The problem with case numbers data

- Always an underestimate
- Not everyone gets tested
- Home self-read tests are not reported
- Some geographic areas less accurate than others
  - Regional variation in test availability
  - Regional variation in culture of testing

Testing percent positivity data

- Correlates with surges
- Begins to rise 1-3 weeks before surges begin
- Can be affected by asymptomatic screening tests:
  - Pre-procedure testing
  - Employee screening
Interpreting the data: Deaths peak 3-4 weeks after cases

Interpreting the data: Deaths per 100,000 allow better comparisons

The problem with case death data

- Reliance on death certificates
  - Physicians often do not know circumstances of death when patients die at home
  - If patients are not tested before death, COVID diagnosis goes unknown
  - Physicians sometimes purposefully do not list COVID
  - Coroners do not always test for COVID

Interpreting the data: Hospitalizations
During surges, the elderly comprise a larger percentage of hospitalizations

During surges, minorities comprise a lower percentage of hospitalizations

Hypertension, obesity, diabetes, and cardiovascular disease are the greatest risks

The problem with hospitalization data

• Routine screening picks up asymptomatic patients during non-COVID hospitalizations
• CDC COVID-NET surveillance sample is small and results are based on calculations
Blood donor seroprevalence program

- Random testing of donated blood for COVID antibodies
- Detects antibodies from infection and from vaccination
- Blood donors are not representative of the U.S. population as a whole

Commercial lab seroprevalence program

- Random testing of blood drawn for commercial lab testing
- Only detects antibodies from past infection (not vaccination)
- People getting blood tests are not representative of the U.S. population as a whole

The bottom line...

- No epidemiologic data set is perfect
- Each variant has different epidemiology
- Know where to find your state and county data
- Trends are important
- Testing percent positivity increases predict surges
- Case number increases predict hospital utilization

SARS-CoV-2 Vaccination

Michael Haden, MD
Assistant Professor of Medicine, Division of Infectious Diseases
The Ohio State University Wexner Medical Center
Medical Director of Clinical Epidemiology - University East Hospital
Available SARS-CoV-2 Vaccines

- mRNA (preferred)
  - Pfizer-BioNTech
  - Moderna
- Adenovirus vector
  - Johnson & Johnson’s Janssen

mRNA Vaccines

- Have been studied for decades
- Rapid, inexpensive and scalable manufacturing
- First approved use was against SARS-CoV-2
  - Pfizer-BioNTech
  - Moderna

mRNA Vaccines

- Lab developed mRNA encoding SARS-CoV-2 spike protein
- Dendritic cells (antigen presenting cells) phagocytize spike protein and present to T and B cells
  - T cells: immediate immunity
  - B cells: humoral (antibody), future immunity
- Given as 2 dose primary series, followed by booster
  - 3rd dose included in primary series for immunocompromised

mRNA Vaccines

- No live virus
- Does not enter nucleus of the cell
- Preferred SARS-CoV-2 vaccine both for efficacy and lower side effect profile
mRNA Vaccines – Adverse Reactions

- Pain, redness and swelling at injection site
- Headache, myalgias
- Fatigue
- Fever, chills
- Nausea
- Rare cases of myocarditis and pericarditis in adolescents

Pfizer-BioNTech

- FDA approved for ages 16 years and older
- Emergency Use Authorization for ages 5-15

- Primary series: 2 shots, 21 days apart
  - Immunocompromised: 3rd dose 28 days after 2nd dose
- Booster: 5 months after primary series
  - Age 16-17: Pfizer BioNTech only
  - Age 18 and older: Pfizer BioNTech or Moderna (Janssen is alternative)

Moderna

- Emergency Use Authorization for age 18 and older

- Primary series: 2 doses, 28 days apart
  - Immunocompromised: 3rd dose 28 days after 2nd dose
- Booster: 5 months after completion of primary series
  - Pfizer or Moderna preferred
  - Janssen is alternative

