NETEC COVID-19 Webinar Series:

Surgical Cases and Considerations For COVID-19 Patients
Welcome

Ted Cieslak, MD, MPH
Welcome: Ted Cieslak, MD, MPH

Procedural PPE in the COVID Era: James Sullivan, MD

Perioperative Considerations of COVID-19: Thomas E. Schulte, MD

Pre-operative COVID Testing: Matthew A. Klopman, MD, FASA, FASE

Intraoperative and Immediate Postoperative Considerations: Jeremy Collins, MB ChB, FRCA

NETEC Resources: Ted Cieslak, MD, MPH

Questions and Answers with NETEC
Welcome

National Emerging Special Pathogens Training and Education Center

Mission Statement

To increase the capability of the United States public health and health care systems to safely and effectively manage individuals with suspected and confirmed special pathogens

For more information

Please visit us at www.netec.org
or email us at info@netec.org
**NETEC Overview**

**Assessment**
- Empower hospitals to gauge their readiness using **Self-Assessment**
- Measure facility and healthcare worker readiness using **Metrics**
- Provide direct feedback to hospitals via **On-Site Assessment**

**Education**
- Provide self-paced education through **Online Trainings**
- Deliver didactic and hands-on simulation training via **In-Person Courses**
- COVID-19 focused **Webinars**

**Technical Assistance**
- **Onsite & Remote Guidance**
- **Compile Online Repository** of tools and resources
- Develop customizable **Exercise Templates** based on the HSEEP model
- **Provide Emergency On-Call Mobilization**

**Research Network**
- **Online Repository** Built for rapid implementation of clinical research protocols
- **Develop Policies, Procedures and Data Capture Tools** to facilitate research
- Create infrastructure for a **Specimen Biorepository**

**Cross-Cutting, Supportive Activities**
Procedural PPE in the COVID Era

James Sullivan, MD
SARS-CoV-2 Viral Transmission

Airborne transmission

WHO classifies as aerosol transmission currently – not always the case

January 1 – cluster of atypical pneumonia in Wuhan province

January 21 – “very clear at least some human-to-human transmission”

February 27 – WHO publishes rational use of personal protective equipment in COVID-19 patients – use a mask if you have Sx

- Pointed out the reality of not only PPE shortages but lack of ability to ramp up production
- Ration PPE, limit contact (healthcare workers, visitors), physical barriers
- Gowns, gloves, medical masks, eye protection
- Asymptomatic do not need to be masked

*Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19) Interim guidance February 27, 2020*
<table>
<thead>
<tr>
<th>Setting</th>
<th>Target personnel or patients</th>
<th>Activity</th>
<th>Type of PPE or procedure</th>
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<tbody>
<tr>
<td>Healthcare facilities</td>
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</table>
| Patient room                | Healthcare workers           | Providing direct care to COVID-19 patients.                              | Medical mask  
Gown  
Gloves  
Eye protection (goggles or face shield).
Aerosol-generating procedures performed on COVID-19 patients.  
Respirator N95 or FFP2 standard, or equivalent.  
Gown  
Gloves  
Eye protection Apron |
| Cleaners                    |                              | Entering the room of COVID-19 patients.                                 | Medical mask  
Gown  
Heavy duty gloves  
Eye protection (if risk of splash from organic material or chemicals).  
Boots or closed work shoes |
| Visitors\(^a\)              |                              | Entering the room of a COVID-19 patient                                 | Medical mask  
Gown  
Gloves |
| Other areas of patient transit (e.g., wards, corridors) | All staff, including healthcare workers. | Any activity that does not involve contact with COVID-19 patients. | No PPE required |
| Triage                      | Healthcare workers           | Preliminary screening not involving direct contact\(^b\)                  | Maintain spatial distance of at least 1 m.  
No PPE required |
| Patients with respiratory symptoms. |                              | Any                                                                      | Maintain spatial distance of at least 1 m.  
Provide medical mask if tolerated by patient.  
No PPE required |
| Patients without respiratory symptoms. |                              | Any                                                                      | No PPE required |
| Laboratory                  | Lab technician               | Manipulation of respiratory samples.                                    | Medical mask  
Gown  
Gloves  
Eye protection (if risk of splash) |
| Administrative areas        | All staff, including healthcare workers. | Administrative tasks that do not involve contact with COVID-19 patients. | No PPE required |
Recommendations – Current Thinking

