lynch JB, del Rio C, NEJM, 2020

Covid-19: Radiographic Features

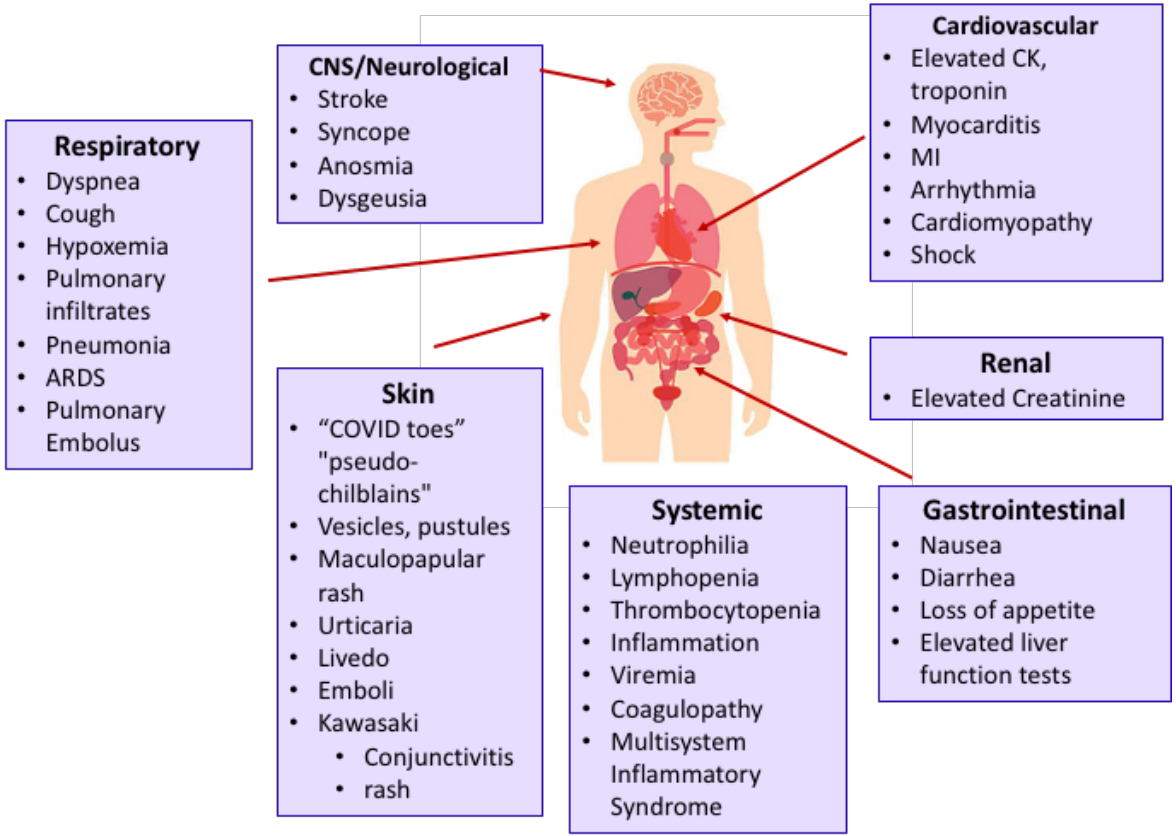
- Peripheral, bilateral ground glass opacities with or without consolidation

- Ground glass opacities may have rounded morphology



Courtesy of Dr. Brent Little (MGH Radiology)

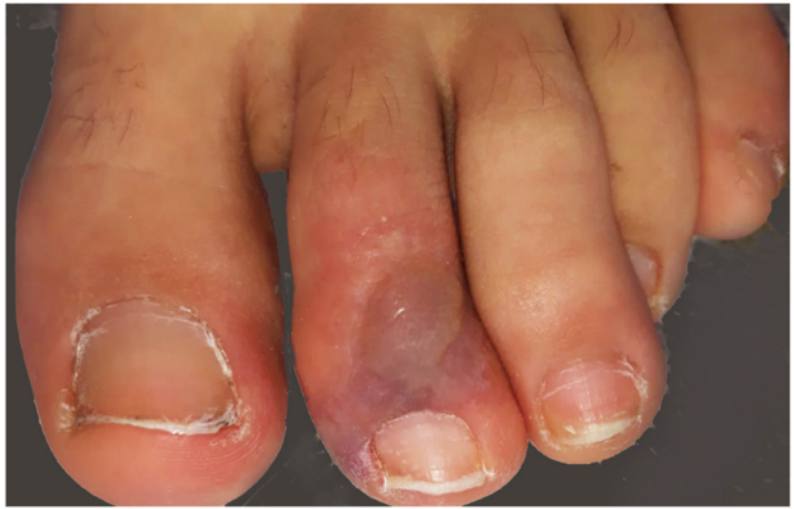
Clinical Presentation in Adults: A Multi-System Disease

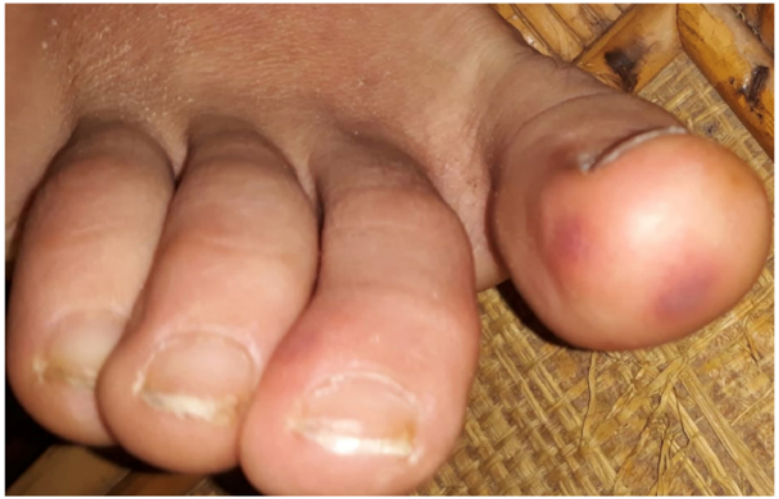


Slide courtesy of Dr. Jay Fishman, Mass General Hosp.

Pernio/chilblains-like

Erythematous to violaceous macules, papules, and papulonodules, some with pseudovesiculation at tips of digits and soles of feet.



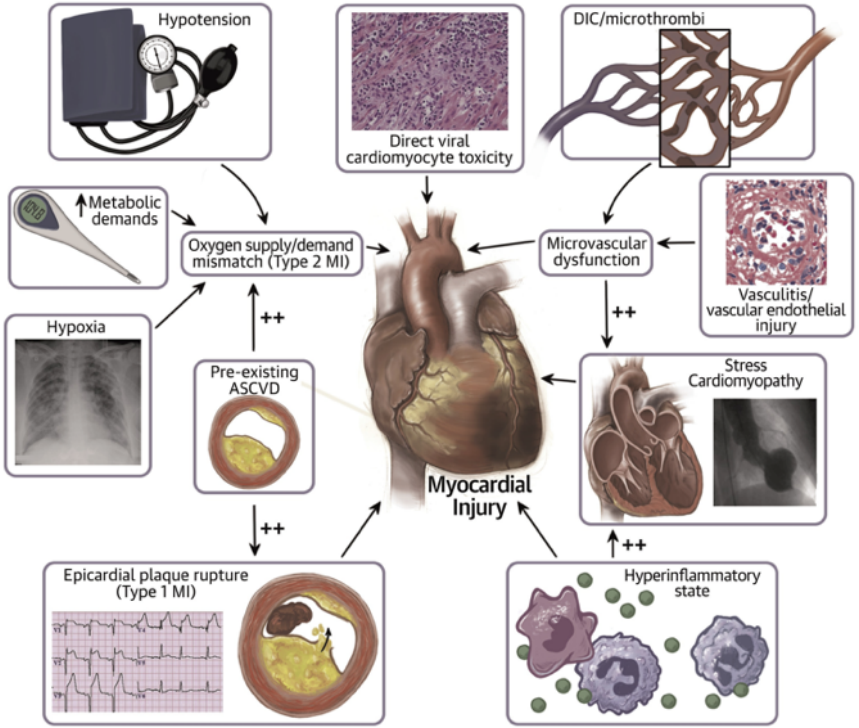


Slide courtesy of Dr. Daniela Kroshinsky (Mass General Hospital)

Mazzota F, Troccoli T. https://www.ejpd.com/en/mondayscase.

