State-of-the-Art Management of COVID-19
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COVID-19: Pathogenesis, Transmission and PPE

Dr. Ramya Gopinath
Infectious Diseases Consultant
Columbia MD, USA
• Coronavirus – “crown”-like spikes
• Bats, birds, rodents, cattle, dogs → humans
• Family of viruses that cause:
  • The common cold
  • SARS (Severe Acute Respiratory Syndrome) - 2003
  • MERS (Middle East Respiratory Syndrome) - 2012
  • COVID-19 (Coronavirus Disease 2019) - 2019
Development of the Pandemic

Tracking the spread of the novel coronavirus

Last updated: April 10, 2020 04:20 PM

1,628,207 cases

How the Virus Hijacks Our Cells

COVID-19 Disease Stages

Stage I (Early Infection):
- Clinical Symptoms: Mild constitutional symptoms (Fever >99.6°F), Dry Cough, diarrhea, headache
- Clinical Signs: Lymphopenia, increased prothrombin time, increased D-Dimer and LDH (mild)

Stage II (Pulmonary Phase):
- Viral response phase
- Clinical Symptoms: Shortness of Breath, Hypoxia (PaO2/FiO2 ≤ 300 mmHg)
- Clinical Signs: Abnormal chest imaging, Transaminitis, Low-normal procalcitonin

Stage III (Hyperinflammation Phase):
- Clinical Symptoms: ARDS, SIRS/Shock, Cardiac Failure
- Clinical Signs: Elevated inflammatory markers (CRP, LDH, IL-6, D-dimer, ferritin), Troponin, NT-proBNP elevation

Potential Therapies:
- Remdesivir, chloroquine, hydroxychloroquine, convalescent plasma transfusions
- Reduce immunosuppression
- Corticosteroids, human immunoglobulin, IL-6 inhibitors, IL-2 inhibitors, JAK inhibitors

Siddiqui, H et al J Heart Lung Trans 2020. DOI: https://doi.org/10.1016/j.healun.2020.03.012
Transmission

Human-to-Human
Sneezing/coughing/talking
Droplets/airborne?
  Aerosol – 3 hrs
On surfaces*
  Stainless steel: 5-6 hrs (→72h)
  Plastic: 6-7 hrs (→72h)
  Copper: max 4 hours
  Cardboard: max 24 hrs
Fecal-oral?
  Asymptomatic carriers

COVID-19 Personal Protective Equipment (PPE) for Healthcare Personnel

**Preferred PPE – Use**
N95 or Higher Respirator

- Face shield or goggles
- One pair of clean, non-sterile gloves
- N95 or higher respirator
  - When respirators are not available, use the best available alternative, like a facemask.
- Isolation gown

**Acceptable Alternative PPE – Use**
Facemask

- Face shield or goggles
- One pair of clean, non-sterile gloves
- Facemask
  - N95 or higher respirators are preferred but facemasks are an acceptable alternative.
- Isolation gown

[cdc.gov/COVID19]
SEQUENCE FOR DONNING PPE

1. GOWN
   • Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
   • Fasten in back of neck and waist

2. MASK OR RESPIRATOR
   • Secure ties or elastic bands at middle of head and neck
   • Fit flexible band to nose bridge
   • Fit snug to face and below chin
   • Fit-check respirator

3. GOGGLES OR FACE SHIELD
   • Place over face and eyes and adjust to fit

4. GLOVES
   • Extend to cover wrist of isolation gown

https://www.cdc.gov/hai/pdfs/ppe/PPE-Sequence.pdf
SEQUENCE FOR DOFFING PPE

Example 1

Example 2

https://www.cdc.gov/hai/pdfs/ppe/PPE-Sequence.pdf
Innovation is Key!

Thank you!
COVID-19: Emergency Room and Hospital Care

Bangaru Raju, MD
Associate Program Director
Internal Medicine
Montefiore Mount Vernon, New York
Clinical Presentation:

**Incubation Period:** 14 days, with median time of 4-5 days

**Symptoms**

- Fever: 83-99%
- Cough: 59-82%
- Fatigue: 44-70%
- Anorexia: 40-84%
- Shortness of Breath: 31-40%
- Sputum Production: 28-33%
- Myalgia: 11-35%
Risk Factors for Severe Illness

- Diabetes
- Chronic Respiratory Disease
- Hypertension
- Cancer
- Case fatality rate X>80 years
Person Under Investigation (PUI) in the ER

Travel history, direct contact with COVID positive patient

Follow appropriate isolation measures

Assess clinical status: for fever, respiratory symptoms
  (cough, SOB etc.)

Investigations: CBC, renal panel, ABG, LDH, Ferritin, r/o Flu, chest X-ray, chest CT scan if needed

Further management based on clinical status and investigations
Patients with mild symptoms, no significant comorbidities, no concern for deterioration may be discharged with following instructions:

- Self-quarantine for two weeks and home monitoring
- Hand hygiene, mask, respiratory hygiene and environmental cleaning
- Limitations on movement around or from the house
- Social distancing,
- follow up by Department of Health is essential

Other patients need hospital admission - caution: follow local guidelines
Hospitalized Patients

- Place in a airborne droplet contact isolation room (negative pressure isolation room) with HEPA filter.

