

COVID-19 era Safety Preparedness for Echocardiography Lab Operations

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*Material included in recorded THI Webinar – Cardiology in the time of COVID-19:
Troponin Assessment, Telemetry & Echo Lab*
<https://www.youtube.com/watch?v=ZoNrhzkgLhY>
March 31, 2020
Houston, Texas

Concern for our patients, ourselves and our families . . .

- *Our hearts and prayers go out to the many patients and families suffering from COVID-19.*
- *“While dedication to patient care is at the heart of our profession, we also have a duty to care for ourselves and our loved ones and to protect all of our patients by preventing the spread of disease*. “ – ASE COVID guideline 2020*

Resources:

1. Texas Heart Institute / Baylor St. Luke's Medical Center – Echo Lab COVID policy statements – (version 3.31.2020)

Available In this Space

2. ASE Statement on Protection of Patients and Echo Service providers During the 2019 Novel Coronavirus Update* (final 3/25/2020, ACC endorsement)

<https://www.asecho.org/wp-content/uploads/2020/03/ASE-COVID-Statement-FINAL.docx3-25-20-003.pdf>

Kirkpatrick J, Mitchell C, Taub C, Kort S, Hung J, Swaminathan M. ASE Statement on Protection of Patients and Echocardiography Service Providers During the 2019 Novel Coronavirus Outbreak. Available online:

3. COVID – 19 Preparedness for Echo labs: Insights from the Frontlines – [3/20/20 – Webinar]

<https://www.youtube.com/watch?v=T8AktdbozOQ>

4. American College of Cardiology – ACC's COVID-19 hub

<https://www.acc.org/latest-in-cardiology/features/accs-coronavirus-disease-2019-covid-19-hub#sort=%40commonsorthdate90022%20descending>

5. American Society of Echocardiography (ASE) COVID resources

<https://www.asecho.org/covid-19-resources/>

Introduction:

- Echo can be essential to care
- Portability = advantage (point of care service)
- Portability = risk (infection spread)
- Echocardiographers are on the Front line of care
- Today's Discussion: specific strategies to mitigate risk

Strategies to Mitigate Risk - Considerations

- **“At Risk” individuals** = patients, sonographers, trainees and physicians
- **Appropriate Use Criteria** *rethinking what is Appropriate Use in COVID era*
- **Ordering & scheduling Policies**
- **Patient Classification** → **may dictate plan**
- **Procedure Type** TTE (cart vs hand held), TEE, Stress Echo
- **Personal Protective Equipment** (PPE) training and availability
- **Other Noninvasive Equipment and environmental vectors**



**ASE Statement on Protection of Patients and Echocardiography Service Providers During
the 2019 Novel Coronavirus Outbreak**

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- Whom to image (indications)
- Where to image
- How to image
 - protocols
 - Protection
 - Personnel
 - Equipment
 - Role of learners
 - Other considerations
- Resources

Kirkpatrick J, Mitchell C, Taub C, Kort S, Hung J, Swaminathan M. ASE Statement on Protection of Patients and Echocardiography Service Providers During the 2019 Novel Coronavirus Outbreak. Available online: <https://www.asecho.org/wp-content/uploads/2020/03/ASE-COVID-Statement-FINAL.docx3-25-20-003.pdf>

Indications: order triage decisions

- Appropriate Use Criteria (ACCF/AHA) rethink – *is there a clear near term benefit*
- Will exam change management *in the short term?*
- Can another higher risk test be avoided with Echo exam?
- Created a Triage & Approval Process – *(not just performing as ordered) Prioritize exams after consultation with ordering MD*
 - Patients under investigation (PUI) – *can we await COVID test results?*
 - Discuss limitations - *Could Hand held device exam other test suffice?*
- TEE – Risk for aerosol (*N-95 – PPE conservation*)
- Stress Echo – *Pharm stress only (exercise heavy breathing & perspiration) same for exercise nuclear and plain TMT – not recommended*
- Echo Research Studies on schedule – *generally deferred (unless life-saving)*

Whom to image

Actively manage echo order list – may require calls / consultation

- Identify elective (non/urgent) exam requests
 - *defer these*
- Identify urgent/emergent exam requests
 - *Perform only these*
 - *defer all others*

BSLMC Hospital NIC COVID Policy

- **Outpatient NIC / EP / PPM / Tilt testing / PV / MPI**

- **Non-urgent** exams cannot be scheduled (schedule blocked)

- **Outpatient NIC / EP / PPM / Tilt testing / PV / MPI**

- **Urgent exams** – can be scheduled if approved by direct communication with Dr. Stainback (Tiger Connect or cell) or by Core MD covering NIC Medical Staff.