Cardiac Manifestations of COVID-19

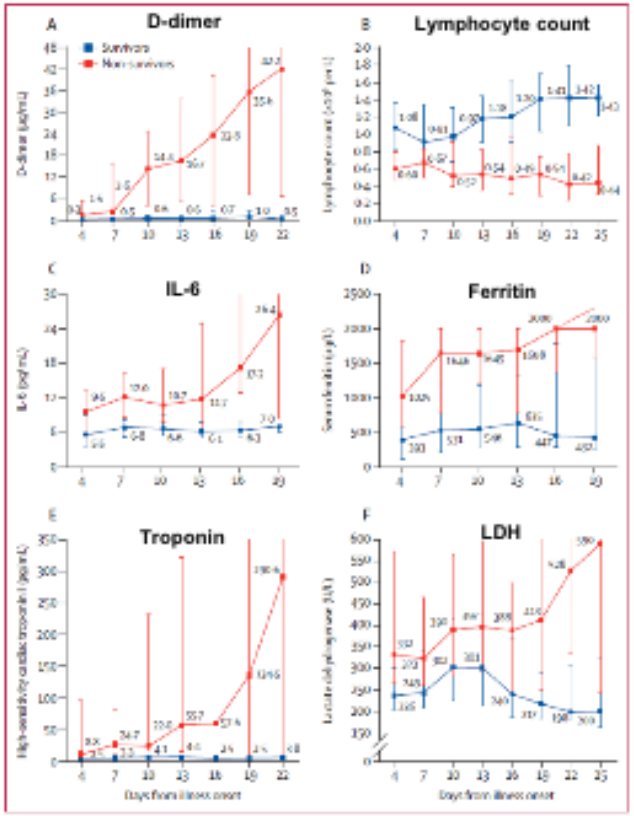
- Acute cardiac injury: elevated troponin
- Heart failure, cardiogenic shock
- Myocarditis
- Arrhythmias
- Thrombosis



Atri D et al JACC: Basic to Translational Science, 2020

Thromboinflammation and Mortality

- Elevated inflammatory and coagulation biomarkers associated more severe disease and mortality
- Inflammatory response may lead to endothelial injury, coagulopathy
- Complications may include pulmonary emboli, myocardial infarction, disseminated intravascular coagulation

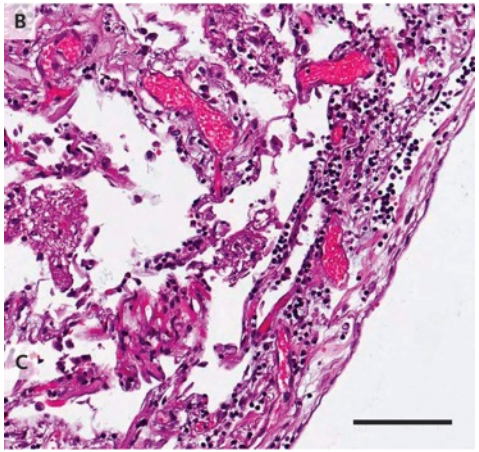


Zhou et al, Lancet 2020

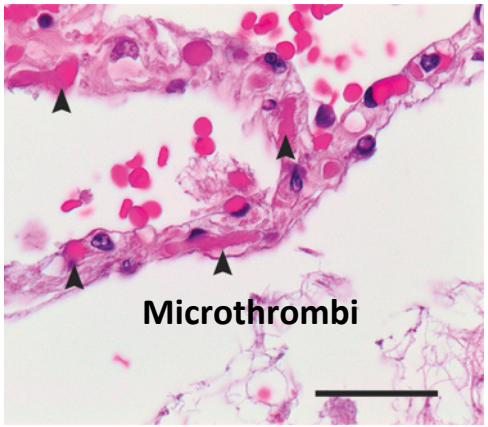
Pathology of COVID-19

- Lungs from people who died of COVID-19 (n=7), influenza-related acute respiratory distress syndrome (n=7) and uninfected people (n=10)

- COVID-19 lungs showed:
  - endothelial injury
  - widespread thrombosis
  - alveolar capillary microthrombi
  - intussusceptive angiogenesis



Lymphocytic pneumonia with multifocal endothelialitis



Ackermann M et al, NEJM, 2020

COVID-19 Spectrum

	Stage	Characteristics
	Asymptomatic/ presymptomatic infection	▪ Positive test for SARS-CoV-2 but no symptoms
~80%	Mild illness	▪ Varied symptoms (eg, fever, cough, sore throat, taste/smell disturbance) but no shortness of breath or abnormal imaging
~80%	Moderate illness	▪ SpO_2 ≥94% & lower respiratory disease (clinical or imaging findings)
~15%	Severe illness	▪ SpO_2 < 94%, PaO_2/FiO_2 < 300, respiratory rate >30/min, or lung infiltrates > 50%
~5%	Critical illness	▪ Respiratory failure, shock, and/or multiorgan dysfunction

Wu Z et al, JAMA 2020; NIH COVID-19 Treatment Guidelines. Last updated June 11, 2020. www.covid19treatmentguidelines.nih.gov.

Risk Factors for Severe COVID-19

- Older age
- Chronic lung disease
- Cardiovascular disease
- Type 2 diabetes mellitus
- Obesity (BMI of >=30)
- Sickle cell disease
- Chronic kidney disease
- Immunocompromised state from solid organ transplant

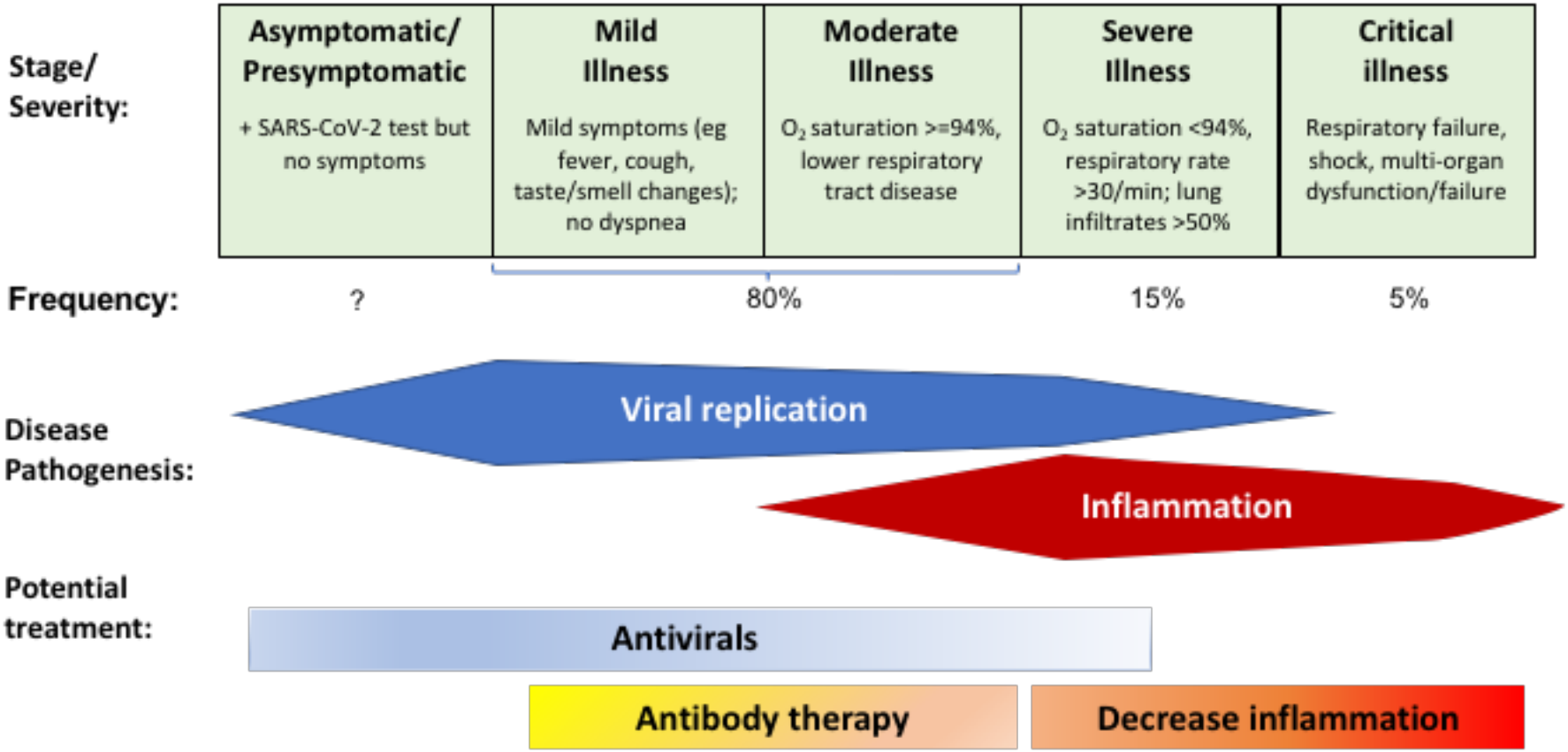
- Possible risk factors include:
  - Pregnancy
  - Other immuno-compromised states