9 July 2020 – WHO

• “Transmission of SARS-CoV-2 can occur through direct, indirect, or close contact with infected people through infected secretions such as saliva and respiratory secretions or their respiratory droplets”
• Respiratory droplets - > 5-10 micron diameter, 1 meter transmission
• Droplet nuclei (aerosol) - < 5 micron, true airborne transmission, suspended in the air, AGP (airborne generating procedures)

Modes of transmission of SARS-CoV-2

• Contact droplet
• Airborne
• Fomite (theoretical)
• Other (stool, plasma, serum, breast milk, transplacental)
• Symptomatic patients assume contagious 12 hours PRIOR to symptoms
• RNA found in upper airways 1-3 days before symptom onset
• First week of symptoms - upper airway peak viral load
• Day 5-10 - onset of antibodies (may limit transmission)
• Second week of symptoms - peak viral load in feces and lower airways
• Longer detection in the more severely ill
Surgery or Procedures Which Cannot be Postponed (Suspected or Confirmed to Have COVID-19)

CDC

Using all recommended PPE: an N95 or equivalent or higher-level respirator (or facemask if respirators are not available), eye protection, gloves, and a gown

- Respirators with exhalation valves should not be used during surgical procedures as unfiltered, exhaled breath would compromise the sterile field
- If shortages exist, N95 or equivalent or higher-level respirators, should be prioritized for procedures involving higher risk techniques (e.g., that generate potentially infectious aerosols) or that involve anatomic regions where viral loads might be higher (e.g., nose and throat, oropharynx, respiratory tract)

As part of routine practice, HCP should also be using additional engineering controls for source control when applicable (e.g., smoke evacuation devices)
At Risk Behaviors

BE INFORMED:

Know Your Risk During COVID-19

On a scale of 1 to 10, how risky is...

1. Opening the mail
2. Getting restaurant takeout
3. Pumping gasoline
4. Playing tennis
5. Going camping
6. Grocery shopping
7. Going for a walk, run, or bike ride with others
8. Playing golf
9. Staying at a hotel for two nights
10. Sitting in a doctor’s waiting room
11. Going to a library or museum
12. Eating in a restaurant/boarded
13. Walking in a busy downtown
14. Spending an hour at a playground
15. Having dinner at someone else’s house
16. Attending a backyard barbecue
17. Going to the beach
18. Shopping at a mall
19. Sending kids to school, camp, or day care
20. Working in an office building
21. Swimming in a public pool
22. Visiting an elderly relative or friend in the home
23. Going to a hair salon or barbershop
24. Eating in a restaurant/foodtruck
25. Attending a wedding or funeral
26. Traveling by plane
27. Playing basketball
28. Playing football
29. Hugging or shaking hands when greeting a friend
30. Eating at a buffet
31. Working out at a gym
32. Going to an amusement park
33. Going to a movie theater
34. Attending a large music concert
35. Going to a sports stadium
36. Attending a religious service with 50+ worshippers
37. Going to a bar
Face Masks Against COVID-19: An Evidence Review

Jeremy Howard, Austin Huang, Zhiyuan Li, Zeynep Tufekci, Vladimir Zdimal, Helene-Mari van der Westhuizen, Arne von Delft, Amy Price, Lex Fridman, Lei-Han Tang, Viola Tang, Gregory L. Watson, Christina E. Bax, Reshama Shaikh, Frederik Questier, Danny Hernandez, Larry F. Chu, Christina M. Ramirez, and Anne W. Rimoin

Proceedings of the National Academy of Science of the United States of America

April 10, 2020

SARS Co-V – highly transmissible, Ro estimates – 2.4 (now thought to be as high as 5.7)

The number of people that one sick person will infect (on average) is called $R_0$. Here are the maximum $R_0$ values for a few viruses.

- Hepatitis C: 2
- Ebola: 3
- HIV: 4
- SARS: 4
- Mumps: 10
- Measles: 18

Adam Cole/NPR
Pathogenicity may be related to inoculum

Inoculum much higher in non-masked individuals

N95 (aerosol) > surgical (droplet) > cloth

Cloth (household) filter 49-85% filtration of particles 0.02 microns or less
Our Protocols

Universal Mask

Universal eyewear when in contact with patients

Known COVID Positive/uncertain COVID

• N95
• gown
• eye wear (face shield)
• gloves

• PAPR may be used instead of mask and eyewear

3M or ILC Dover Half Hood Donning Checklist

1. Hand Hygiene
2. Verify that the PAPR motor is functioning using the air flow check
3. Secure the motor to the belt & attach the tubing to the motor
4. Attach the hood to the tubing
5. Turn on the motor & don the hood
6. Don gown, tying with bows, tucking back of gown behind motor
7. Hand hygiene & gloves

