

Managing Diabetes Through COVID-19

The Novel Coronavirus, SARS-CoV-2

April 2, 2020

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That Discomfort You Are Feeling...

Depleted Cognitive Reserve

“I go from completely handling things to sobbing just because I’m grieving for the world”

<https://hbr.org/2020/03/that-discomfort-youre-feeling-is-grief>

Division of Diabetes Treatment and Prevention (DDTP)

- **People with diabetes who are infected with the coronavirus are more likely to develop severe coronavirus disease (COVID-19) and complications.**
 - They **should be especially diligent to reduce risk of exposure**, including hand washing, practicing social distancing, and staying home as much as possible.
- **Managing diabetes** can be more challenging during this time.
 - **Blood sugars:** activity restriction, changes in eating patterns, and illness can all affect blood sugars. Patients should **monitor more closely** and **call their healthcare team** if they are having problems.
 - **Medications:** patients should ensure they have sufficient medications and call their healthcare team if they need refills.
- To reduce the risk of coronavirus exposure, **avoid going to the clinic unless necessary.**
 - Patients who develop **mild symptoms** should monitor their blood sugars, stay well hydrated, and call their healthcare team with concerns.
 - For **severe symptoms**, seek medical care right away.

Diabetes and Risk with COVID-19

A Person with Diabetes (PWD) is ***not more likely to get*** COVID-19, the problem is...

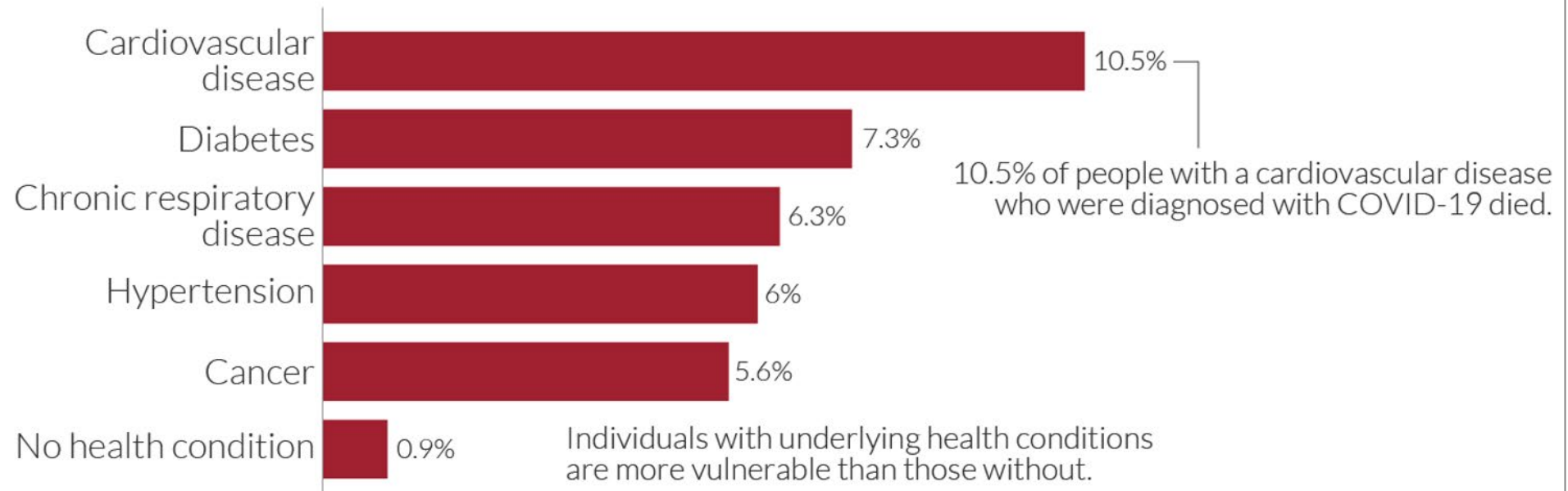
- ***Once infected, they are more likely to develop serious or critical disease***
 - Especially if they have ***poorly controlled diabetes***
 - And/or they already ***have some of the complications*** such as heart disease or kidney disease
 - The ***more health conditions someone has*** (for example, diabetes and heart disease), ***the higher their chance of getting serious complications from COVID-19.***
- Experts do not believe there is any different risk for people with type 1 versus type 2 diabetes
- For Diabetes, ***age and how well diabetes is controlled*** affects the risk most—***still need U.S. population data***

Coronavirus: Early-Stage Case Fatality Rates by Underlying Condition in China

Coronavirus: early-stage case fatality rates by underlying health condition in China

Our World
in Data

Case fatality rate (CFR) is calculated by dividing the total number of deaths from a disease by the number of confirmed cases. Data is based on early-stage analysis of the COVID-19 outbreak in China in the period up to February 11, 2020.



Data source: Novel Coronavirus Pneumonia Emergency Response Epidemiology Team. *Vital surveillances: the epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19)—China, 2020*. China CDC Weekly.