Disproportionate burden of COVID-19 among racial and ethnic minorities, Native Americans, the poor

https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/evidence-table.html

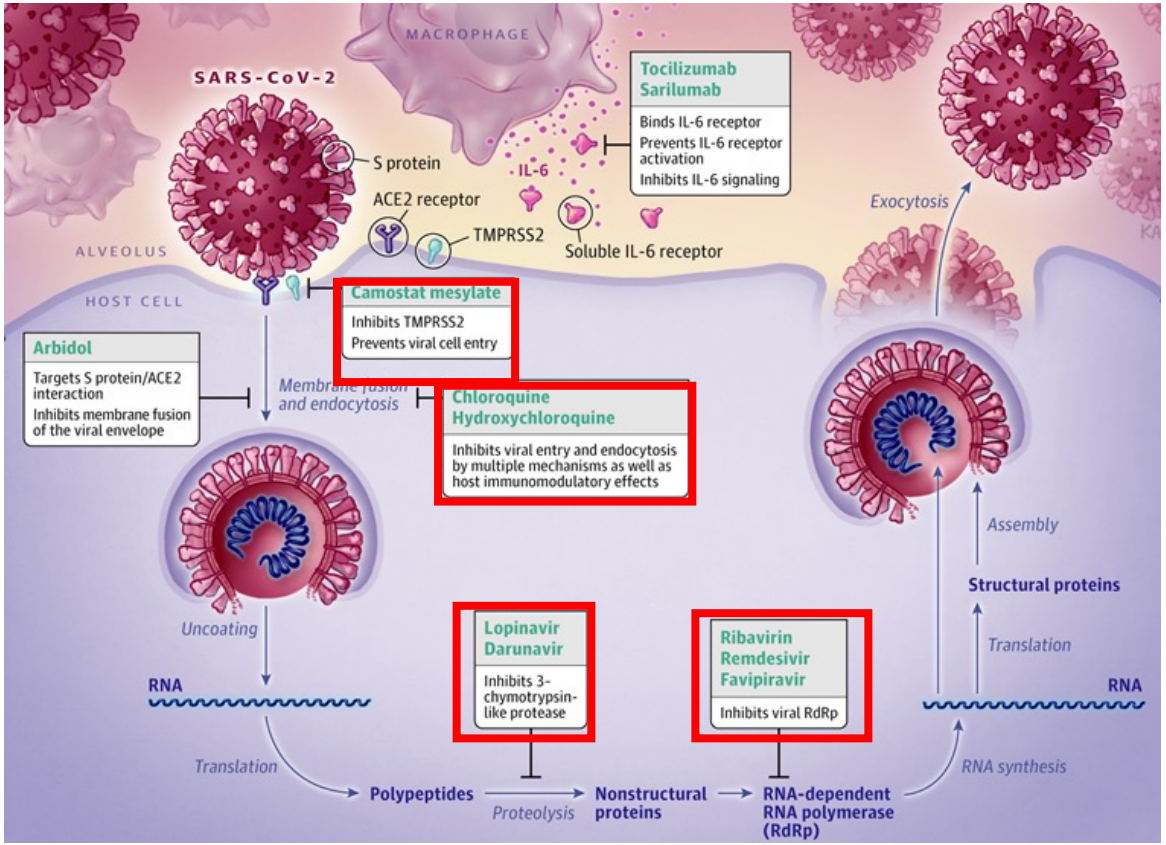
Williamson EJ et al, Nature, 2020

Treatment Across the COVID-19 Spectrum



Gandhi R. CID, 2020

SARS-CoV-2: Antiviral targets



- Viral entry: ACE2 and TMPRSS2: camostat
- Membrane fusion and endocytosis: hydroxychloroquine (HCQ)
- Viral protease: lopinavir/ritonavir
- RNA-dependent RNA polymerase: remdesivir, favipiravir

Sanders et al JAMA 2020

Case of HCQ: From single arm studies and observational cohorts

International Journal of Antimicrobial Agents
Available online 20 March 2020, 105949
In Press, Journal Pre-proof

Hydroxychloroquine and azithromycin as a treatment of COVID-19: results of an open-label non-randomized clinical trial

Philippe Gautret [a, b, $], Jean-Christophe Lagier [a, c, $], Philippe Parola [a, b], Van Thuan Hoang [a, b, d], Line Meddeb [a], Morgane Mailhe [a], Barbara Doudier [a], Johan Courjon [e, f, g], Valérie Giordanengo [h], Vera Esteves Vieira [a], Hervé Tissot Dupont [a, c], Stéphane Honoré [i, j], Philippe Colson [a, c], Eric Chabrière [a, c], Bernard La Scola [a, c], Jean-Marc Rolain [a, c], Philippe Brouqui [a, c], Didier Raoult [a, c]

the bmj | BMJ 2020;369:m1844 | doi: 10.1136/bmj.m1844

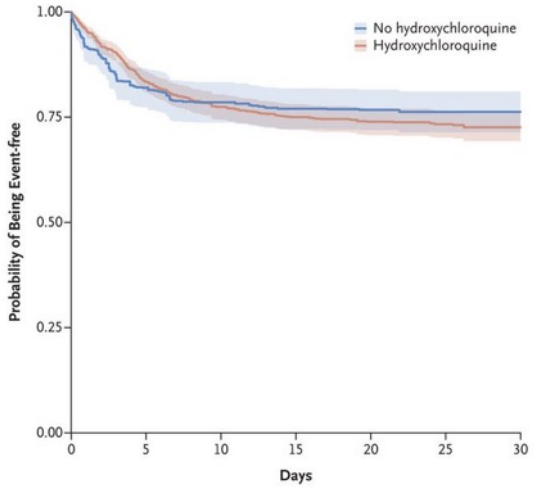
Clinical efficacy of hydroxychloroquine in patients with covid-19 pneumonia who require oxygen: observational comparative study using routine care data

Matthieu Mahévas,[1] Viet-Thi Tran,[2] Mathilde Roumier,[3] Amélie Chabrol,[4] Romain Paule,[3] Constance Guillaud,[1] Elena Fois,[1] Raphael Lepeule,[5] Tali-Anne Szwebel,[6] François-Xavier Lescure,[7] Frédéric Schlemmer,[8] Marie Matignon,[9] Mehdi Khellaf,[1] Etienne Crickx,[1] Benjamin Terrier,[6] Caroline Morbieu,[6] Paul Legendre,[6] Julien Dang,[2] Yoland Schoindre,[3] Jean-Michel Pawlotsky,[10] Marc Michel,[1] Elodie Perrodeau,[2] Nicolas Carlier,[11] Nicolas Roche,[11] Victoire de Lastours,[12] Clément Ourghanlian,[13] Solen Kerneis,[14] Philippe Ménager,[15] Luc Mouthon,[6] Etienne Audureau,[16] Philippe Ravaud,[2] Bertrand Godeau,[1] Sébastien Gallien,[17] Nathalie Costedoat-Chalumeau[2,6]

ORIGINAL ARTICLE

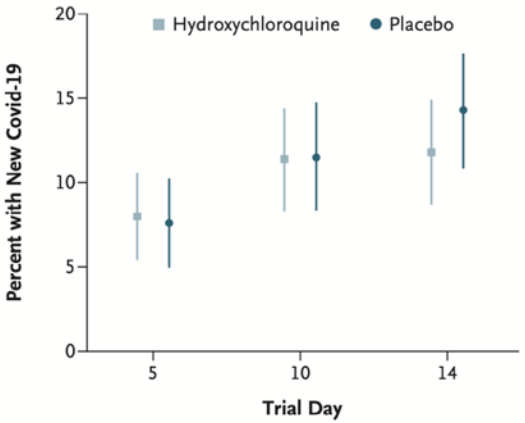
Observational Study of Hydroxychloroquine in Hospitalized Patients with Covid-19

Joshua Geleris, M.D., Yifei Sun, Ph.D., Jonathan Platt, Ph.D., Jason Zucker, M.D., Matthew Baldwin, M.D., George Hripcsak, M.D., Angelena Labella, M.D., Daniel K. Manson, M.D., Christine Kubin, Pharm.D., R. Graham Barr, M.D., Dr.P.H., Magdalena E. Sobieszczyk, M.D., M.P.H., and Neil W. Schluger, M.D.