In hospital care:
- Supportive care is mainstay of treatment,
- Fever - with Acetaminophen
- Patients with pneumonia or critically ill-- antibiotics such as Ceftriaxone, Azithromycin may be started
- Hypoxia- give supplementary oxygen to maintain oxygen saturation above 90%
Hospital Admission

- ICU/Telemetry: for patients with clinical deterioration
  Further care as per ICU team

- Discharge:
  1) Home
  2) Short-Term Rehabilitation
  3) Nursing home
  4) Hospice/Palliative care.
Ear, Nose and Throat

Otolaryngology – Head and Neck Surgery

Covid 19 Considerations

Axay Shanti Kalathia MD
Overview

**High Risk!** Viral density greatest in nose, nasopharynx, oropharynx

Wuhan:

- endoscopic pituitary surgery
- fourteen people involved in that case became infected


China, Italy, Iran, UK, Greece anecdotal reports:

- Highest rate of COVID-19 transmissions to otolaryngologists including deaths
Presentation

Outpatient
Cold symptoms

Inpatient
Airway issues
Tracheostomy consultation

Universal Precautions!!!
Presenting Symptoms

Huang et al: Lancet Published: January 24, 2020 DOI: https://doi.org/10.1016/S0140-6736(20)30183-5

- Fever - 98%
- Dry Cough - 76%
- Malaise - 44%

Mild Cases: (clinic)
- Sore Throat
- Facial Pain/Headache
- Nasal congestion and drainage
- (GI symptoms)

Loss or diminished taste/smell
- In many, the presenting symptom!
- Germany series reports up to 60%
- South Korea series reports up to 30%
Examination

Clinician at risk

*Universal Precautions

Avoid routine use of tongue depressor or mirror exam unless clinically indicated

Keep 6-foot distance except when examining

Have patient wear mask until nose/mouth exam

Clean all surfaces patient comes into contact

Additional cleaning procedures: e.g. wipe down otoscope handles, keyboards, pens, etc.
Personal Protective Equipment

**Homemade Masks:** SSIO-USA Seva
- prevent wearer from spreading
- prevent touching face
- Use on top of surgical mask or N95 mask to protect from gross spillage

**Surgical Masks**
- fluid Restriction; large droplets

**N95 respirator mask**
- 95% of small and large particle aerosol
- tight fitting
- US standards:
  - N95, N99, N100
- European standards:
  - FFP 3 (99%) > FFP 2 (94%) > FFP 1 (84%)
Procedures

Endoscopy: Aerosol Generating Procedure (AGP)
Any intervention involving nose, mouth, throat:
oral/dental
nasal and laryngeal endoscopy
bronchoscopy and esophagoscopy
high flow oxygen??; ?inhalation therapy??
At minimum N95 mask, shield, gloves and gown
Isolate room for 3 hours
Innovations

CDC and FDA lifted restrictions, allowing use of personal and industrial devices in healthcare

Reusable Industrial Elastomeric Respirator
  Honeywell example shown

Reusable Homemade Elastomeric Mask

Boston Children's Hospital Video
  Anesthesia Mask ~ $1
  Inline Filter < $1
  Elastic Strap > $1
Surgery

Higher risk when powered surgical instrumentation (drill, cautery, laser) used in nose, mouth, throat: virus containing plume

Postpone elective operations
Test patient for Covid first
   If Negative, use N95 mask by entire team
If Positive:
   PAPR (Powered Air Purifying Respirators) by OR team
Tracheostomy

American Academy of Otolaryngology Head and Neck Surgery Recommendations

https://www.entnet.org/content/tracheotomy-recommendations-during-covid-19-pandemic

Wait minimum 2-3 weeks from time of intubation

2 negative tests prior to operation

Limit people in room (students, residents video)

Complete paralysis

Closed circuit

Avoid cautery
Doctors by themselves cannot cure diseases. Divine Grace is essential.

Nov 18, 1999 (Second World Youth Conference)
Care of the Critically ill COVID–19 patient

KALPALATHA K. GUNTUPALLI MD
CHIEF OF PULMONARY/CRITICAL CARE MEDICINE
BEN TAUB HOSPITAL,
OSCAR FRIEDMAN ENDOWED PROFESSOR, BAYLOR COLLEGE OF MEDICINE
HOUSTON, TX
This is a first!

1. When did we see an infectious disease that affected *some one you know* and is seriously ill from it and some of them die from it?
2. When did we see (8-14%) our *colleagues infected* from patients?
3. When did we see the lockdown for the world and we are the “*new soldiers* - boots on the ground” in the trenches with serious risk to ourselves and perhaps our families?
4. When did we see hospitals filled with patients with *one* disease?
5. When did we in the recent past see so many patients *younger than 50 critically ill* and die from one disease?
6. When did we see ophthalmologists and neurosurgeons take *primary care* of ICU patients?
7. When was there a health crisis that *no one could volunteer* because they were needed locally too?
8. When did we think construction workers can donate N 95s and oil industry CAPRs and engineer make us safe intubation boxes?
9. When did *sports arenas become hospitals*?
10. When did the whole world *stay home but were afraid to socialize. Home but not on vacation*?
COVID-19 Symptoms with admission criteria