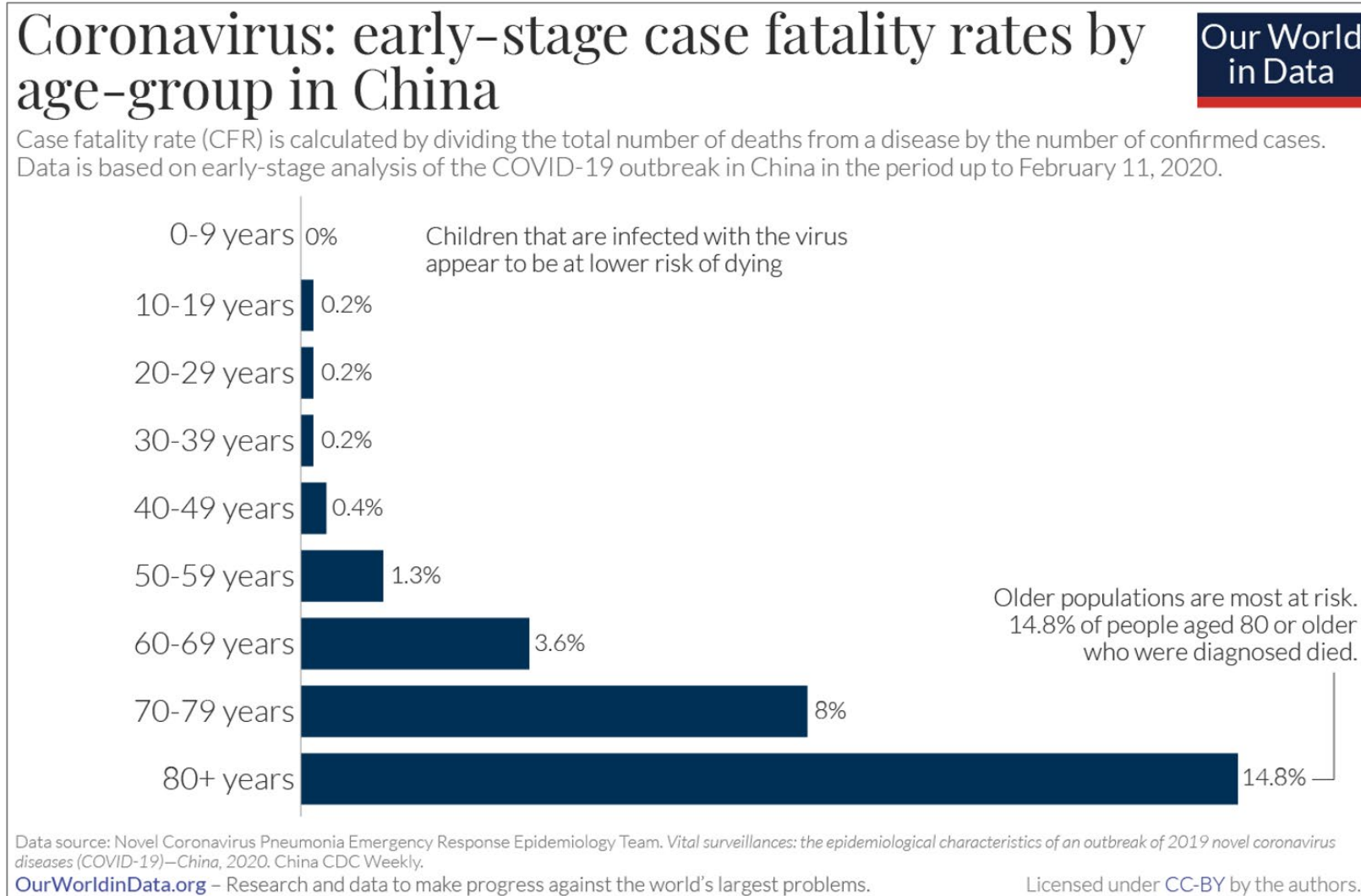
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Additional High-Risk Underlying Conditions Often Associated with Diabetes

- Obesity, especially BMI > 40
- Smoking (and vaping)
 - Lung damage
 - Impaired immune function (especially nasopharyngeal)
- CKD—dialysis
 - Underlying condition + Increased exposure risk
- Other forms of immunocompromise
 - S/p transplant
 - HIV if low CD4 counts—optimize antiviral therapy
 - Steroid therapy
 - ? Biologic therapies for autoimmune conditions (Crohn's, RA, etc.)

Coronavirus: Early-Stage Case Fatality Rates by Age-Group in China



<https://ourworldindata.org/coronavirus>

Glucose Control Is key

- An ***important factor*** in ***any form of infection control*** in patients with diabetes seems to be whether a patient's **glucose levels** are well controlled or not.
 - **Hyperglycemia** can cause **impaired function of white blood cells (WBCs)** which can result in **impaired immune function**
 - Prior research indicates that with **BGs > 250**, function of **WBCs is impaired**
 - Viral infections/**COVID-19** lead to **increased inflammation**, also increased by **elevated blood sugars** leads to **more inflammation** which causes **higher risk for complications**.

Insulin/ Medication — Rationing /Nonadherence

- Patients who have needed to ration their insulin (or other meds) could be at higher risk (American Diabetes Association [ADA])
 - “For that margin of people who are running low and can’t afford to buy ahead, it [the virus] could be an issue,” the ADA said. **“If they’re already rationing, then they certainly are moving into that higher risk category.”** The ADA offers assistance at <https://insulinhelp.org/>
- Need to ***help patients avoid rationing due to lack of supplies during the pandemic***
- We know even those who are not specifically rationing due to costs take their meds as prescribed less than 50% of the time
- Encourage and assist patients to **follow their care plan and take their meds**
 - That *may require an increase in monitoring* (diabetes camp effect)—**offer phone assistance as needed and able** (remote care)
 - Bring and maintain blood glucose below 250 mg/dl if possible—but for most patients and care teams this is *not a time for major routine med changes*
 - May need **help with adjustments** for **reduced activity/food** or **illness**

The best way to prevent illness from COVID-19 is to **avoid exposure** to the virus.