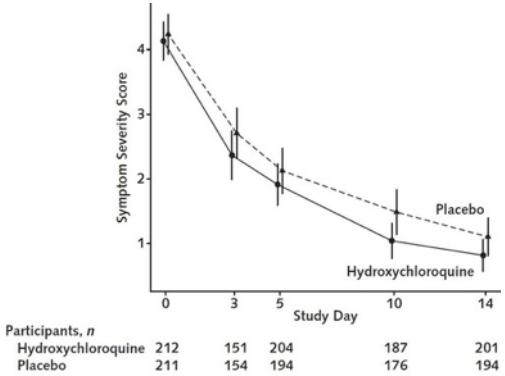
HCQ: To randomized controlled trials…

Post-exposure prophylaxis



Limitations: most participants enrolled 3-4 days after exposure; only 2-3% had confirmed dx

Early Treatment



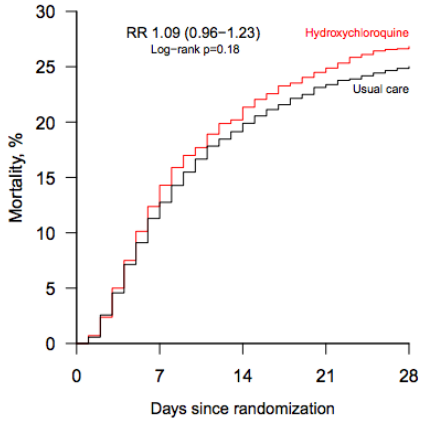
Limitations: lack of confirmed SARS-CoV-2 infection in large proportion of participants; endpoint changed to symptom severity score

Hospitalized patients

RECOVERY
Randomised Evaluation of COVID-19 Therapy

Statement from the Chief Investigators of the Randomised Evaluation of COVid-19 thERapY (RECOVERY) Trial on hydroxychloroquine, 5 June 2020

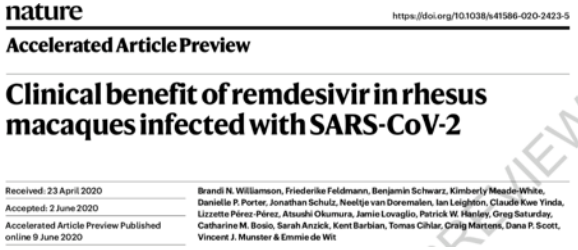
No clinical benefit from use of hydroxychloroquine in hospitalised patients with COVID-19



Boulware et al, NEJM 2020; Skipper CP et al, Ann Int Med, 2020
medRxiv 2020.07.15.20151852; doi: https://doi.org/10.1101/2020.07.15.20151852; Cavalcanti NEJM, 2020

The Case of Remdesivir (RDV)

- Nucleotide prodrug: inhibits viral RNA polymerase: chain terminator
- Macaques: reduced SARS CoV-2 levels in lung (not upper respiratory tract), ameliorated disease

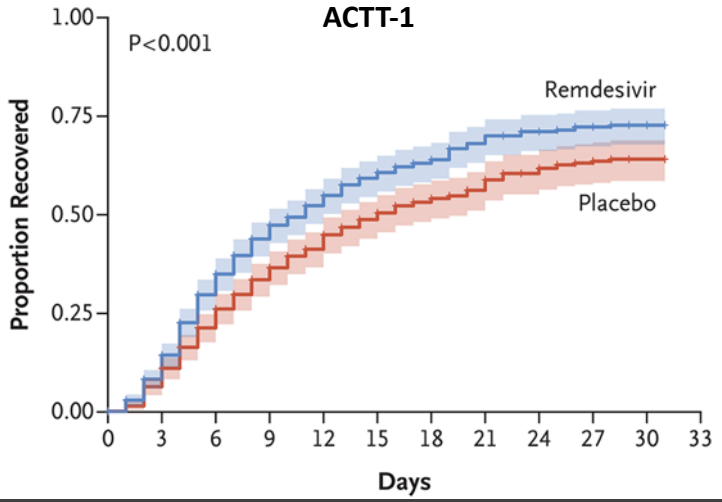

nature
https://doi.org/10.1038/s41586-020-2423-5
Accelerated Article Preview

Clinical benefit of remdesivir in rhesus macaques infected with SARS-CoV-2

Received: 23 April 2020
Accepted: 2 June 2020
Accelerated Article Preview Published online 9 June 2020

Brandi N. Williamson, Friederike Feldmann, Benjamin Schwarz, Kimberly Meade-White, Danielle P. Porter, Jonathan Schulz, Neeltje van Doremalen, Ian Leighton, Claude Kwe Yinda, Lizzette Pérez-Pérez, Atsushi Okumura, Jamie Lovaglio, Patrick W. Hanley, Greg Saturday, Catharine M. Bosio, Sarah Anzick, Kent Barbian, Tomas Cihlar, Craig Martens, Dana P. Scott, Vincent J. Munster & Emmie de Wit

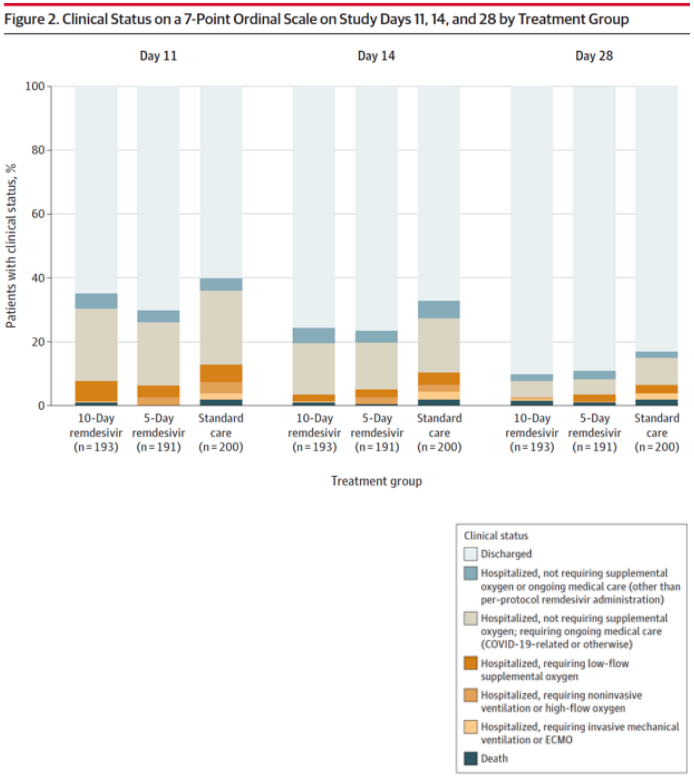
- Preliminary analysis of ACTT randomized trial: recovery more rapid with RDV than placebo (11 vs 15 d)
  - Mortality at 14 days: 7.1% RDV, 11.9% placebo (hazard ratio 0.7, 95% CI, 0.47 to 1.04).
  - Benefit of RDV clearest in those on supplemental oxygen but not intubated
- SIMPLE trial: in people with severe COVID-19 but not intubated: 5 days of RDV as good as 10 days



Williamson BN et al, Nature, 2020; Beigel JH et al, NEJM 2020; Goldman JD et al, NEJM 2020