Troubleshooting your PAPR

• Check to see if the caps on the filters are removed
• Check to see if the bottom cap is present and secured
• Check your battery life (green is good, red is bad)
• Check your hood and tubing
Procedural PPE in the COVIC Era

Our Protocols

✓ PPE donned before entering room and before any AGMP
✓ No one enters (even in PPE) for 15 min after AGMP
✓ Doff PPE after transporting
COVID Positive/Uncertain
Perioperative Considerations of COVID-19

Thomas E. Schulte, MD
Pre-surgical Screening

Phone calls

Travel and Health Screen

Education
- Visitor Restrictions
- Preoperative COVID testing

Travel Screening

Time taken: 1916 7/8/2020

- COVID-19
- MERS-CoV
- Ebola
- None/Unsure

In the last month have you traveled to an area with a widespread outbreak, or had close contact with a person known to have: Novel Coronavirus (COVID-19), MERS-CoV, or Ebola?

- Yes
- No
- Unable to answer/Refuses

Have you traveled outside of the country within the last month?

- Yes
- No
- Unable to answer/Refuses

MERS/COVID: Do you have any of these symptoms?

- Patient Reported Fever > 38.0 (100.4)
- Clinic Measured Temp > 38.0 (100.4)
- Shortness of Breath

- No Symptoms

Restore Close Cancel
Pre-Operative Considerations of COVID-19

Pre-Anesthesia Screening Clinic

- Room patients immediately – NO waiting room
  - Everyone masked
  - Phone call when arrival in parking lot to assure space

- Travel and Health Screen with temperature check

- No partners, unless authorized or needed

- Telehealth Video visits
  - Increase 500%
  - Continue after COVID

- Use of APP’s in Preop when not utilized
Operating Room Scheduling

- Limited operating rooms
  - Staff nursing shortages
  - OR nurses sent to help ICU/Ward coverage

- COVID testing status prominent
  - Added to Patient screen in EPIC

- Open scheduling – NO block scheduling
  - Acute Care, Cardiac, Ortho Trauma

- During shutdown – ALL cases approved by Surgical and Anesthesia Director
Perioperative Considerations of COVID-19

Preoperative Holding Area

- Staggered arrival

- Patient DIRECT from front door to Negative pressure room if COVID-19 positive
  - Skip access services

- Two negative pressure rooms in Preop
  - Anesthesia machine with limited supplies
    - Induce general anesthesia in room. Transport to OR
  - Cart outside room with additional supplies

- Unknown patients treated as COVID-19 positive
<table>
<thead>
<tr>
<th>Preoperative Operating Room Setup</th>
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<tbody>
<tr>
<td><strong>Designated COVID Operating Rooms</strong></td>
</tr>
<tr>
<td>• Positive pressure rooms</td>
</tr>
<tr>
<td>• Limited supplies in room</td>
</tr>
<tr>
<td>• All supplies outside of OR in Sterile Core</td>
</tr>
<tr>
<td><strong>Limit door opening – signs on door</strong></td>
</tr>
<tr>
<td><strong>Cleaning wipes, hand sanitizer, sterile scrub (Avagard) in OR</strong></td>
</tr>
</tbody>
</table>
**Environmental Services**

**Additional Environmental Services members added to Team**
- Additional education by Infection Control about cleaning

**Shortages of cleaning wipes**
- “Homemade bleach wipes”

<table>
<thead>
<tr>
<th>Patient area</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>Screening/triage area</td>
<td>At least twice daily</td>
</tr>
<tr>
<td>Inpatient rooms / cohort - occupied</td>
<td>At least twice daily, preferably three times daily, in particular for high-touch surfaces</td>
</tr>
<tr>
<td>Inpatient rooms - unoccupied (terminal cleaning)</td>
<td>Upon discharge/transfer</td>
</tr>
<tr>
<td>Outpatient / ambulatory care rooms</td>
<td>After each patient visit (in particular for high-touch surfaces) and at least once daily terminal clean</td>
</tr>
<tr>
<td>Hallways / corridors</td>
<td>At least twice daily (^b)</td>
</tr>
</tbody>
</table>
| Patient bathrooms/ toilets                 | Private patient room toilet: at least twice daily  
                      Shared toilets: at least three times daily |