It is of critical importance that healthcare teams be proactive in **explaining** how to limit exposure.

Best Scenario—Prevent Infection

The virus spreads through **droplets** that are produced when an infected person coughs or sneezes.

- Person-to-person spread **through close contact** is the *primary method of spread*—advise to PWD:
 - Take extra measures to put **distance** between yourself and other people and **avoid exposure**.
 - **Stay home as much as possible** (phone/tele-visits for medical care)
 - Avoid all non-essential travel, especially air travel
 - Practice social distancing: six feet or more
 - Avoid crowds, especially in poorly ventilated closed-in spaces.
 - open air, good circulation (drive-up, outdoor delivery for foodbanks)
 - Avoid close contact with anyone with symptoms or known COVID-19

Best Scenario—Prevent Infection (continued)

Touching a surface covered in viral droplets and then touching your face can spread the virus
(not the primary means of spread)

- To the extent possible, **avoid touching *high-touch surfaces*** in public places (elevator buttons, door handles, handrails) or ***handshaking***
 - Push doors with elbow or shoulder. Use a tissue or your sleeve to cover your hand or finger if you must touch something.
- **Wash your hands** after touching surfaces in public places.
 - **Best option: soap and water** for at least 20 seconds from fingertips to wrist (soap damages the virus capsule; water temperature is not a factor)
 - If you cannot wash use **hand sanitizer** that is more than 60% alcohol for 20 seconds
- **Avoid touching eyes, nose, mouth** (face)
- **Clean and disinfect “high-touch surfaces” in home, vehicle, etc.**
 - Tables, counters, rails, light switches, remotes, doorknobs, phone, keys, car door handles, steering wheel, etc.
 - Should remain wet 20–60 seconds or more
 - The CDC has list of disinfectants

Be Sure Patients Are Prepared

- For staying home, “stay-at-home order,” or lockdown
- For self-quarantine for suspected or known exposure of patient or household member
- For someone else within the home being infected
- For illness (suspected or confirmed COVID-19) in PWD

Because healthcare worker cognitive load capacity is already maxed out, it is recommended to have a **print-out of instructions/check-lists** to refer to.

If patient wasn't anxious before—they will likely be with exposure or symptoms in self and/or housemates. Your instructions are critical and can be calming — doing something and having a plan.

Be Sure Patients Are Prepared (continued)

- Advise to PWD: **Gather your supplies:**
 - **Phone numbers** of your doctors and healthcare team, ED, pharmacy, and insurance provider — have handy
 - **List of medications** and doses (including vitamins and supplements)
 - Extra refills on **prescriptions for meds and supplies** so they do not have to leave the house (recommending 90 days of meds for refills)
 - If unable to get to the pharmacy, find out about having medications delivered
 - Always have **enough insulin** for two weeks or more
 - **May need extra insulin for sick day coverage**
 - If you are struggling to pay for insulin, the ADA has resources to help—visit <https://insulinhelp.org/>
 - **Simple carbs** like glucose tablets, regular soda, honey, jam, Jell-O, hard candies or popsicles to help keep your blood sugar up *if you are too ill to eat, especially if at risk for low BGs (taking insulin, SUs)*
 - **Glucagon** and **ketone strips**, in case of lows and highs (especially T1DM)
 - Have enough **household items and groceries** on hand so that you will be prepared to stay at home for a period of time
 - Extra supplies like **rubbing alcohol and soap** to wash your hands

Recommendation from ADA and Others

- For people with underlying health conditions, including diabetes, **healthy family members in the household should conduct themselves as if they were a significant risk to them.**
 - For example, they should be sure to **wash their hands** before interacting with, feeding, or caring for them.
 - If possible, a **protected space** should be made available for vulnerable household members.
 - **All utensils and surfaces should be cleaned regularly** (dishware, towels, sheets, high-touch surfaces, etc.).
 - Consider providing ***additional protections for household members over 65 years old and/or with underlying health conditions.***
 - Limit people in and out of the home—especially limit visitors
 - Visit through **glass barrier—avoid direct hand-offs** of items and cleanse
 - **Distance from household members who go in and out frequently**
 - Consider request for ***job modification*** or ***excuse from work*** due to increased risk of complicated illness if unable to work from home and if work poses increased risk of exposure.

Household Member or Patient Has Medium- or High-Risk Exposure

- ***For people who are not sick, but who may have been exposed***
 - Can be PWD or household member
- ***Self-monitoring for medium-risk exposure*** can include:
 - Regularly checking your temperature
 - Watching for signs of a respiratory illness, such as fever, cough or shortness of breath,
 - **Limiting interaction with others and social distancing**
- ***Quarantine for high-risk exposure:***
 - The **separation** of a person reasonably believed to have been **exposed but not yet symptomatic**, from others who have not been so exposed, **to prevent the possible spread** of disease
 - Recommend **14 days from exposure**