Remdesivir (RDV) in Moderate COVID-19

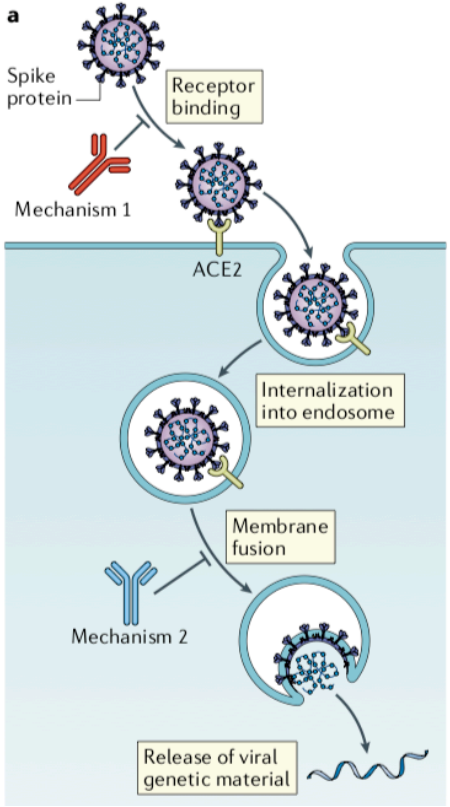
- 596 hospitalized patients with moderate COVID-19: pulmonary infiltrates, O_2 sat >94%
- Randomized to RDV 10-d, RDV 5-d, standard of care (SOC)
- Day 11:
  - RDV 10-day similar clinical status as SOC
  - RDV 5-day: better clinical status distribution as SOC but of “uncertain clinical importance”
- FDA EUA for RDV now extends to all hospitalized patients
- In hospitalized patients with moderate disease, may be reasonable to decide on RDV use on case-by-case basis



Spinner C et al, JAMA, 2020; https://www.fda.gov/media/137564/download

Antibody Therapy

- Passive transfer of neutralizing Ab: convalescent plasma (CP), monoclonal antibodies (mAb)
- >20,000 people with COVID-19 in US: transfusion reactions <1%; low rate of other complications
- Ongoing prophylactic & therapeutic trials of CP, mAb



Abraham J, Nature Reviews Immunology, 2020; Shen et al, JAMA 2020; Li JAMA 2020; Joyner M et al, Mayo Clin Proc, 2020

Boost immune responses

Convalescent Plasma (CP)

U.S. FOOD & DRUG ADMINISTRATION

NIH COVID-19 Treatment Guidelines

- On August 23, FDA issued emergency use authorization for CP based on analysis of data from Mayo Clinic Expanded Access Program (EAP)
- Compared outcomes among patients who received CP with high titers of neutralizing antibodies (Ab) to outcomes in patients with low titers (Broad Institute assay)
- No difference in 7-day survival
- Among patients who were not intubated: 11% of those who received CP with high Ab titers died within 7 days compared with 14% of those who received CP with low titers
- Post-hoc analyses by Mayo on ~3000 patients (out of ~35,000) suggested benefit of high titer plasma (Ortho-Clinical IgG assay) in patients who received CP within 3 days of diagnosis, who were not intubated, and were <80 yrs old
- Because of lack of comparison group and possibility of confounding, NIH COVID-19 Treatment Guidelines Panel (and FDA) conclude that CP should not be standard of care and that randomized trials should be completed

- https://www.medrxiv.org/content/10.1101/2020.08.12.20169359v1

Decrease inflammation

Steroids: Case of Dexamethasone

RECOVERY
Randomised Evaluation of COVID-19 Therapy
Open label, 175 NHS Hospitals in the UK

- Controversy regarding use of steroids in viral pneumonia, acute respiratory distress syndrome
- Given hyperinflammatory state in COVID-19, steroids evaluated as potential intervention
- Open label, randomized trial among hospitalized patients in the UK: 2104 received dex, 4321 usual care

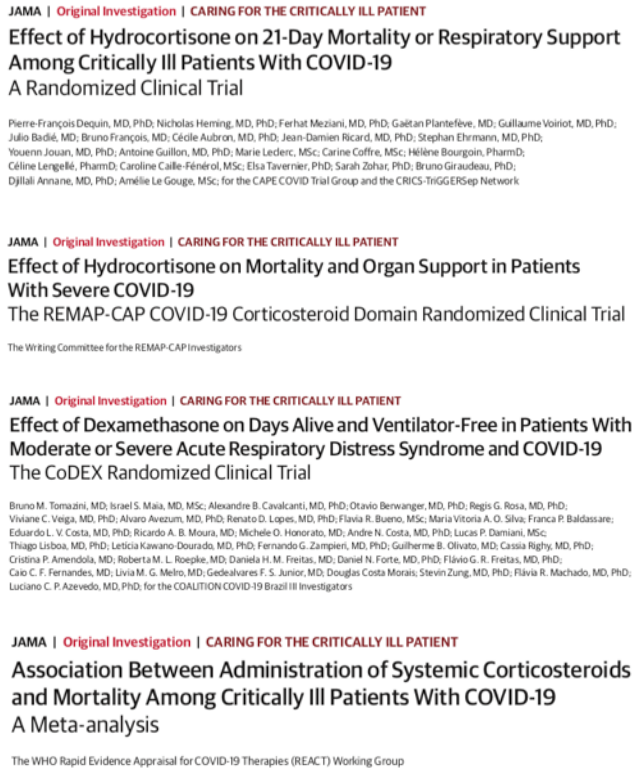
Mortality	Dex	Usual Care	RR mortality
All participants	22.9%	25.7%	**0.83** (0.75-0.93) **p<0.001**
Ventilation/ ECMO	29.3%	41.4%	**0.64** (0.51 – 0.81)
Oxygen only	23.3%	26.2%	**0.82** (0.72 – 0.94)
No oxygen	17.8%	14%	**1.19** (0.91 – 1.55)

Conclusion: Dexamethasone associated with decreased mortality among those on supplemental oxygen or on mechanical ventilation/ECMO. No benefit in those not requiring oxygen.

RECOVERY Collaborative Group, NEJM, 2020

Decrease inflammation

Steroids: Other evidence



JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Hydrocortisone on 21-Day Mortality or Respiratory Support Among Critically Ill Patients With COVID-19

A Randomized Clinical Trial

Pierre-François Dequin, MD, PhD; Nicholas Heming, MD, PhD; Ferhat Meziani, MD, PhD; Gaëtan Plantefève, MD; Guillaume Voiriot, MD, PhD; Julio Badié, MD; Bruno François, MD; Cécile Aubron, MD, PhD; Jean-Damien Ricard, MD, PhD; Stephan Ehrmann, MD, PhD; Youenn Jouan, MD, PhD; Antoine Guillon, MD, PhD; Marie Lederc, MSc; Carine Coffre, MSc; Hélène Bourgoin, PharmD; Céline Lengellé, PharmD; Caroline Caille-Fénérol, MSc; Elsa Tavernier, PhD; Sarah Zohar, PhD; Bruno Giraudeau, PhD; Djillali Annane, MD, PhD; Amélie Le Gouge, MSc; for the CAPE COVID Trial Group and the CRICS-TriGGERSep Network

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Hydrocortisone on Mortality and Organ Support in Patients With Severe COVID-19

The REMAP-CAP COVID-19 Corticosteroid Domain Randomized Clinical Trial

The Writing Committee for the REMAP-CAP Investigators

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Dexamethasone on Days Alive and Ventilator-Free in Patients With Moderate or Severe Acute Respiratory Distress Syndrome and COVID-19

The CoDEX Randomized Clinical Trial

Bruno M. Tomazini, MD; Israel S. Maia, MD, MSc; Alexandre B. Cavalcanti, MD, PhD; Otavio Berwanger, MD, PhD; Regis G. Rosa, MD, PhD; Viviane C. Veiga, MD, PhD; Alvaro Avezum, MD, PhD; Renato D. Lopes, MD, PhD; Flavia R. Bueno, MSc; Maria Vitoria A. O. Silva; Franca P. Baldassare; Eduardo L. V. Costa, MD, PhD; Ricardo A. B. Moura, MD; Michele O. Honorato, MD; Andre N. Costa, MD, PhD; Lucas P. Damiani, MSc; Thiago Lisboa, MD, PhD; Leticia Kawano-Dourado, MD, PhD; Fernando G. Zampieri, MD, PhD; Guilherme B. Olivato, MD; Cassia Righy, MD, PhD; Cristina P. Amendola, MD; Roberta M. L. Roepke, MD; Daniela H. M. Freitas, MD; Daniel N. Forte, MD, PhD; Flávio G. R. Freitas, MD, PhD; Caio C. F. Fernandes, MD; Livia M. G. Melro, MD; Gedealvares F. S. Junior, MD; Douglas Costa Morais; Stevin Zung, MD, PhD; Flávia R. Machado, MD, PhD; Luciano C. P. Azevedo, MD, PhD; for the COALITION COVID-19 Brazil III Investigators