Isolation & Notify infection control

COVID positive

Usual Care

Severe ARDS = (P/F < 150): Consider the following rescue strategies:
• Paralytics
• Recruitment maneuvers/high PEEP
• Alternate ventilator modes: APRV, inverse-ratio ventilation
• Inhaled fio2 (case-by-case decision by attending)
• ECMO in very rare (after multi-disciplinary discussion)

CONSIDERATIONS IN DNI/DNR PATIENTS

No high flow O2/NIPPV
Maximize comfort using medications

CONSIDERATIONS IN CARDIAC ARREST

Consider futility early
Limit number of people and duration of resuscitation efforts

Severe Disease: MICU
Impending respiratory failure
Shock

Mild Disease
Acute Care floor
RR < 30
SaO2 > 93% on RA
PaO2 > 70 on RA
No increased WOB
Hemodynamics stable

1. Monitor SaO2, QT interval, electrolytes
2. Close observation for clinical deterioration: worsening oxygenation, increased WOB
3. Consider broad spectrum antibiotics if superinfection suspected
4. Avoid nebulizers; use MDI with spacer if indicated
5. Preferential use of acetaminophen for fever
6. Supportive care

Supportive care: fluid resuscitation, oxygen supplementation, and antipyretics

Moderate Disease
Acute Care or Step down
Any of the following:
RR > 30
SaO2 < 93% on RA
PaO2 < 70 on RA
Increased WOB
Hemodynamics stable

1. Venturi mask/NRB to maintain SaO2
2. If rapidly declining course, consider early intubation; ANESTHESIA to intubate
3. Consider high flow O2 or NIV only if in negative pressure room, if not, place surgical mask over the HFO cannula
4. If NIV, place viral filter close mak
5. Consider self-proning
6. Avoid nebulizers; use MDI with spacer if needed
7. Preferential use of acetaminophen for fever, avoid NSAIDs
8. Avoid systemic steroids

Supportive care: fluid resuscitation, oxygen supplementation, and antipyretics

CONSIDERATIONS IN DNI/DNR PATIENTS

No high flow O2/NIPPV
Maximize comfort using medications

CONSIDERATIONS IN CARDIAC ARREST

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• ECMO in very rare (after multi-disciplinary discussion)

High PEEP highest Tp2

<table>
<thead>
<tr>
<th>FiO2</th>
<th>0.3</th>
<th>0.3</th>
<th>0.3</th>
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<td>5</td>
<td>10</td>
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<td>14</td>
<td>16</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>24</td>
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</table>

Other testing: CXR, EKG, baseline echo, CT Chest if indicated

Laboratory Testing: CBC w/diff, CMP, CRP, PCT, LDH, ferritin, troponin, CPK, D-Dimer

Microbiologic Testing: NP swab for flu/RSV with reflex to Verigene (adenovirus, human metapneumovirus, parainfluenza, rhinovirus), COVID-19, urine strep and legionella antigen, sputum Gr stain and culture
Non-Invasive Management: Oxygen Delivery Systems

High Flow Oxygen Delivery system 20-60 L/min Humidified, heated

Nasal Cannula

Non rebreather Mask
Non-Invasive Ventilation
CPAP/Bi PAP

- Total Face mask With Viral filter
- Helmet CPAP With Viral Filter
“Cooperative” or Self Proning
Severe ARDS = (P/F < 150):
Consider the following rescue strategies:
• Paralytics
• Recruitment maneuvers/high PEEP
• Alternate ventilator modes: APRV
• Inhaled Epoprostenol
• ECMO - rare (after multi-disciplinary discussion)

1. **ANESTHESIA** to intubate (pre-oxygenate, avoid bag-mask ventilation, RSI)
2. Early broad spectrum antibiotics
3. Fluid bolus then **assess fluid** responsiveness
4. Low Vt ventilation (4-6 cc/kg, Pplat < 30) **Lung protective ventilation**
5. Post-intubation CXR, **avoid daily CXray**
6. Ensure ETT is secure
7. Encourage **bedside Ultrasound** rather than routine CXR.
8. Ensure **adequate sedation**
9. **Early proning**
10. **Sedate Paralyse with proning**

**Lab Testing:**
- CBC w/diff, CMP, CRP, PCT, LDH, ferritin, troponin, CPK, D-Dimer
- Microbiologic Testing: NP swab for flu/RSV with reflex to Verigene (adenovirus, human metapneumovirus, parainfluenza, rhinovirus), COVID-19, urine strep and legionella antigen, sputum Gr stain and culture
- Other testing: CXR, EKG, baseline echo, CT Chest if indicated

**CONSIDERATIONS IN DNI/DNR PATIENTS**
No high flow O2/NIPPV
Maximize comfort using medications

**CONSIDERATIONS IN CARDIAC ARREST**
Consider futility early
Limit duration of resuscitation efforts

**Severe ARDS = (P/F < 150):** Consider the following rescue strategies:
- Paralytics
- Recruitment maneuvers/high PEEP
- Alternate ventilator modes: APRV
- Inhaled Epoprostenol
- ECMO - rare (after multi-disciplinary discussion)
ARDS: Concept of Lung Injury in an inflamed or diseased lung