Viral Vector Vaccine

- Recombinant, replication incompetent adenovirus vector
- Encodes SARS-CoV-2 spike protein

- Not preferred for SARS-CoV-2 vaccination due to risk of serious adverse events
  - Thrombosis with thrombocytopenia syndrome

- Alternative use:
  - Allergy to components of, or adverse reaction to an mRNA vaccine
  - Limited access to other available vaccines
Johnson and Johnson’s Janssen

- Emergency Use Authorization for age 18 and older
- Primary series: 1 shot
- Booster: mRNA (Pfizer or Moderna) recommended 2 months after primary series

SARS-CoV-2 Vaccination

- Fully vaccinated defined as 2 weeks after completion of primary series
Vaccine Efficacy

- Clinical Trial Data: Prevention of lab confirmed COVID-19:
  - Pfizer-BioNTech: 95%
  - Moderna: 94.1%
  - Janssen: 66.3%

<table>
<thead>
<tr>
<th>Total Vaccine Doses</th>
<th>At Least One Dose</th>
<th>Fully Vaccinated</th>
<th>Booster Doses***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered</td>
<td>63,2,579,855</td>
<td>72,911,828</td>
<td>35.3%</td>
</tr>
<tr>
<td>Administered</td>
<td>515,152,887</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Learn more about the distribution of vaccines:

207.0M People fully vaccinated
73.0M People received a booster dose**

Vaccine Effectiveness Against Infection Among Adults Ages 18 Years and Older

COVID-19 vaccines were less effective at preventing COVID-19 infection in July and August compared to earlier months. Time has passed since people got vaccinated, and Delta became the predominate variant during this time period.
Among 1,228,664 fully vaccinated individuals:
• Only 2,246 developed COVID-19
• 327 of these were hospitalized, 189 with severe disease
• 36 deaths

Omicron?
• Anticipate reduced protection from infection due to numerous changes in spike protein
• Vaccination continues to play a role in controlling spread, hospitalization and death
• Laboratory and epidemiologic studies are still needed

SARS-CoV-2 Vaccination

An ounce of prevention is worth a pound of cure
Summary

- Multiple vaccines widely available in the US
- Vaccines are safe and highly effective
- Even in setting of new SARS-CoV-2 variants and breakthrough infection, vaccines remain important tool in preventing spread, hospitalization and death

Symptoms

- Fever
- Cough
- Sore throat
- Malaise
- Myalgia
- Headache
- Loss of sense of taste or smell
- With Omicron, cough, headache, and sore throat without loss of sense of taste or smell are a common presentation

Management Of COVID 19 In The Ambulatory Setting

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The Ohio State University Wexner Medical Center

Polymerase Chain Reaction (PCR) versus Antigen (Ag) Testing

- The Gold standard is PCR. With PCR a small sample of DNA is amplified making it easier to detect the desired pathogen in the sample.
- Ag testing is detection of viral surface proteins
- PCR testing is more sensitive than Ag in detecting coronavirus.
- The FDA has stated that the sensitivity of Ag tests may be decreased in the setting of Omicron. SARS-CoV-2 Viral Mutations: Impact on COVID-19 Tests | FDA
- PCR testing will be positive for more days over the course of an illness than Ag testing. This does not mean Ag testing is not useful, but it does mean the interpretation of a negative test should account for this.
First Considerations

- Does the Patient need seen in person, or can they be managed by Telehealth?
- Outpatient the main treatment is supportive and assessing patients to see who is high risk and may benefit from monoclonal antibodies.
- It is important to advise the patient as to the need for isolation and provide information on how to do so as well as evaluate if others in the household need to quarantine.

Isolation

- Monitor symptoms for progression
- Stay in a separate room from other household members if possible
- Use a separate bathroom, if possible.
- Improve home ventilation, if possible.
- Avoid contact with other members of the household and pets.
- Don't share personal household items, like cups, towels, and utensils.
- Wear a well-fitting mask when you need to be around other people.