Cleaning and Disinfection of Environmental Surfaces in the context of COVID-19. World Health Organization 5/2020
2 Circulating Nurses – Hand Off
• Transport Team – N95 Face shields
• OR Team - PAPRs

Trained Respiratory Therapists
• Assist with all transports
• Assist with Anesthesia lines

Anesthesia Team – MD + Resident/CRNA
• Two person for contamination checks

Infection Control training on PAPRs
• RT’s, Nursing Leads, CD’s were superusers
Pre-operative COVID Testing

Matthew A. Klopman, MD, FASA, FASE
Pre-operative Considerations of COVID-19

Goals

Avoid surgery in COVID positive patients
  • Worse outcomes in surgical patients with COVID
    • 30-day mortality higher
      • OR 9.5 compared to matched controls without COVID
    • More complications
      • OR 4.98 overall, pulmonary OR 35.62

Team Safety
  • Allows selection of proper PPE

Post-op bed assignment
  • COVID cohort units

Who Needs a Test?

- All patients with likely or planned inpatient admission following their procedure
- All patients having any anesthesia services
- All interventional oncology procedures (chemo and radioembolization)
- The following additional procedures (with some potential overlap with cases requiring anesthesia):
  - Bronchoscopy, tracheostomy exchange, and pulmonary function testing
  - Electroconvulsive therapy
  - Oral/maxillofacial surgical procedures and any dental procedures requiring drilling
  - ENT scopes
  - EGD/ERCP/esophageal manometry, PEG tube placement and exchange, and colonoscopies
  - TEE, cardiac stress test, and scheduled cardiac catheterizations
  - Sleep studies requiring CPAP
  - Ophthalmologic surgeries
  - Prostate biopsies

In the event that a patient arrives without a test result, cases that are urgent or time-sensitive may proceed at the surgical team’s discretion. Appropriate PPE should be worn for patients with an unknown COVID status.
A Test is NOT a Test

Diagnostic Tests
Used to diagnose active coronavirus infection

Molecular Tests – detect virus genetic material
- Nucleic Acid Amplification Test (NAAT), commonly with RT-PCR Assay
- Greatest accuracy
  - High specificity (low false positive rate)
  - Some more than 95% sensitive (5% false negative)
    - Range 60% to >95%
- Some studies demonstrate positive result prior to symptom onset (pre-symptomatic individuals)
- All molecular tests not created equal
  - Abbott ID NOW point-of-care test with high false-negative rate (48% reported in one study)
  - BD Max System with 3% false positive rate in one study

Antigen Tests – detect proteins on surface of virus
- Easy-to-use, point-of-care, in development
- Less sensitive than NAAT
  - Higher false negative rate
A Test is NOT a Test

**Antibody Tests**
Used to diagnose those who present later in the course of illness and those who were previously infected

- Test becomes positive between 9-14 days after onset of symptoms
- Sensitivity ranges from 60-100% depending on test, how many days post-infection
- Specificity generally >95%
- Use tests with an Emergency Use Authorization (EUA) from the FDA
# Summary of Available Tests

<table>
<thead>
<tr>
<th>MOLECULAR TEST</th>
<th>ANTIGEN TEST</th>
<th>ANTIBODY TEST</th>
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<tbody>
<tr>
<td><strong>Also known as</strong></td>
<td>Rapid diagnostic test*</td>
<td>Serological test, serology, blood test, serology test</td>
</tr>
<tr>
<td>Diagnostic test, viral test, molecular test, nucleic acid amplification tests [NAAT], RT-PCR tests</td>
<td>Nasal or throat swab</td>
<td>Finger stick or blood draw</td>
</tr>
<tr>
<td>Nasal or throat swab [most tests] Saliva [a few tests]</td>
<td>One hour or less</td>
<td>Same day (many locations) or 1-3 days</td>
</tr>
<tr>
<td>Same day (some locations) or up to a week</td>
<td>Positive results are usually highly accurate but negative results may need to be confirmed with a molecular test.</td>
<td>Sometimes a second antibody test is needed for accurate results.</td>
</tr>
<tr>
<td>This test is typically highly accurate and usually does not need to be repeated.</td>
<td>Diagnoses active coronavirus infection</td>
<td>Shows if you’ve been infected by coronavirus in the past</td>
</tr>
<tr>
<td>Diagnoses active coronavirus infection</td>
<td>Definitively rule out active coronavirus infection. Antigen tests are more likely to miss an active coronavirus infection compared to molecular tests. Your health care provider may order a molecular test if your antigen test shows a negative result but you have symptoms of COVID-19.</td>
<td>Diagnose active coronavirus infection at the time of the test or show that you do not have COVID-19</td>
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*Some molecular tests are also rapid tests.*
# Intraoperative and Immediate Postoperative Considerations of COVID-19