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Association Between Administration of Systemic Corticosteroids and Mortality Among Critically Ill Patients With COVID-19

A Meta-analysis

The WHO Rapid Evidence Appraisal for COVID-19 Therapies (REACT) Working Group

CAPE COVID (France)

- 149 patients with COVID-19 in ICU
- 21-day mortality: 14.7% in hydrocortisone group; 27.4% in placebo group (p=0.06)

REMAP-CAP (International)

- 614 patients in ICU
- Hydrocortisone likely to be superior to no steroids in terms of organ support-free days

CoDEX (Brazil)

- 299 patients in ICU
- Dexamethasone: increase in ventilator-free days

WHO meta-analysis

- 1703 patients from 7 randomized trials
- Corticosteroids associated with lower mortality

Dequin, JAMA, 2020 ; Writing Committee for the REMAP-CAP Investigators, JAMA, 2020; Tomazini, JAMA, 2020; WHO Rapid Evidence Appraisal for COVID-19 Therapies (REACT) Working Group, JAMA, 2020

Decrease inflammation

Anti-IL-6 Inhibitors

- Elevated interleukin-6 levels associated with worse clinical outcomes; may be part of cytokine storm that can occur in severe COVID-19
- Early non-randomized studies suggested possible benefit of IL-6 inhibition
- Press releases from two randomized studies report anti-IL-6 receptor monoclonal antibodies (sarilumab, tocilizumab) failed to demonstrate efficacy in hospitalized people with COVID

https://www.sanofi.com/en/media-room/press-releases/2020/2020-07-02-22-30-00
https://www.clinicaltrials.gov/ct2/show/NCT04315298?term=sarilumab&cond=COVID-19&draw=2&rank=1;
https://www.roche.com/investors/updates/inv-update-2020-07-29.htm

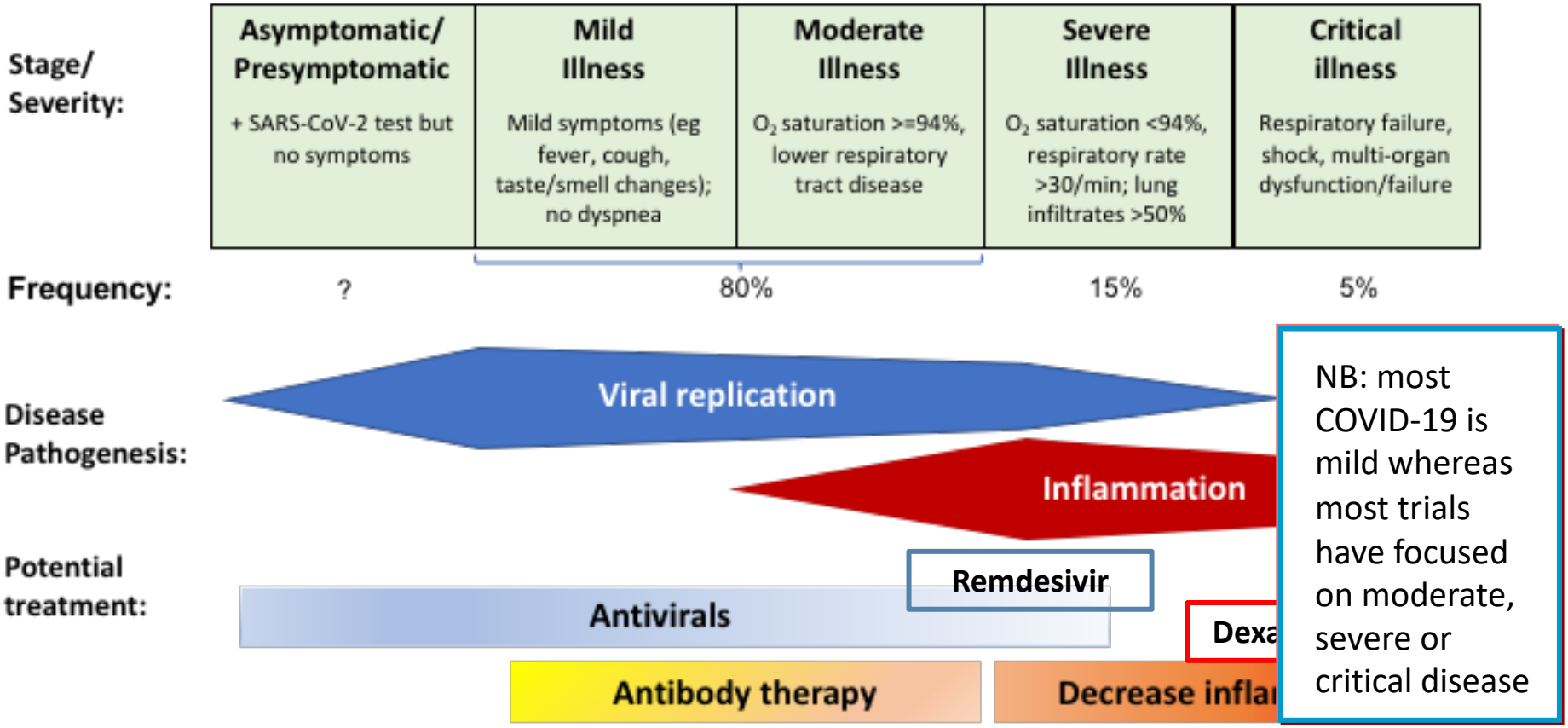
Decrease inflammation

Tocilizumab

- Randomized placebo-controlled manufacturer-funded trial in severe COVID-19 pneumonia (COVACTA)
- 294 received tocilizumab, 144 placebo
- Clinical status at day 28: no difference between the groups
- Median time to hospital discharge shorter in tocilizumab group (20 vs 28 days, p=0.037); median duration of ICU stay shorter in tocilizumab group (9.8 vs. 15.5 days, p=0.045)
- No difference in mortality (19.7% vs. 19.4%); serious adverse events (34.9 vs. 38.5%)

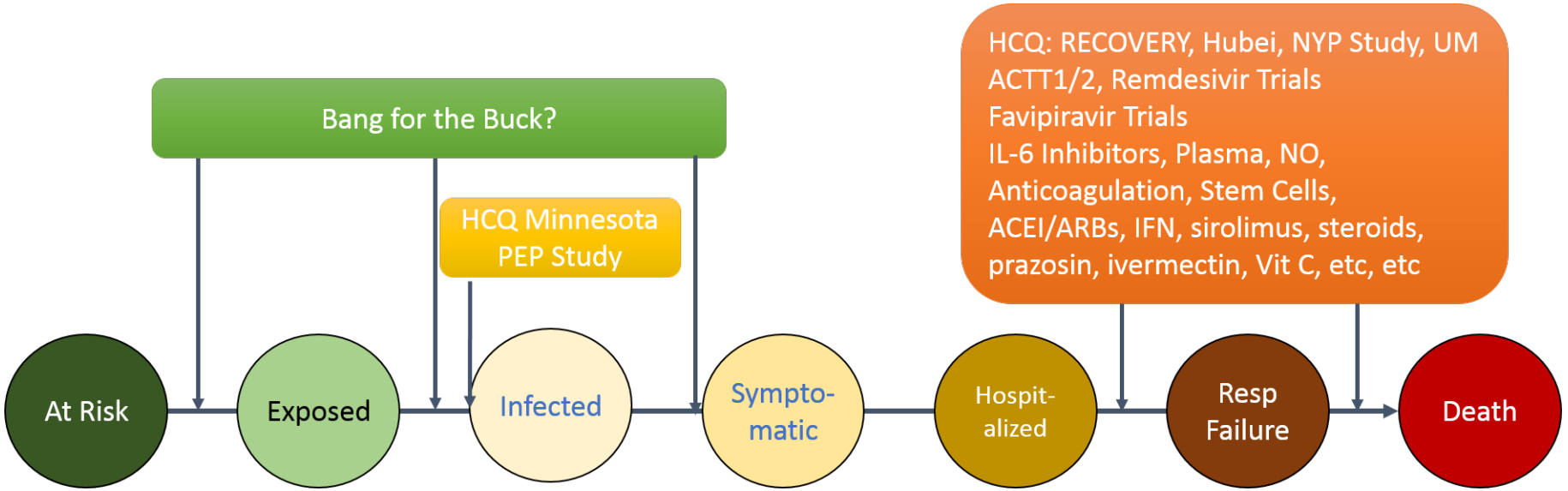
https://www.medrxiv.org/content/10.1101/2020.08.27.20183442v2