COVID-19 Quarantine and Isolation | CDC

Quarantine

If you have been exposed to someone with COVID-19:

- Call your healthcare provider if you have symptoms of COVID-19.
- Get tested for COVID-19 if you have symptoms that do not improve or persist.
- Follow your healthcare provider’s instructions on when to return for follow-up.
- Isolation for 14 days if you have symptoms of COVID-19.

https://www.cdc.gov/media/releases/2021/0227-isolation-quarantine-guidance.html#v09

Triage

- When possible, patients with symptoms of COVID-19 should be triaged via telehealth visits to determine whether they require COVID-19-specific therapy and in-person care.
- Patients with dyspnea should be referred for an in-person evaluation by a health care provider and should be followed closely during the initial days after the onset of dyspnea to assess for worsening respiratory status.
- Management plans should be based on a patient’s vital signs, physical exam findings, risk factors for progression to severe illness, and the availability of health care resources.
- Nonhospitalized Patients: General Management | COVID-19 Treatment Guidelines [nih.gov]
Considerations For Who Needs To Be Seen In Person

- Dyspnea
- Chest Pain
- Mental Status Changes
- Low Pulse Ox (<94%, <90%)
- Pallor
- Underlying conditions that place the patient at risk such as those with cancer, solid organ transplant, or COPD (though this is not an inclusive list)

Therapeutics

Nonhospitalized Adults: Therapeutic Management | COVID-19 Treatment Guidelines (nih.gov)

Therapeutics For Those Who are High Risk

- Monoclonal Antibodies: With Omicron the predominant variant only Sotrovimab provides benefit.
- Pre-exposure Prophylaxis: Tixagevimab/cilgavimab
- Paxlovid (Nirmatrelvir and Ritonavir). Nirmatrelvir (Anti-viral) inhibits a SARS-CoV-2 protein to stop the virus from replicating. Ritonavir (P450 Inhibitor) slows down nirmatrelvir’s breakdown to help it remain in the body for a longer period at higher concentrations.
  - Due to P450 action there are a lot drug interactions and dosage adjustments: [https://www.fda.gov/media/155071/download](https://www.fda.gov/media/155071/download)
  - Molnupravir is an anti-viral.

High Risk Patients

- Cancer
- Chronic Kidney Disease
- Chronic Liver Disease
- Chronic Lung Disease
- Neurologic Conditions
- Diabetes
- Down’s Syndrome
- Cardiac Disease
- HIV
- Immunosuppression
- Obesidy
- Sickle Cell
- Pregnancy
- Solid Organ Transplant

Symptomatic Treatment – Non-Hospitalized

- Acetaminophen
- NSAID's
- Benzonatate
- Dextromethorphan
- Albuterol
- Inhaled Corticosteroids

COVID-19 Inpatient Treatment Overview

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Asymptomatic</th>
<th>Mild/Mod</th>
<th>Severe</th>
<th>Critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>No new oxygen requirement</td>
<td>Monitoring Only</td>
<td>Increased Oxygen Requirement</td>
<td>RM, NIV, MV, ECMO</td>
</tr>
<tr>
<td>Mild/Mod</td>
<td>Symptomatic</td>
<td>Risk Factors Assessment +/- RDV x 3 days</td>
<td>RDV x 5 days Dexamethasone</td>
<td>+/- RDV x 5 days Dexamethasone Tocilizumab</td>
</tr>
<tr>
<td>Severe</td>
<td>Symptomatic</td>
<td>New/Increased Oxygen Requirement</td>
<td>RM, NIV, MV, ECMO</td>
<td>+/- RDV x 5 days Dexamethasone Tocilizumab</td>
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</tr>
</tbody>
</table>