Large volume ventilation causes lung injury even in normal lungs.
Repeated opening/closing of an atelectatic collapsed alveoli causes lung injury.
Repeated Alveolar Collapse and Expansion

PSILI - Patient Self Induced Lung Injury
Ventilator Induced Lung Injury
Avoid RACE Repetetive Airway Collapse Expansion = PEEP
Avoid Overdistension = Limit plateau pressure < 30
Low Tidal Vomume
Severe Hypoxemic Respiratory Failure
Narendra et al CHEST 2017

Lung Protective Ventilation

Figure 2 - A suggested approach to severe hypoxemic respiratory failure based on our view of the available evidence. The dashed lines represent less-favored alternative approaches. This approach is intended to be reasonable, not rigid. Experienced clinicians might select different priorities, and this approach might be superseded as new evidence becomes available. ECMO = extracorporeal membrane oxygenation; PBW = predicted body weight; PFO = patent foramen ovale. See Figure 1 legend for expansion of other abbreviations.
Proning for ARDS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prone</th>
<th>Supine</th>
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<tbody>
<tr>
<td>Number 466</td>
<td>237</td>
<td>229</td>
</tr>
<tr>
<td>28 day mortality %</td>
<td>16</td>
<td>32.8 P &lt; .001</td>
</tr>
<tr>
<td>90 day mortality</td>
<td>23.6</td>
<td>41 P &lt; .001</td>
</tr>
<tr>
<td># sessions 16 hrs</td>
<td>4+_4</td>
<td>73% of time on ventilator</td>
</tr>
</tbody>
</table>

NEJM 2013

PROSEVA TRIAL
50% reduction in mortality
NEJM 2013
Top Ten Clinical Take Away Points

1. COVID-19 has **protean manifestations**

2. Up to half of the patients can be managed by **non invasive methods**

3. Remember large volume ventilation can cause/exacerbate lung injury in spontaneous or ventilated patients. **Avoid large volume ventilation. Use lung protective ventilation**

4. **Intubation by the most experienced**, preferably by video laryngoscopy with rapid sequence intubation.

5. **“Cooperative Proning”** in unintubated – When on vent **Prone early** in severe hypoxemic patients, develop multidisciplinary “proning teams”

6. Keep the **L and H phenotypes** in mind but **ARDS treatment principles are similar**.

7. **Paralysing patient** and comes with enhanced responsibility! Need **multiple safety steps/checks**

8. Patients are **hypercoagulable**!

9. Think **out of the box** for bedside interventions! That can save you, your colleagues and your patient!

10. **Post ICU Syndrome** – Neuromuscular Weakness, Cognitive defects, Psychiatric problems. Just getting patient out of the ICU is not the only criterion for victory celebration!
Top 10 Administrative Take Away Points

1. This is not a Sprint but a Marathon! (Wuhan – Dec → April)
2. Your poor planning can cost lives! Protecting health care workers should be your top most priority!
3. Going from “resource rich” to “resource poor” may be only a week away!
4. “Command and Control center” should be the coordinating apex body
5. Plan/Rehearse and prepare to change again in 24 hrs - Multidisciplinary engagement is the key in the Surge planning
6. Prepare to train personnel not normally deployed for those tasks – All are COVID doctors in a pandemic.
7. ARDS has relatively longer ICU course – patients accumulate and you reach capacity very quickly
8. Build in 20% workforce for outages from COVID illness, exhaustion, emergencies
9. Keep up the morale of your team! Be cognizant of burnout/anxiety/depression/PTSD
10. Lead from the front! “Yatha Raajaa Thatha prajaa” – People around you take cues from your body language, behavior, coping, etc.
Innovations can save you and your colleagues
# ARDS – The Two Phenotypes

<table>
<thead>
<tr>
<th>Feature</th>
<th>Common</th>
<th>L - type</th>
<th>H - type – Typical ARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance</td>
<td>Keep tidal volume low 6-8 ml/kg</td>
<td>Very Good</td>
<td>Low</td>
</tr>
<tr>
<td>Reason for hypoxia</td>
<td></td>
<td>V/Q abnormality Subpleural Patchy infiltrates, Low lung weight</td>
<td>Shunt = water logged lungs, basal atelectasis, heavy</td>
</tr>
<tr>
<td>PEEP</td>
<td>Keep driving pressure &lt; 15</td>
<td>8-10</td>
<td>Higher</td>
</tr>
<tr>
<td>Proning for PO2/FIO2 &lt; 150</td>
<td>Both may respond</td>
<td>May respond</td>
<td>More likely to respond</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low recruitability</td>
<td>High recruitability</td>
</tr>
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</table>

**The” L” Phenotype**

**The “H” Phenotype**
CAPRs
Sairam
and
Thank You!
Cardiovascular Implications of COVID-19

Aniket S. Rali, MD
Baylor College of Medicine
Outline

- Cardiac biomarkers
- Mimicker of ACS
- Clinical Considerations
- QTc Monitoring
Cardiovascular Biomarkers

- High-sensitivity cardiac troponin I has been shown to be a predictor of worse in-hospital outcomes.