Treatment Across the COVID-19 Spectrum



Gandhi R. CID, 2020

Treatment Across the COVID-19 Infection Spectrum



Slide from Dr. Mark Siedner, MGH

Multi-Dimensional Challenge of COVID-19

- COVID-19 prevention and treatment requires multidimensional approach, with understanding of the host, stage/severity of disease, and intervention
- Depending on host, stage/severity of disease, therapy may differ: antiviral therapy, immunomodulator, combinations (antiviral + immunomodulator)
- **Lessons from HIV**
  - Pressure to deploy interventions must be tempered by importance of finding out if a treatment works: our guide must be the science
  - Iterative process, building on advances until tipping point is achieved

Siedner M, Gandhi RT, Kim AY, JID, 2020

COVID-19 and HIV

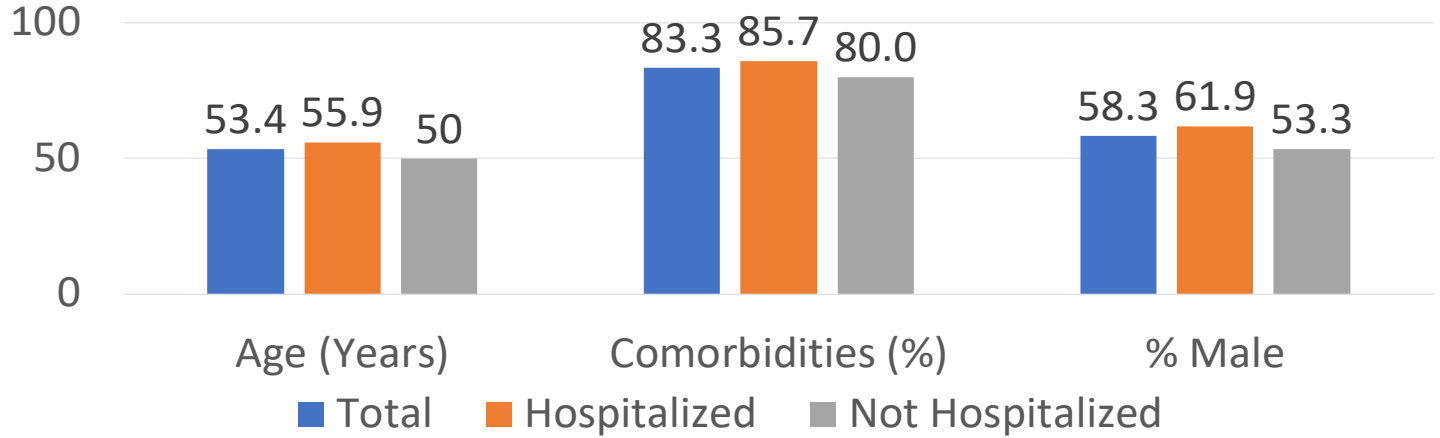
Is HIV a risk factor for severe COVID-19?

Do HIV medications have activity against SARS-CoV-2?

What is the impact of COVID-19 on HIV care and prevention?

HIV and COVID-19: MGH Series

- Between March 3 and April 26, 2020, identified 36 people with HIV with confirmed COVID-19; another 11 with probable infection
- Nearly half (16/36) lived or worked in congregate setting
- ~85% had non-HIV comorbidity: obesity, cardiovascular disease, etc.

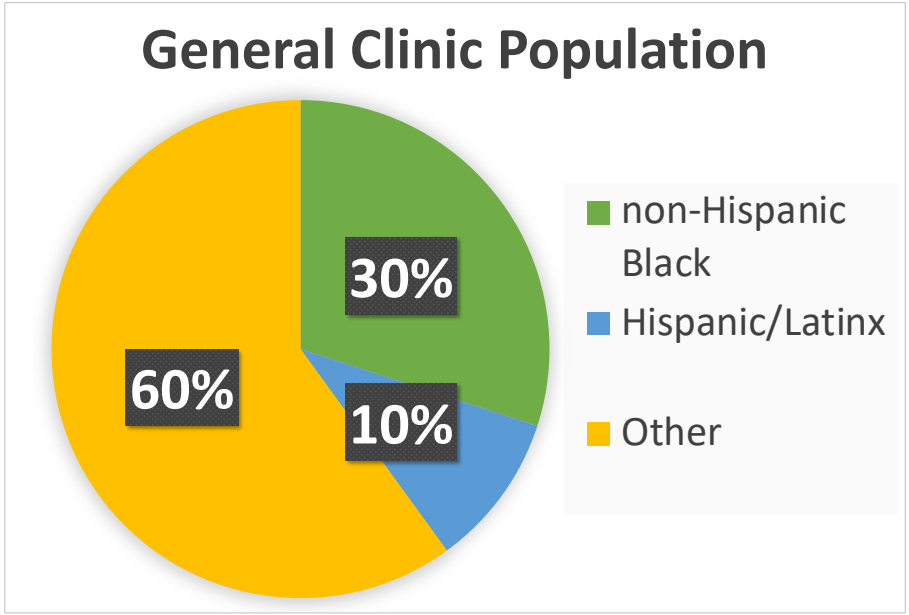


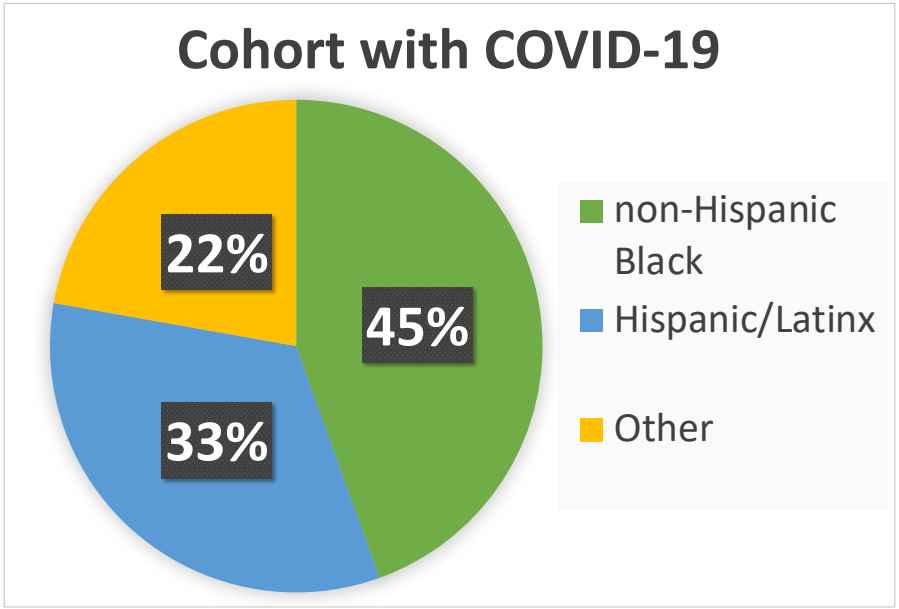
Meyerowitz E et al, AIDS 2020, Virtual Covid 2020