## Outline: Infection Prevention Goals

<table>
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<th>Control of physical space</th>
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<tbody>
<tr>
<td>• Cross contamination to other patients: direct to OR</td>
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<tr>
<td>• Transmission to staff: containment of virus, PPE</td>
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<table>
<thead>
<tr>
<th>Uncompromised medical care</th>
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<tbody>
<tr>
<td>✓ Preparation</td>
</tr>
<tr>
<td>✓ Education</td>
</tr>
<tr>
<td>✓ Drills</td>
</tr>
<tr>
<td>✓ Staffing</td>
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</table>
Intraoperative and Immediate Postoperative Considerations of COVID-19

Releasing the Virus: Aerosol Generating Procedures

**Anesthesia:** Airway manipulation: manipulation + gas flow
- Bag-mask ventilation, CPR
- BiPAP
- Jet ventilation
- Intubation/extubation
- Tracheal suction
- FONA (Front of Neck Access)
- Changing circuits

**Surgical**
- Sinus/airway surgery
- Thoracic Sx (open lung with DLT)
- Laparoscopy/bovie plumes
- Bronch/Endoscopy/TEE
Positive Pressure Room

Negative Pressure Room

Positive Pressure Room
15 Minutes

- Time to remove 99% of aerosolized particles
- Minimize HCW presence
- May determine PPE protocols during supply chain limitations
- Airflow during door opening is complex (pressure, temp, door pumping effect) and may flow into rather than out of OR
Intraoperative and Immediate Postoperative Considerations of COVID-19

Airway Management Principles - Checklists

- Location?
- Decolonization? Nasal povodine-iodine, oral chlorhexidine
- No BMV
- First pass success: best person, best plan, best kit
- Immediate inflation of cuff – avoid stethoscope
- Tracheal tube clamping PRIOR to ANY disconnection
- Viral filter close to ETT
- Ballard closed system suctioning
- Controlled extubation : technique, location
Intraoperative and Immediate Postoperative Considerations of COVID-19

Aerosol Containment Box?
Protecting Anesthesia Equipment and Machine

Circuit Setup

Filtration Efficiency based on a challenge of 100,000 Microbes

- 99.9% efficiency
- 99.999% efficiency

FILTER MATRIX

100 have the potential for breakthrough

FILTER MATRIX

Only 1 has the potential for breakthrough
### Avoiding Contamination of Environment

| Aerosols | ✓ Airway management principals  
✓ Smoke evacuators, laparoscopy ports |
|----------|----------------------------------------------------------------------------------|
| Droplets/fomites | ✓ Double gloving  
✓ Plastic covers – probes, computers, keyboards  
✓ Limiting equipment in designated rooms  
✓ Patient bed remains in OR  
✓ Frequent hand hygiene, zip-locking, witnessed waste  
✓ Disposable vs reusable equipment (e.g. Glidescopes)  
✓ Terminal clean +/- UV-C |
| Staff | ✓ Minimize routine breaks  
✓ PPE champion/buddy/clean runner  
✓ Closed loop communication  
✓ Personal effects outside OR |
Uncompromised medical management:

- Ventilatory requirements: ICU ventilator in OR? Flolan, NO
- Additional team member
- Prone position
- ECMO
- ‘Bring OR’ to the ICU
- Regional anesthesia?
Disposal of Patient

Intraoperative and Immediate Postoperative Considerations of COVID-19

Location of extubation: OR, PACU, ICU

Availability of negative pressure isolation room in PACU

Contamination of other patients in PACU

Medical condition of patient
NETEC Resources

Ted Cieslak, MD, MPH
NETEC will continue to build resources, develop online education, and deliver technical training to meet the needs of our partners.

**NETEC is Here to Help**

**Ask for help!**

- Send questions to [info@netec.org](mailto:info@netec.org) - they will be answered by NETEC SMEs
- Submit a Technical Assistance request at [NETEC.org](http://NETEC.org)
Questions and Answers
### Contact

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<td>youtube.com/thenetec</td>
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- Twitter: @the_NETEC
- Instagram: @theNETEC
- LinkedIn: @the_NETEC

Use hashtag: #NETEC

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<th>Website</th>
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<td><a href="mailto:info@netec.org">info@netec.org</a></td>
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