COVID 19 Mimics ACS

- MyoPericarditis vs Coronary Spasms vs Coronary Micro-emboli

COVID 19 Mimics ACS - Considerations

- Benefits of diagnostic/therapeutic cardiac catheterization vs exposure to HCW and potential contamination of lab equipment.
- Role for POC echocardiography in identifying wall motion abnormalities, pericardial effusions etc.
- Role of thrombolytics in treatment of ACS.
COVID 19 – Telemetry Monitoring

• Who needs telemetry monitoring?

Cardiac Monitoring in COVID-19 Patients

SARS-CoV2 (Confirmed)

Meet BSLMC Telemetry Criteria**

- Initiate Telemetry Monitoring
- Daily ECGs While Being Treated With Kaletra® or Plaquenil®

Do Not Meet BSLMC Telemetry Criteria

Negative Troponin at Admission

- Trend troponins at least once daily for 72 hours.
- Initiate telemetry monitoring for at least 72 hours.

Do Not Initiate Telemetry Monitoring

Positive Troponin at Admission*

- ACS or Rule out MI
- Deceased Solutions
- Acute stroke/TIA
- Post op CABG or history of CABG, valve replacement
- Symptomatic arrhythmia
- Cardiac contusion
- Myocarditis or Pericarditis
- Step down from ICU with recent cardiac or respiratory arrest
- 2nd or 3rd degree heart block
- Uncontrolled atrial arrhythmia or sustained VT
- Post op patients with angina, new EKG changes, positive pre-op stress test SBP < 90 or HR > 130
- Initiation/monitoring/drug toxicity of antiarrhythmic medications
- Suspected rejection of heart transplantation

*Positive for this cohort of patients considered > 2 x upper limit of normal in the BSLMC lab.

** BSLMC Telemetry Criteria
- Chest pain
- Syncope
- S/p PCMI/Ablation/AICD
- K+ > 5.5, K+ < 2.5, or Mg < 1.0
- PE, or intervention/thrombolysis
- History of VAD or Heart Transplant
- ACS or Rule out MI
- Decompensated HF
- Acute stroke/TIA
- Post op CABG or history of CABG, valve replacement
- Symptomatic arrhythmia
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*Positive for this cohort of patients considered > 2 x upper limit of normal in the BSLMC lab.
Thank You!
COVID-19 Treatments – QTc Monitoring

- Two medications proposed in treatment of COVID-19, i.e. Azithromycin and Hydroxychloroquine, both prolong QTc and can cause lethal arrhythmias.
Gastrointestinal and Liver Involvement with COVID-19

Dr. Hari Conjeevaram, MD, MSc, FACP, FACG
Professor of Medicine
University of Michigan
Ann Arbor, MI, USA
What we know:

- Incidence of GI (Digestive) symptoms including nausea and/or diarrhea in up to 50% (range 5-50%).

- There have been reports of isolated diarrhea preceding cough and fever.

- The virus may be present in GI secretions and viral RNA is detectable in stool.
  - Gastrointestinal infection and potential fecal-oral transmission must be considered.

- Abnormal liver enzymes are observed in 20-30% of persons with COVID-19 infection.

Joint GI Society COVID-19 Clinical Insights March 2020
AASLD COVID-19 Clinical Insights April 2020
Digestive Symptoms

- Anorexia (Lack of appetite) – most common
- Diarrhea
  - Recently cases of ‘hemorrhagic colitis’ reported
- Vomiting
- Abdominal Pain

Joint GI Society COVID-19 Clinical Insights March 2020
Digestive Symptoms

*As severity of the disease increased, digestive symptoms become more pronounced.

Endoscopic Procedures – Potential High Risk for Transmission

- There is potential for fecal-oral transmission.
  - Virus is detected in saliva and in stool (virus shedding).

- The joint GI societies recommend to “strongly consider rescheduling non-urgent endoscopic procedures”.

- Endoscopic procedures should be considered aerosol-generating (droplet exposure).

- When performing procedures, in addition to standard PPE (gloves, gown, eyewear), also should use headwear (face shield) and masks.

Joint GI Society COVID-19 Clinical Insights March 2020
Liver Tests/Liver Function Abnormalities

• Mainly ALT (SGPT), AST (SGOT) elevations [1-2 times the upper limit of normal (ULN)]*
• Elevated Bilirubin – usually mild to modest
• Elevated Prothrombin Time (PT)/INR*
Liver Tests/Liver Function Abnormalities

- **Incidence** of elevated liver biochemistries in hospitalized patients ranges from 14% to 53%.

- Elevated liver biochemistries may reflect a direct virus-induced cytopathic effect and/or immune damage from the provoked inflammatory response.

- Liver injury occurs more commonly in more severe COVID-19 cases than in mild cases.
  - Higher mean liver enzyme levels and PT/INR in patients with digestive symptoms.

- Low serum albumin on hospital admission is a marker of COVID-19 severity.

AASLD COVID-19 Clinical Insights April 2020
Liver Tests/Liver Function Abnormalities

• Rare cases of severe acute liver injury have been described.

• Some of the therapeutic agents used to manage symptomatic COVID-19 may be hepatotoxic (e.g. statins, remdesivir, and tocilizumab) (less common with chloroquine, hydroxychloroquine, and azithromycin).
Take Home Messages:

• Up to half of all COVID-19 patients present with digestive symptoms.