Self-Quarantine at Home

- Quarantining means **staying home and away from other people** as much as possible for that **14-day period**.
 - Those who do not live alone should do their best to **retreat to their room or find a separate area in their home** (door closed), and they ***should not go out shopping, eating, or socializing***.
 - Do not sleep in the same bedroom (with other family members)
 - The exposed person needs to be isolated in their own room, if possible, and keep the door closed
 - Use a separate toilet, if possible
 - Be careful with dishes. They should go right from the person into the dishwasher or wash immediately in hot water.
 - Have only one family member care for them
 - Mask (bandana, scarf, etc.) on exposed person in common area
 - **Wash hands and disinfect high-touch surfaces often**
 - Need to *especially protect PWD from exposure*

If Convert from Asymptomatic to Symptomatic

- If you are under self-quarantine because of possible exposure and ***develop symptoms compatible with COVID-19 infection*** (fever, cough, shortness of breath, etc.), ***call your care team***, local hospital, or public health department to find out what to do.
 - For mild cases, your care team may direct you to **stay home and treat your symptoms and self-isolate**.
 - Those with **more serious symptoms and people in higher-risk** groups may be directed to **where to seek medical care**.
- ***Self-Isolation: for people who are sick (any COVID-19 compatible symptoms, whether known exposure or not, whether tested or not) to separate sick people with a contagious disease from people who are not sick.***

Self-Isolation of Ill Person in the Home

- Household members should stay in another room or be **separated** from the patient **as much as possible**.
 - Use a **separate bedroom and bathroom**, if available.
- **Prohibit visitors** who do not have an essential need to be in the home.
 - Glass door or window as **barrier** for visits—**avoid direct hand-off** of items
- Shared spaces in the home should have **good air flow**, such as an air conditioner or open window, weather permitting.
- Perform **hand hygiene frequently**.
- **Avoid touching eyes, nose, and mouth with unwashed hands.**
- The **patient should cover coughs with tissue or into elbow** and **wear a facemask** when around other people.
 - If the patient is not able to wear a facemask (for example, because it causes trouble with breathing), the caregiver should wear a mask when in the same room as the patient.
- Wear a **disposable facemask and gloves** when you touch or have **contact with the patient's blood, stool, or body fluids, such as saliva, sputum, nasal mucus, vomit, urine**.
 - Throw out disposable facemasks and gloves after using them. **Do not reuse.**

Self-Isolation of Ill Person in the Home (continued)

- **Household members should care** for any **pets** in the home.
 - Do not handle **pets or other animals while sick**. **Washing hands after touching** or having contact with animals will prevent the spread of many diseases.
- **Avoid sharing household items** with the patient.
 - Do not share dishes, drinking glasses, cups, eating utensils, towels, bedding, or other items.
 - After the patient uses these items, wash them thoroughly.
- **Clean and disinfect all “high-touch” surfaces**, such as counters, tabletops, doorknobs, bathroom fixtures, toilets, phones, keyboards, tablets, and bedside tables every day.
 - Also, clean any surfaces that may have blood, stool, or body fluids on them.
- **Wash laundry thoroughly**.
 - Immediately remove and wash clothes or bedding that have blood, stool, or body fluids on them.
 - **Wear disposable gloves** while handling soiled items **and keep soiled items away from your body**. **Clean your hands** (with soap and water or an alcohol-based hand sanitizer) immediately after removing your gloves.
 - Read and follow directions on labels of laundry or clothing items and detergent. In general, using a **normal laundry detergent according to washing machine instructions and dry thoroughly using the warmest temperatures recommended** on the clothing label.

How Long Does Isolation Last?

- You should stay in isolation (stay away from others) until:
 - You have had **no fever for at least 72 hours** (that is three full days of no fever **without using medicine that reduces fevers**)
- ***And***
 - **Other symptoms have improved** (for example, when your cough or shortness of breath have improved)
- ***And***
 - **At least seven (7) days have passed since your symptoms first appeared**
- CDC: What to do if you are sick:
[cdc.gov/coronavirus/2019-ncov/if-you-are-sick/steps-when-sick.html](https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/steps-when-sick.html)
- Healthcare workers may have to isolate for longer (10 days since onset of symptoms) and should do what they are told by the healthcare facility they work for.