Inpatient Treatment of COVID-19

Dustin Chase, MD, MBA, SFHM
Associate Professor of Clinical Medicine
Vice Chair of Inpatient Clinical Medicine
Clinical Operations Director, Division of Hospital Medicine
Department of Internal Medicine
The Ohio State University Wexner Medical Center

- Historically: Monoclonal Abs Remdesivir
- Evaluation for Home Oxygen Monitoring
- No Dexamethasone
COVID-19 Inpatient Treatment Overview

**Mild/Mod**
- Broader Usage of Remdesivir
- 87% Reduction in COVID-19 hospitalization or death at day 28

PINETREE Trial (Outpatient)
- Sa Crew within 7 days
- Remdesivir
  - 200mg IV Day 1
  - 100mg IV Day 2
  - 100mg IV Day 3

**Severe**
- Remdesivir 5 days for Severe
- Median recovery 10 vs. 15 days
- Mortality 6.7% vs. 11.9% at day 15
- 5 days as good as 10 days for most
- Dexamethasone (RECOVERY)
  - 6mg IV x 10 days
  - 17% lower mortality
- Discharge when patient ready

**Critical**
- Tocilizumab
  - One time dose but long half life
  - Presence of inflammation, CRP>75
  - More beneficial in rapidly progressive, early disease but carries risk of infection
  - Trend towards reduced mortality
- Baricitinib
  - 4mg daily dosing x 14 days
  - 44% mortality reduction at 60 days
  - Limited data

CRP>75

**Tocilizumab**
References


First, the obvious...

- Delay traveling until you are vaccinated
- If you are vaccinated, get boosted before traveling
- Make sure your traveling companions are vaccinated
- Don’t travel if you have COVID symptoms
What Should You Pack?

- Rapid COVID test
- Extra face masks
- Hand sanitizer (< 12 ounces for TSA)
- Thermometer
- Oximeter
- Acetaminophen and/or NSAID
- Vaccine card
- Extra prescription medications

Travel within the U.S.

- Check the websites first!
  - https://covid.cdc.gov/covid-data-tracker/#datatracker-home
  - Individual state & city department of health websites
- Car travel:
  - Consider packing lunch rather than restaurants
  - Wear mask whenever indoors and when outdoors in crowded areas
  - Keep hand sanitizer in the car
- Restaurants:
  - Check restaurant COVID policy for employees and guests
  - Visit at off-hours
  - Consider carry-out

Traveling to somewhere outside of the U.S.?

- Will the country let you in?
- Check the websites first!
  - https://travel.state.gov/content/travel.html
  - Government websites of countries you will be visiting
- COVID travel insurance often required for entry
- Rapid COVID or COVID PCR test < 24 or 48 hours prior to arrival
- Retail self-read home tests not accepted
- Many airports & pharmacies offer travel testing
- Some countries require testing on arrival (bring cash!)
- Will you need a COVID certificate?
Returning to the U.S.?

• Check the websites first!
• Rapid COVID or COVID PCR within 1 day of return to U.S.
• Retail self-read home tests not accepted
• Some international hotels & airports offer testing
• Home tests with telehealth video supervision accepted:
  • Abbott BinaxNOW
  • Ellume AZOVA
  • Cue
  • Quired

Minimizing COVID risks during air travel

• The airport is often riskier than the airplane
• In the airport:
  • Avoid busy travel days
  • Use hand sanitizer regularly
  • Maintain physical distancing whenever possible
  • Avoid airport restaurants and bars
• In the plane:
  • Turn on overhead air vent
  • Avoid or minimize eating/drinking
  • Wear a mask at all times
Traveler’s Risk Factors:
- Age
- Obesity
- Diabetes
- Hypertension
- Cardiac disease
- Immunosuppression

Travel Destination:
- Indoor crowds
- Restaurants
- Bars
- Outdoor crowds
- Cruises
- Hotel or Airbnb/VRBO
- Masking culture
- Vaccination culture

Is It Safe To Travel?