• A small percent present with digestive symptoms but no respiratory symptoms.

• COVID-19 patients with digestive symptoms have a longer time from onset to admission.

• As the severity of the disease increased, digestive symptoms became more pronounced.

• Laboratory data: mild to significant increase in ALT (SGPT), AST (SGOT), and prothrombin time (PT/INR).

• Endoscopic Procedures – potential high risk for transmission.

• DO not stop immunosuppressant medications for patients.
Joint GI Society COVID-19 Clinical Insights March 2020

AASLD COVID-19 Clinical Insights April 2020

Jai Sai Ram!
Radiology of COVID-19

VIJAY CHUNDI, MD, RADIOLOGIST
Common Patterns and Distribution on Initial CT Images of 919 Patients With COVID-19

<table>
<thead>
<tr>
<th>Imaging Finding</th>
<th>No. of Studies</th>
<th>No. of Reported Cases/ Total No. of Patients (%)</th>
</tr>
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<tbody>
<tr>
<td>Bilateral involvement</td>
<td>12</td>
<td>435/497 (87.5)</td>
</tr>
<tr>
<td>Peripheral distribution</td>
<td>12</td>
<td>92/121 (76.0)</td>
</tr>
<tr>
<td>Posterior involvement</td>
<td>1</td>
<td>41/51 (80.4)</td>
</tr>
<tr>
<td>Multilobar involvement</td>
<td>5</td>
<td>108/137 (78.8)</td>
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<tr>
<td>Ground-glass Opacification</td>
<td>22</td>
<td>346/393 (88.0)</td>
</tr>
<tr>
<td>Consolidation</td>
<td>10</td>
<td>65/204 (31.8)</td>
</tr>
</tbody>
</table>

Salehi, Abhedi, et al; AJR:215, July 2020
Covid-19 Pneumonia
Imaging modalities

**Radiographs (X-ray):** widely available and portable
- Portable supine CXR is limited in differentiating peripheral fluid from air space disease (Consolidation)

**CT:** Gold standard - Available in most of developed world but issue with cost and availability exists. NOT portable

**Ultrasound (US):** widely available, portable including handheld units
- Proven for ER and bedside use and routinely used worldwide; excellent in neonates, pediatrics, and ICU
- Excellent for finding fluid; pleural effusions, guiding drainage, etc.
- Limitations in chest-Operator dependent, Sternum and ribs obscure lungs, deeper areas not seen
US of COVID-19 Pneumonia

Need more studies but some preliminary reports are promising in this crisis.

If pretest probability (prevalence and clinical suspicion) is high and CT or CXR not practical or available, US can help confirm if positive.
Chest CT COVID-19 Pneumonia

**Asymptomatic** (1-2 wks) - few peripheral Ground Glass Opacities (GGOs)

**Early** Symptomatic - Peripheral GGOs, mild consolidation

**Severe** Symptomatic - Greater degree of consolidation and ARDS

**Older** patients and immunocompromised pts may have atypical features

If testing is negative with **High** clinical suspicion and suggestive CT, presume they have COVID-19 and re-test
COVID-19 Pneumonia
Key Points

CXR at early phase-normal or minimally abnormal
CT may show classic bilateral, multilobar GGOs (often round) before symptoms
Lymphadenopathy and pleural effusions are rare
With clinical progression, progressive consolidation develops
End Stage is ARDS-Bilateral extensive air space opacification
CT COVID-19
Peripheral GGOs

https://pubs.rsna.org/doi/10.1148/radiol.2020200236
COVID-19 Classic Rounded Peripheral GGOs

Source: Itnonline.com and Radiology Online
NOT LIKELY to be COVID-19 Pneumonia

Discrete nodules
Cavitation
Central GGOs (Non COVID-19 Pneumonia)
Smooth septal thickening with pleural effs (CHF)
Subpleural reticulation or honey combing (Interstitial lung dz)
If you see the above, you should look for OTHER etiologies
CONCLUSIONS

Radiology plays an important role in evaluation of COVID-19 pneumonia.

Bilateral peripheral GGOs are highly suggestive of COVID-19 pneumonia.

If testing is negative with **High** clinical suspicion and suggestive CT, presume they have COVID-19 and re-test.
LABORATORY MEDICINE
COVID-19

PRAVEENA YETUR, MD FCAP FASCCP
SENIOR PATHOLOGIST
MEDICAL SCIENCE LIAISON
LABCORP – WEST DIVISION
About COVID-19 Tests

1) COVID-19 Test
   - Real Time PCR
   - Nucleic Acid Amplification (NAA)
   - Sensitivity and Specificity
   - Turnaround Time (TAT)

2) ID NOW™ COVID-19 (Abbott Rapid Test)
   - Isothermal NAA

3) Antibody Blood Test

COVID-19 tests are offered without copay or out-of-pocket cost.
In which settings are COVID-19 tests available to the public?

1) Outpatient
   - Physicians Offices and Clinics
   - Surgery Centers
   - Point of Care Testing Facilities (Drive-Thru)

2) Inpatient
   - Hospitals
   - Nursing Care Facilities

3) Other settings (Correctional Facilities, etc.)
What are sample types?