Active Infection of PWD—Concerns

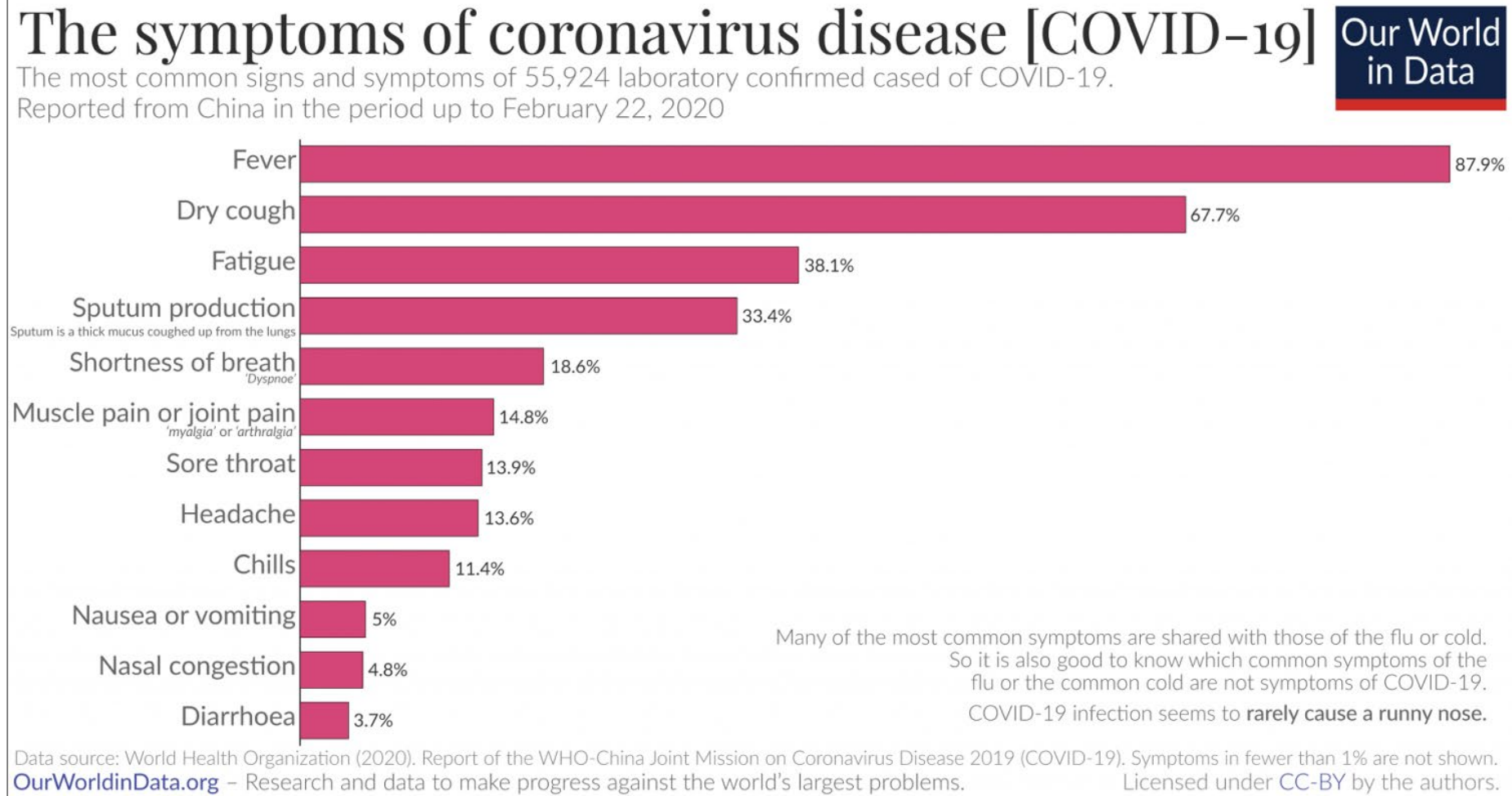
- Exacerbation of diabetes (blood sugar issues)
- Exacerbation of other chronic conditions (e.g., cardiac, respiratory, renal function)
- Worsening of COVID-19

Active Infection—Concerns

Onset of COVID-19

- Signs and symptoms of COVID-19, including mild respiratory symptoms and fever, develop on an **average of five to six days** after infection (the incubation period can vary in a wide range of between 1–14 days)
- Published research indicates that COVID-19 presents initially with ***mild symptoms in the first week***, which includes **fever** (77%–98%), **dry cough** (46%–82%), **shortness of breath** (3%–10%), and myalgia or fatigue (11%–52%).
 - Guan et al. (Feb. 28 NEJM) found that **only 43.8% of the patients presented with fever** on admission, although fever developed in 88.7% during hospitalization...suggests that fever is not the hallmark of the onset of COVID-19.
 - Fever and cough less common in the elderly and immunocompromised — more often shortness of breath at onset
 - Runny nose uncommon with COVID-19 but common with allergies

The Symptoms of Coronavirus Disease (COVID-19)



<https://ourworldindata.org/coronavirus>

Active Infection in PWD

Onset of COVID 19

- If **patients feel they are developing symptoms** they should **call their healthcare team**
 - Awareness for monitoring is critical
 - Ensure proper isolation (see previous slides)
 - Criteria for testing
- *“Given the collective anxiety regarding the epidemic, even low-risk patients may benefit from **talking to their clinicians about symptoms, getting reassurance, and discussing an appropriate plan of care.**”*

NEJM March 27, 2020
- Need to know **how to access care if symptoms worsen**
- Help for stress, fear, anxiety: 1-800-985-5990

Active Infection in PWD

Worsening of COVID-19

- The symptoms of the disease develop and change over time and **often worsen in the second week** of infection
 - More rapidly if immunocompromised, etc.
- **Severe and critical cases** can lead to severe pneumonia, respiratory failure, septic shock, and multiple organ dysfunction or failure.
- In adults, **emergency warning signs** include:
 - Difficulty breathing or shortness of breath
 - Persistent pain or pressure in the chest
 - New confusion or inability to arouse
 - Bluish lips or face
- If develop emergency warning signs for COVID-19 **get medical attention immediately—call first** to notify clinic or ED
 - If possible, wear mask into the facility or prior to 911 arrival

Infection in PWD — Concerns

Worsening of diabetes (blood sugar issues)

- Being ill can make it more difficult to manage diabetes.
 - **Hyperglycemia:** Illness itself can increase insulin resistance and **raise blood glucose levels.**
 - People with diabetes, **both type 1 and 2**, have a higher risk for **diabetic ketoacidosis (DKA)** when ill with a viral infection—that can make it harder to avoid sepsis and septic shock (impaired immune function, electrolyte and fluid imbalance)
 - **Hypoglycemia:** If a patient is severely short of breath, has severe malaise or is vomiting and is ***unable to eat and keep down fluids***, that can cause **glucose levels to fall** (occasional hypoglycemic response to viral illness)