- **Inpatient –Low risk**

- These can be performed in the NIC lab area on third floor
- **Exception: TEE** – these must be cleared by Lab MD director / Core Medical Staff covering (low risk only and only if cannot be performed in any other more controlled area (i.e., Cath lab / EP Lab / ICU setting)
- **NIC Holding area is closed**
- Patients must be received by a NIC care provider who takes them directly to exam room and discharges back to floor from exam room (not to holding area)

- **Echo Machine Modifications (stripped down)**

- Only one probe, no cables (remove ECG cables, - use 2 or 3 second capture time depending on HR (2 Sec ok if regular tachycardia) - no Gel bottles (single use disposable gel containers) – no misc. accessories such as linens, paperwork - Machine covers if airborne precautions

- **Inpatient – High Risk: (PUI) or COVID positive**

- **These patients may not be transported to the NIC Lab area** – [Nuclear ONLY if approval and as exception- & vasodilator stress only]
- Studies must be performed in the patient's room as a portable with usual PPE precautions
- A **limited protocol will be performed**, full protocol if needed.
- **A log** will be kept in each department to track orders for PUI/ confirmed COVID-19 patients – note, this will include notes from discussion with MD re: performance / deferral reason & proposed follow up
- **Lab surfaces**: Daily assignments for first AM, Late AM, afternoon and end of day work surfaces and computer equipment, keyboard, mouse, and door handles and other surfaces using hospital-approved wipes
- **Echo Machine Modifications (stripped down)**
 - Only one probe, no cables (remove ECG cables, - use 2 or 3 second capture time depending on HR (2 Sec ok if regular tachycardia) NO Echo ECG recordings - no Gel bottles (single use disposable gel containers) – no misc. accessories

How to image - Protocols

Goal - Limiting examiner exposure

Problem-focused “limited” 2D, M-mode and Doppler protocols to address indication and detect and adequately assess unexpected pathology

- Defer all non-essential exams

“limited” 2D, M-mode & Doppler Protocol

Default protocol regardless of order type (comprehensive can be done with approval)

- Goals
- 10-15 min (~30-40 views) - LVEF, WMA, peric effusion, RA & PA pressure, LVOT SV
 - Screen for and appropriately evaluation of **significant** valve disease & peric. Effusion

- PSLAX 2D Standard deep (20 cm)
- PSLAX 2D optimized depth
 - M-mode – AoV, MV, LV
 - Color Doppler – for AR, MR
 - PSLAX – Ascending Aorta
- PSLAX – RVIT view (TV)
 - 2D
 - Color and CW Doppler (PAP)
- PSSAX
 - 2D: Aortic, TV, PV, IAS
 - Color Doppler: TR, AR, PV
 - CW Doppler for TR (PAP)
- Apical 4, 2, 3 & 5 chamber views
 - Each Apical view – show all endocardial and epicardial borders (pericardium) of all 4 chambers
 - Color Doppler – capture best loops for AR, MR, TR, PR (even if mild) – all 4 valves

- Apical 4, 2, 3 & 5 chamber views (cont)
 - Pulsed Doppler – LVOT, MV leaflet tips (repeat with respirometer and slow sweep speed only if large or suspicion for tamponade)
 - CW Doppler – LVOT, MV if MR, TV for PAP
- RV focused view (when appropriate)
- Subcostal 4 chamber (and 2 chamber if appropriate)
- M-mode RV free wall if suspicion for tamponade (proper sweep speed and respirometer)
- IVC 2D, Color and Hepatic Vein
- Abdominal Aorta – screen for aneurysm / dissection
- IV – Saline or Contrast (when appropriate)
- Notes
 - understand indication & properly address
 - Be prepared – “to go pack” with IV saline, echo enhancing agent (contrast) – avoid going back in
 - Evaluate Patient risk – use proper PPE
 - Exam may be extended or abbreviated if direct MD supervis.
 - Individual gel packs – no ECG leads (or cables) – no accessories on cart – one transducer on cart
 - No paper work / folders, worksheet etc in pt room!