1) Nasopharyngeal (NP) Swabs
2) Oropharyngeal (OP) Swabs
3) NP Wash/Aspirate
4) Sputum
5) Lower Respiratory Tract Aspirates
6) Bronchoalveolar Lavage (BAL)
What is the stability of the sample?

1) Room Temperature – 24 hours
2) Refrigerated – 72 hours
3) Frozen – longer
What are the current CDC testing criteria?

1) Clinical Criteria
   - Signs and symptoms associated with COVID-19

2) Epidemiological Criteria*
   - History of residence in or travel to affected geographic regions
   - Any exposure
   - Other

*CDC criteria is changing with regular updates
Detailed guidance about the testing process, including specimen handling for COVID-19 specimens, is available at: https://www.labcorp.com/COVID-19
COVID-19: Opportunities for Service

GANESH YADLAPALLI, MD

PROFESSOR OF MEDICINE
UNIVERSITY OF CINCINNATI MEDICAL SCHOOL, USA

ASSOCIATE CHIEF, SECTION OF NEPHROLOGY,
VA MEDICAL CENTER, CINCINNATI, USA

ASSOCIATE DIRECTOR OF DIALYSIS UNIT,
CINCINNATI VA MEDICAL CENTER
Goal - Slow Down the Pandemic
What Can We Do?
COVID-19 Pandemic: Current Status

https://coronavirus.jhu.edu/map.html
Future Lessons From Seasonal Influenza

Prepare for the Worst, Pray for the Best

Steps to Slow Down the Pandemic

Effective measures are

- Social Distancing
- Personal Protection Equipment (PPEs)
  - Masks
  - Face shields
  - Gowns
- COVID-19 Testing
Opportunities to Help

General public

People who are at high risk of exposure

  Healthcare workers
  Staff working in death care industry
    Funeral home staff
    Religious organization (priests)
  Staff working for solid waste and wastewater management

What can we do:

  We can supply PPE – mask, face shields and gowns
PPE: Masks

Homemade Mask and PPE Service Project

https://sathyasai.us/service/homemade-mask-service-2020
PPE: Face shields

https://sathyasai.us/service/homemade-mask-service-2020
PPE: Gowns
SSIO COVID-19 Initiative

Goal:

Is to supply at least 95,000 Masks, shields and gowns

SSIO of Mauritius will be distributing 5000 masks next week

SSIO of Botswana will be distributing face shields to local hospital
PPEs: Other Avenues for Innovation

N95 masks (Respirators)

HEPA filters for masks

HEPA filters for ventilators

Necessity is Mother of Invention
COVID-19 Testing

We are exploring

- Collaborations to develop testing kits
- To buy point-of-care testing kits

Explore Universe of Brain for the Universe

Thank you
Mental Health and Well Being
During and After the COVID-19 Pandemic

Meera Narasimhan, MD, DFAPA

Professor and Chair, Department of Neuropsychiatry and Behavioral Science, University of South Carolina & Service Line Director, Behavioral Health Prisma Health Columbia, South Carolina & Special Advisor to the President, University of South Carolina Health Innovations and Economic Development
# Stress of COVID-19 Pandemic

## Healthcare Systems, Professionals & People

### Healthcare Systems
- Mismatch between demand and resources
- Testing capabilities
- Triaging
- Protecting personnel while taking care of patients
- PPE rationing
- Policy changes
- Agonizing clinical and financial decisions

### Healthcare Workers
#### Professional Level
- Unknown nuances of disease pathology
- Overwhelming barrage of patients (sick and scared)
- Overwhelming flow of information
- Shifting guidelines
- PPE
- ICU beds
- Negative pressure rooms
- Ventilators

#### Personal Level
- Potentially bring this virus back home to our loved ones
- Worries about family children, elderly
- Anxious, afraid and threatened
- Painful awareness of our own mortality

### Healthcare Workers

### People
- Disrupts normalcy
- Social Isolation
- Fear, worry, irritability due to binge viewing of media outlets, social media, misinformation
- Worries about family children, elderly
- Not being able to say goodbye to family during their final moments
- Economic implications
Symptoms of Stress during COVID-19

- Fear and worry about your own health and the health of your loved ones
- Changes in sleep or eating patterns
- Difficulty sleeping or concentrating
- Feeling anxious and sad
- Worsening of chronic health problems
- Worsening of mental health conditions
- Increased use of alcohol, tobacco and drugs

Mind Body Connectivity

Psychoneuroimmunology

Stress

- Depression
- Anxiety Ds

Limbic System (Hippocampus)

Hypothalamus

Pituitary Gland (Anterior Pituitary)

CRH

ACTH

Adrenal Cortex

Endocrine

Thyroid

Adrenals

Glucocorticoid

Cytokines

- Infection
- Pain
- Allergies
Therapies and Tools
Coping with the Stress of COVID-19

- Mindfulness
- Psychological First Aid
- Trauma Focused CBT
- Grief Counseling
- Online therapy companies
- AI powered mental health chatbots
- Crisis Text lines
- Suicide hotlines