Infection in PWD—Worsening of Diabetes

- **Hyperglycemia** and higher risk for **diabetic ketoacidosis (DKA)** when ill with a viral infection
 - Patients who are feeling sick need to **monitor their glucose more frequently**
 - They should **continue taking their diabetes medications, *unless instructed otherwise*** by their providers
 - Based on what we know about risk of DKA with ketogenic diet and surgical stress with SGLT2i meds—***stop SGLT2i***
 - **If patient is sick**
 - May need to **add Insulin** to control blood glucose levels
 - **If unable to eat** or not sick but **needing to ration food**
 - May or may not need an alternative diabetes med—closely monitor
 - **If patient on both insulin and SGLT2i**, and gets sick, unable to eat or needs to limit food due to shortage—***STOP the SGLT2i first before reduce or stop insulin***
 - If you reduce/stop the insulin and not the SGLT2i then there is a much higher **risk for DKA** during stress of illness or reduced carb intake

Infection in PWD — Preventing High BGs/DKA

- Leading manufacturers report that COVID-19 has not impacted their current manufacturing and distribution capabilities for insulin and other supplies at this time (ADA)
 - The ADA has resources to help. Visit <https://insulinhelp.org/>.
- NPH and regular insulin can be purchased with no prescription; Walmart has lower cost (ADA – Medscape message)
- If you need to **add “sick day” insulin** and *instruct patients new to insulin*, consider:
 - Use pens, if possible, for simplicity
 - Tele-video visit to instruct and help monitor/adjust if possible
 - Phone call to instruct and monitor/adjust
 - If possible, use a YouTube video (there are several available) as a visual aid
 - Car visit: instructions provided from outside with patient/caregiver in car (with window up and use phone if possible), then monitor by phone
 - If a clinic visit is required (discouraged), try to do outdoors. Create a six-foot or longer counter to teach across with glass or other barrier if possible. Mask the ill person or quarantined caregiver as well as healthcare worker.
 - Brainstorm and share ideas

Infection in PWD—Preventing High BGS /DKA

- **Need for fluids and hydration**

- PWD should drink plenty of fluids
 - Good to have both non-sugary and sugary fluids on hand, such as water and broth, apple juice or sugary sodas to use during illness (ADA, Joslin)
- If having trouble keeping water down, have small sips every 15 minutes or so throughout the day to ***avoid dehydration***.

- In T1DM (and some with T2DM): instruct on checking ketones: if **blood sugar has registered high** (e.g., BG greater than 240–250 mg/dl) more than two times in a row, **check for ketones** to avoid DKA. (May need to modify level to check ketones.)

- **Call the doctor's office immediately**, if positive for **medium or large ketones**
 - (And if instructed to with trace or small ketones)

- Wash hands and clean **injection/infusion and finger-stick sites** with soap and water or rubbing alcohol.

Infection in PWD—Worsening of Diabetes

Or If Not Sick But Limiting Food Intake

- **Hypoglycemia:** usually due to ***reduced food intake***
 - Check blood sugar more often; instruct based on risk
 - Stop SGLT2i (if patient sick and/or reduced food intake)
 - May need to reduce or stop sulfonylureas
 - May need to reduce insulin
 - Rapid glucose
 - If low (blood sugar below 70 mg/dl or target range), eat 15 grams of simple carbs that are easy to digest like glucose tabs, honey, jam, Jell-O, hard candy, popsicles, juice, or regular soda, and re-check blood sugar in 15 minutes to make sure levels are rising.
 - Glucagon rescue: sick-day use
 - Kit
 - Pre-filled syringe
 - Nasal

Managing Through COVID 19

- Work with patients and have a plan:
 - How often to check blood sugar
 - When to check for ketones (may need keto test strips)
 - Any changes to diabetes medications
 - May need **insulin increased or added** to control BGs during infection
 - **Stop SGLT2 inhibitors** if sick or eating less (rationing food)
 - Especially important: if patient is **on both insulin & SGLT2i** and sick and or low BGs—**STOP SGLT2i first**
 - stopping or reducing insulin before stopping SGLT2i can **increase risk of DKA**
 - If reduced food intake (sick or rationing), may need to reduce or stop sulfonylureas and/or insulin to avoid hypoglycemia
 - Use of glucagon and sources of rapid glucose
 - What about **ACEI/ARBs**—statement from ACC
 - Medications to use for symptom management
 - Acetaminophen (caution with some CGM)—low dose
 - What about **Ibuprofen, NSAIDs?**
 - How to monitor and when to call regarding BGs and/or COVID symptoms

Concerns About Ibuprofen/NSAIDS

- Reports circulating that taking ***drugs like ibuprofen (NSAIDS)*** could **worsen the progress of the illness** (French Health Ministry and some reports with other viral pneumonias) are **theoretical**
- "Based on currently available information, **WHO does not recommend against the use of ibuprofen**"
 - "We are also consulting with physicians treating COVID-19 patients and are **not aware of reports of any negative effects of ibuprofen, beyond the *usual known side effects that limit its use in certain populations.***"
- Patients with COVID-19 are at higher risk of damage to internal organs, including kidneys.
 - And ***kidney damage (AKI) can be a side effect of ibuprofen*** for some patients—***especially PWD***
 - We already advise **avoiding NSAIDs in PWD—*not a good choice when ill***