Disproportionate Burden of COVID-19 Among Racial/Ethnic Minorities with HIV

40% of people with HIV in MGH Clinic are Blacks or Latinx

77% of people with HIV and COVID-19 were non-Hispanic Blacks or Latinx



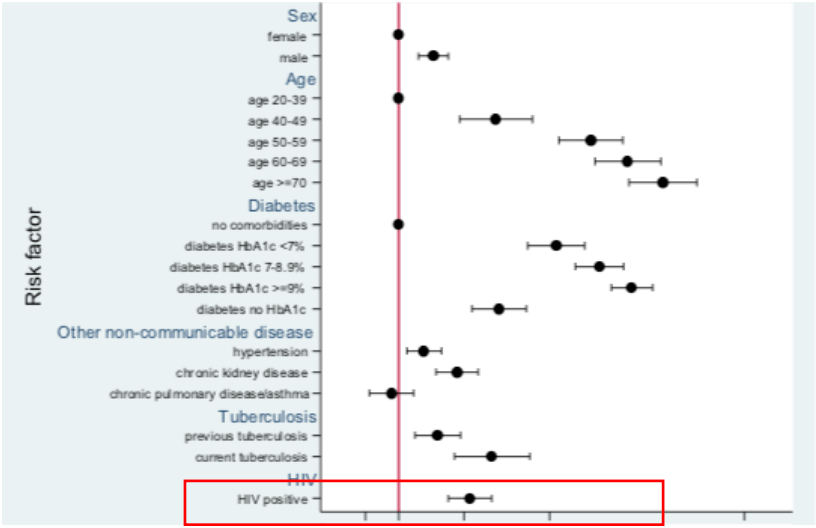


Meyerowitz E et al, AIDS 2020, Virtual Covid 2020

Is HIV a risk factor for COVID-19? South Africa

- About 3.5 million active public sector adult patients; ~520,000 with HIV
- ~22,000 COVID-19 and not deceased; 625 COVID-19 deaths
- Adjusted hazard ratio for COVID-19 mortality for HIV: 2.14 (1.7, 2.7); irrespective of viral suppression/immunosuppression
- Cannot rule out residual confounding (eg socioeconomic status, obesity)

Associations with COVID-19 Death



National Institute for Communicable Diseases, Covid-19 Special Health Surveillance Bulletin, June 22, 2020; Davies MA medRxiv doi.org/10.1101/2020.07.02.20145185; Boulle A et al, CID, 2020

Is HIV a risk factor for COVID-19? UK

- **National Health Service: OpenSAFELY**
  - 17.3 million adults; 27,480 with HIV
  - 14,882 COVID-19 deaths; 25 deaths among those with HIV
  - After adjustment, HIV associated with 2.3-fold higher risk of COVID-19 death. Association larger among Blacks.
- **ISARIC CCP-UK prospective cohort**
  - 47,539 hospitalized patients with COVID; 115 with HIV
  - After adjustment, HIV associated with 1.49-fold higher COVID mortality.

Bhaskaran K, Rentsch CT, MacKenna B, et al. https://www.medrxiv.org/content/10.1101/2020.08.07.20169490v1.
Geretti AM, Stockdale A, Kelly S, et al. https://www.medrxiv.org/content/10.1101/2020.08.07.20170449v1.

Is HIV a Risk Factor for Severe COVID-19? VA Study

- Veterans Aging Cohort Study
- Risk of severe COVID outcomes similar by HIV status

	PWH n=30,981	Uninfected n=76,745	OR (95% CI)
COVID+	253	504	
Hospitalized	34%	35%	1.09 (0.85, 1.41)
ICU	14%	15%	1.08 (0.72, 1.62)
Death	9.5%	11.1%	1.08 (0.66, 1.75)

Park et al., AIDS 2020, Virtual Covid 2020

COVID-19 and HIV

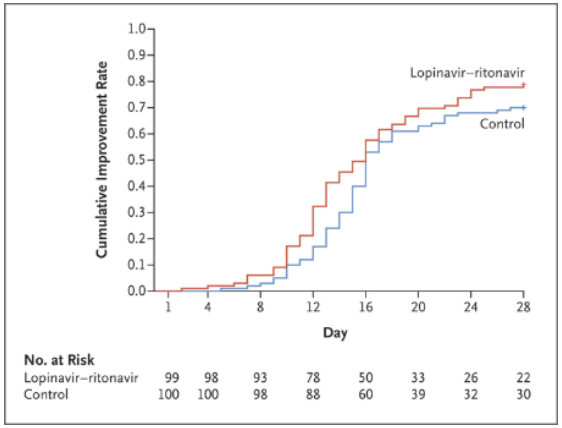
Is HIV a risk factor for severe COVID-19?

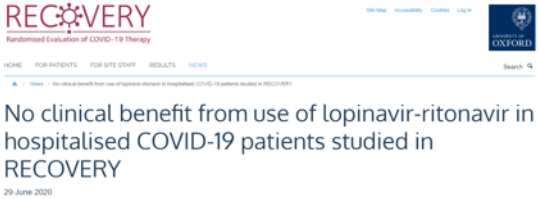
Do HIV medications have activity against SARS-CoV-2?

What is the impact of COVID-19 on HIV care and prevention?

Does Lopinavir/ritonavir work against COVID-19?

- In vitro, LPV/r inhibits SARS-CoV protease; has been used off-label to treat people with COVID
- Randomized trial in China (n=199), LPV/r had no impact on clinical improvement, mortality
- RECOVERY: ~1600 patients randomized to LPV/r; ~ 3400 to usual care: no impact on mortality; mechanical ventilation progression, length of stay
- Likely explanation: levels needed to inhibit SARS-CoV-2 likely not achieved in vivo

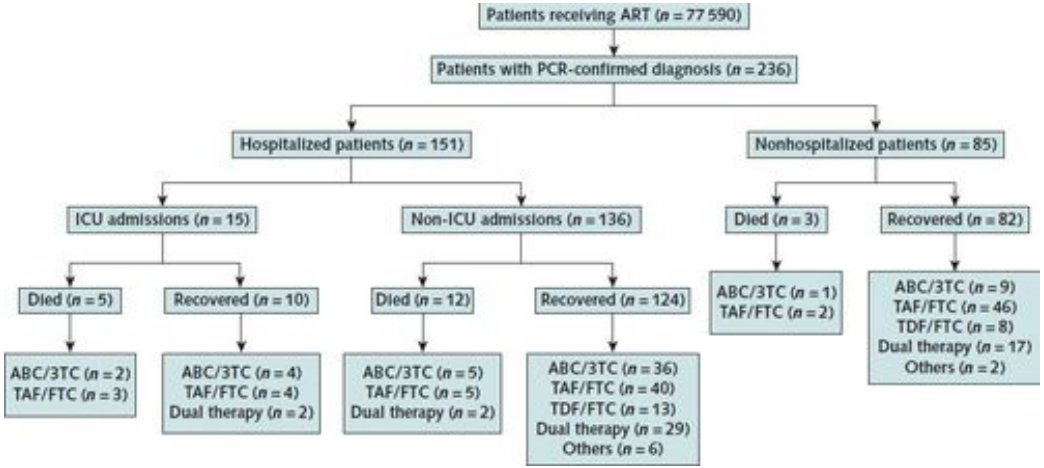




Cao B et al, NEJM, 2020; Schoergenhofer, Ann Int Med, 2020
https://www.clinicaltrialsarena.com/news/recovery-trial-lopinavir-ritonavir/

COVID-19 Among People with HIV on ART

- About 77,000 people with HIV receiving ART in clinics in Spain
- N=236 diagnosed with COVID-19, 151 hospitalized, 20 died
- Risk of COVID diagnosis and hospitalization lowest among those on TDF/FTC
- Hospitalization/10,000 people:
  - TDF/FTC: 10.5
  - TAF/FTC: 20.3
  - ABC/3TC: 23.4
  - Other regimens: 20
- Residual confounding? Groups may be different



J del Amo et al, Ann Int Med, 2020

COVID-19 and HIV

Is HIV a risk factor for severe COVID-19?

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What is the impact of COVID-19 on HIV care and prevention?

Impact of COVID-19 on HIV Treatment and Prevention

- WHO survey: significant disruptions in access to HIV treatment because of COVID-19
- Survey of >13,500 LGBTI+ people in 138 countries:
  - Increased socioeconomic vulnerability
  - 26% of PWH reported difficulty with access to ART refills
- Disruptions in PrEP care in the US
  - Especially among vulnerable subpopulations (young, non-white, Latinx, publicly insured) (Krakower D et al, AIDS 2020/Virtual Covid)

https://www.aids2020.org/aids-2020-virtual-opens-with-focus-on-impact-of-covid-19-on-global-hiv-response/

Final Thoughts

- Disproportionate impact on racial and ethnic minorities of COVID-19 and HIV highlight how disparities drive disparate infectious diseases → we must address structural forces to end intolerable inequities in health care access and outcomes for these “twin” epidemics.
- We cannot let the COVID-19 pandemic cause us to lose sight of how far we’ve come in our quest to end the HIV epidemic.
- Despite overwhelming need to respond to COVID-19, we must continue to move forcefully to end HIV epidemic here and around the world.

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