(URL links on SSSIO website)
Coping with COVID-19 the SAI way

Rx

Mental Wellness Prescription

For Healthcare Providers

S top worrying about things you cannot control
A dd a sense of normalcy to help yourselves, coworkers, family and friends
I nternet, I-phones (Information Technology) in moderation to connect with the world, stay informed, but avoid getting overwhelmed with the surge of information flow
B e healthy by exercising regularly and maintaining a healthy diet
A must is sleep and rest
B e mindful of your emotions, do self checks of your feelings: anxiety, depression & practice mindfulness meditation
A prayer of gratitude to SAI for the opportunity bestowed on us to serve our fellow human beings

Lokah Samastah Sukhino Bhavantu
SSIO
ZONE 3 COVID-19 SUMMARY
FIJI, AUSTRALIA, NZ
Fiji COVID-19 Summary

CURRENT STATUS OF CONFIRMED CASES

Total cases: 16
Total deaths: 0
Cases recovered: 0
Updated cases diagnosed in Fiji

Source: Ministry of Health and Medical Services, Fiji Broadcasting Corporation (FBC)
As of 10 April 2020, 6 countries (Commonwealth of the Northern Marianas (CNMI), Papua New Guinea, Fiji, French Polynesia, Guam and New Caledonia) in the PICTs have reported 225 cases including 6 deaths, excluding the number of cases from USS Theodore Roosevelt currently docked in Guam.

Restrictions in place: Samoa, Solomon Islands, Tonga, Vanuatu and Tuvalu have declared states of emergency.

The Marshall Islands and Federated States of Micronesia have completely sealed their borders.

CMNI is under nationwide curfew from 7pm to 6am daily.

Cook Islands are in Code Yellow recommending people work from home.

Fiji is under a nationwide curfew from 8pm to 5am daily. Lautoka and Suva are under full lockdown.

French Polynesia is under nationwide curfew from 8pm to 5am till 29 April.

Kiribati is at Level 4 alert with a stay at home policy.

New Caledonia self-quarantine measures continue.

Niue is at Level 4 alert with a stay at home policy.

Papua New Guinea ended its lockdown on 06 April. The state of emergency has been extended by 2 months.

Tonga is under nationwide curfew from 8pm to 6am.

Source: https://www.spc.int/updates/blog/2020/04/covid-19-pacific-community-updates
Australia Covid Summary

CURRENT STATUS OF CONFIRMED CASES

Total cases: 6203
Total deaths: 53
Cases recovered: 3141

Australia

Australia- timelines for Govt response Covid-19
New Zealand

**CURRENT STATUS OF CONFIRMED CASES**

- Total cases: 1035
- Total deaths: 4
- Cases recovered: 422
New Zealand

Epidemic curve

Total confirmed and probable cases over time, as at 9.00 am, 9 April 2020

Modified from: Epidemic Curve
<table>
<thead>
<tr>
<th>LEVEL</th>
<th>RISK ASSESSMENT</th>
<th>RANGE OF MEASURES (can be applied locally or nationally)</th>
</tr>
</thead>
</table>
| **Level 4 - Eliminate** | Likely that disease is not contained | - Sustained and intensive transmission  
- Widespread outbreaks | - People instructed to stay at home  
- Educational facilities closed  
- Businesses closed except for essential services (e.g. supermarkets, pharmacies, clinics) and lifeline utilities  
- Rationing of supplies and requisitioning of facilities  
- Travel severely limited  
- Major reprioritisation of healthcare services |
| **Level 3 - Restrict** | Heightened risk that disease is not contained | - Community transmission occurring OR  
- Multiple clusters break out | - Travel in areas with clusters or community transmission limited  
- Affected educational facilities closed  
- Mass gatherings cancelled  
- Public venues closed (e.g. libraries, museums, cinemas, food courts, gyms, pools, amusement parks)  
- Alternative ways of working required and some non-essential businesses should close  
- Non face-to-face primary care consultations  
- Non acute (elective) services and procedures in hospitals deferred and healthcare staff reprioritised |
| **Level 2 - Reduce** | Disease is contained, but risks of community transmission growing | - High risk of importing COVID-19 OR  
- Uptick in imported cases OR  
- Uptick in household transmission OR  
- Single or isolated cluster outbreak | - Entry border measures maximised  
- Further restrictions on mass gatherings  
- Physical distancing on public transport (e.g. leave the seat next to you empty if you can)  
- Limit non-essential travel around New Zealand  
- Employers start alternative ways of working if possible (e.g. remote working, shift-based working, physical distancing in the workplace, staggering meal breaks, flexible leave arrangements)  
- Business continuity plans activated  
- High-risk people advised to remain at home (e.g. those over 70 or those with other existing medical conditions) |
| **Level 1 - Prepare** | Disease is contained | - Heightened risk of importing COVID-19 OR  
- Sporadic imported cases OR  
- Isolated household transmission associated with imported cases | - Border entry measures to minimise risk of importing COVID-19 cases applied  
- Contact tracing  
- Stringent self-isolation and quarantine  
- Intensive testing for COVID-19  
- Physical distancing encouraged  
- Mass gatherings over 500 cancelled  
- Stay home if you’re sick, report flu-like symptoms  
- Wash and dry hands, cough into elbow, don’t touch your face |

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