Utilize Remote Care

- Offer **diabetes care, education, and support** by remote (virtual) tele-visits, as well as acute care and respiratory infection assessment
 - **Reduces exposure** to at-risk patients, their families, and to staff—which can mean fewer infected persons (**prevention**)
 - **Keeps people healthier** (versus abandoning diabetes and other chronic care): reduces risk for need for clinic or ED visit for exacerbation of chronic condition and reduces risk of complicated disease if infected with COVID-19
 - **Conserves** PPE, testing supplies, healthcare workforce, hospital beds, etc.
 - **Podiatry care** ideas: “All Feet On Deck—The Role of Podiatry During the COVID-19 Pandemic”
 - <https://procommunity.diabetes.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=8b5604d5-65ef-472a-905f-c279e169b0f0&forceDialog=0>

Idea Sharing



Follow Care Plan and Support for Those with Chronic Conditions

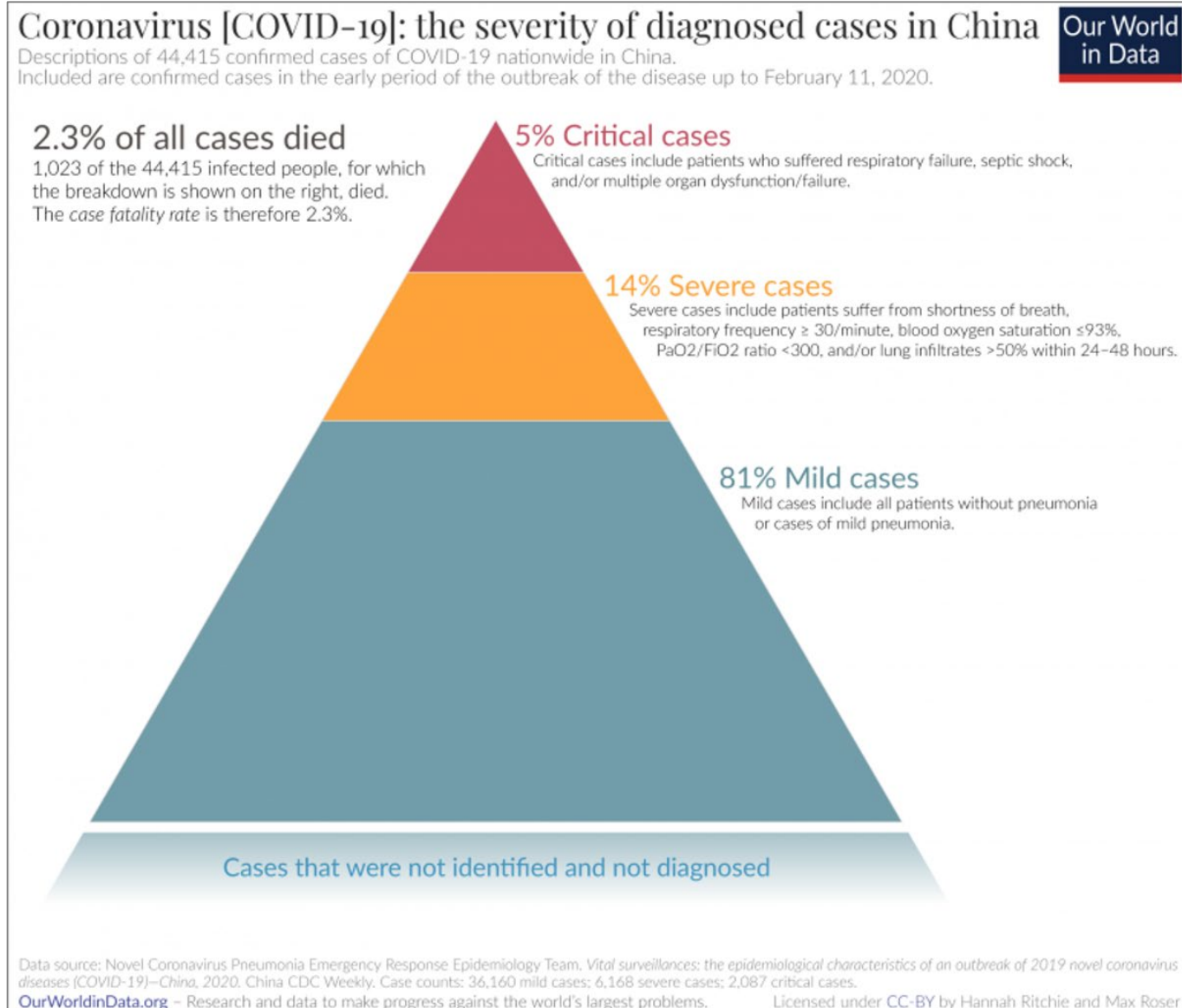
- *Messaging from the NIH and CDC:*
 - Now is a great time for **people with underlying conditions** to **follow care plans** and to **optimize control** of whatever condition they have—especially blood glucose and BP, smoking cessation
 - Also take breaks, talk to others (virtually), eat healthy foods, get adequate sleep and exercise
- *From the NHS (UK) to healthcare teams:*
 - “**Diabetes services should look to maintain and optimize the health of individuals** within their services over the course of the pandemic and **should not underestimate the importance of these contributions** to the overall health service response.”
 - Many contacts can be performed remotely (telephone, email, video conferencing)

DSMT Telehealth

Updated March 24, 2020

- Per CMS: The expansion of telehealth services affects DSMT services, as it does all other telehealth services: it removes the limitations on where the Medicare beneficiary is eligible to receive telehealth services during the public health emergency (PHE). Prior to the new 1135 waiver, telehealth services were generally available to the beneficiary in a medical facility in a rural area. Now, the expansion allows telehealth services, including DSMT, to be provided in all settings, including when the beneficiary is in his/her home, without the rural restriction.
- The ADA and ADCES have requested that CMS consider Registered Nurses and Pharmacists to be qualified DSMT Telehealth providers. We are also awaiting guidance as to if DSMT can be provided via telephone without video. ADA Quality Coordinators will be notified via email as soon as we have more information. Please check our website for updates.

COVID-19: The Severity of Diagnosed Cases in China



<https://ourworldindata.org/coronavirus>

ACE2 Expression: COVID-19 and Medications

- The COVID-19/SARS-CoV-2 virus uses the ACE2 receptor to gain access into cells
 - The first step in viral entry is the binding of the viral trimeric spike protein to the human receptor angiotensin-converting enzyme 2 (ACE2).
- ***Increased ACE2*** expression ***possible*** with **ACE inhibitors** and angiotensin II type I receptor blockers (**ARBs**). ACE2 can also be increased by **thiazolidinediones and ibuprofen**
 - Animal studies have ***suggested both increased risk and increased protection*** with some of these agents—all **theoretical**
 - Lancet article, French Health Ministry letter, social and mass media

ACE2 Expression: COVID-19 and Medications (2)

Despite these theoretical uncertainties regarding whether pharmacologic regulation of ACE2 may influence the infectivity of SARS-CoV-2, there is clear potential for harm related to the withdrawal of RAAS inhibitors in patients in otherwise stable condition. Covid-19 is particularly severe in patients with underlying cardiovascular diseases,⁹ and in many of these patients, active myocardial injury, myocardial stress, and cardiomyopathy develop during the course of illness. RAAS inhibitors have established benefits in protecting the kidney and myocardium, and their withdrawal may risk clinical decompensation in high-risk patients.

Vaduganathan, Muthiah, Orly Vardeny, Thomas Michel, John J.v. McMurray, Marc A. Pfeffer, and Scott D. Solomon. "Renin–Angiotensin–Aldosterone System Inhibitors in Patients with Covid-19." *New England Journal of Medicine*, 2020. <https://doi.org/10.1056/nejmsr2005760>.

Statement from ACC on ACEI and ARBs

- **The HFSA, ACC, and AHA recommend continuation of RAAS antagonists for those patients who are currently prescribed such agents for indications for which these agents are known to be beneficial, such as heart failure, hypertension, or ischemic heart disease.**
- **In the event patients with cardiovascular disease are diagnosed with COVID-19, individualized treatment decisions should be made according to each patient's hemodynamic status and clinical presentation.**
- **Therefore, be advised not to add or remove any RAAS-related treatments, beyond actions based on standard clinical practice.**
- **These theoretical concerns** and findings of cardiovascular involvement with COVID-19 **deserve much more detailed research**, and quickly. As further research and developments related to this issue evolve, we will update these recommendations as needed.

“COVID-19 and Angiotensin-Converting Enzyme Inhibitors and Angiotensin Receptor Blockers: What Is the Evidence?”

- Despite the lack of evidence, there have been advocates for both the use and cessation of ACEIs/ARBs in patients with hypertension.
 - This has prompted some individuals to **solicit changes in their hypertensive medications** and growing uncertainty from physicians on what should be done.
 - **Changes in antihypertensive medications would require patients to visit their pharmacy and possibly obtain blood work, which would increase their exposure and risk of infection.**
 - **Antihypertensive medication changes between classes additionally require frequent dose adjustment and management of adverse effects and increases the risk of medical errors.**
- “The Council on Hypertension of European Society of Cardiology **strongly recommends that physicians and patients should continue treatment with their usual anti-hypertensive therapy** because there is **no clinical or scientific evidence to suggest that treatment with ACEIs or ARBs should be discontinued because of the COVID-19 infection.**”
- Patel, Ankit B., and Ashish Verma. “COVID-19 and Angiotensin-Converting Enzyme Inhibitors and Angiotensin Receptor Blockers.” *JAMA*, 2020. <https://doi.org/10.1001/jama.2020.4812>.

Patients Requiring Hospitalization for COVID-19

- Very sick patients who are hospitalized should be managed with **insulin**
- Oral agents—particularly metformin, sodium-glucose transporter 2 inhibitors, glipizide and pioglitazone—should be stopped.
 - Usually also stop the glucagon-like peptide receptor-1 analogues*
- Only insulin can be used for acutely sick patients – those with sepsis, severe breathing disorders, and definitely if they are on a ventilator.

*study from Grady on GLP-1 RA in hospitalized patients—need to review before any recommendation related to COVID-19

Specific Drug Treatments

- There are currently no drugs that have been approved specifically for the treatment of COVID-19, although
 - Vaccines against the disease are currently under development
 - Trials with remdesivir, hydroxychloroquine and chloroquine, and other therapeutic options (convalescent ABs, other anti-virals) are underway; see <https://clinicaltrials.gov/>