High Risk (PUI / Confirmed COVID) Check List:

- If order received, notify Core Echo Med Staff
- Core Echo Medical Staff communicates directly with ordering physician
- Confirm exam should not be deferred
- If exam deferred (e.g., patient stable and pending COVID-19 test) Document in Log
- Use only designated “high Risk” machine **[note: abandoned – all now treated as high risk to avoid mistakes]**
- PPE equipment conservation - limit to one person performing exam when possible
- No trainees / students / observers

May vary per institution & and may change with recommendations and local conditions

- PPE procedure – supplies, don & duff
<https://www.cdc.gov/hai/pdfs/ppe/ppe-sequence.pdf>
- Appropriate machine covering
- post-exam disinfection procedure
- High Level Probe disinfection protocol [Tropon / Cidex] not always needed
 - “Belt and Suspenders” for COVID positive
 - Required: Any exam with transducer contact of: Blood, mucous membrane, wounds
 - Proper Probe Sheath usage vs Wipe Down techniques
 - label transducer / unit as “Clean for next use”
- Return machine to designated high risk storage area **[note: abandoned – all now treated as high risk]**

“High Risk” Staff Members – non patient facing support roles if possible

Risk for adverse COVID complications may be increased:
individuals with:

- Age > 60
- Chronic systemic illness
- Cardiovascular disease / Pulmonary Disease
- Immunocompromised
- pregnancy

Plan: Prospective identification with manager and placement whenever possible in roles not involving direct patient contact.

Example Duties: offline analysis and preliminary report generation, coordinator performance roles that are not patient-facing (staffing schedules, environment of care maintenance, equipment readiness, order triage, results communications, etc.)

How to Image: Personal Protection

- **Standard care** - meticulous handwashing or hand sanitization, gloves.
- **Droplet precautions**: gown, gloves, headcover, facemask and eye shield.
- **Airborne precautions** : add special masks (e.g. N-95 or N-99 respirator masks, or powered air purifying respirator - PAPR systems) and shoe covers.

Note: The local application of each component of PPE can vary

TEE – > Airborne precautions (N-95+) in Suspected / Confirmed COVID Cases

Machine cover, probe sheath if able, N-95 even if intubated due to risk of air leaks around balloon with PEEP and suction events.

(TTE in COVID positive or PUI on Vent – Aerosol precautions for same reasons)

COVID negative patients = Droplet precautions

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SARS-CoV-2 transmission



- Initial spillover from animal reservoir or intermediate host (not yet identified)
- Human-to-human spread via
 - Large respiratory droplets (e.g., cough, sneeze)
 - Fomites (e.g., contaminated surfaces)
 - Airborne route possible with aerosol-generating procedures (e.g., intubation)

CDC. Coronavirus Disease 2019 (COVID-19). Accessed **March 18, 2020**.

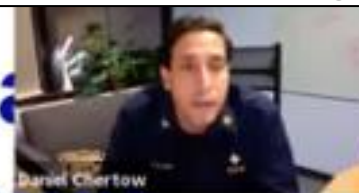
<https://www.cdc.gov/coronavirus/2019-ncov/about/transmission.html>

CAPT. Daniel S. Chertow, MD MPH, FCCM, FIDSA

National Institute of Allergy and Infectious Diseases, NIH, Bethesda, MD

Screen shot – ASE COVID-19 Echo Lab Preparedness 3/20/20 webinar (resource 3)

CDC guidance on PPE for healthcare workers caring for COVID-19 patients



- Minimum requirements
 - Gloves, gown, eye protection
 - Medical/surgical face-mask
- N95 respirator mask for aerosol-generating procedures
- Balances risk with potential for scarcity

CDC. Coronavirus Disease 2019 (COVID-19). Accessed **March 18, 2020**.

<https://www.cdc.gov/coronavirus/2019-ncov/about/transmission.html>

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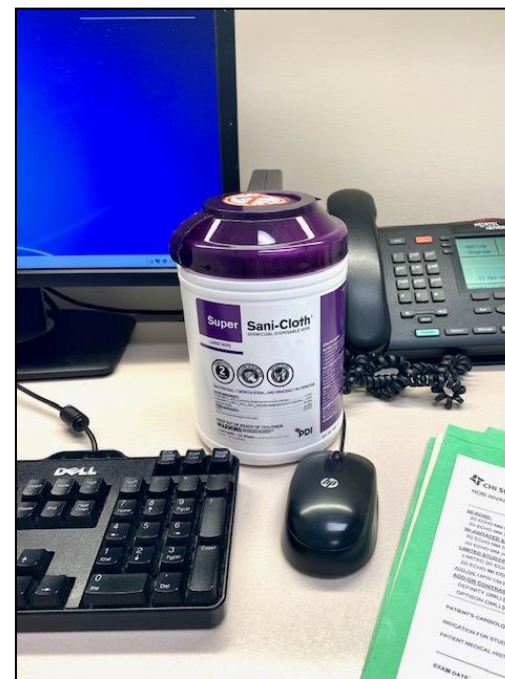
How to Image: Probe / Cart disinfections

- **Follow institutional and vendor recommendations**
- **These should be integral to usual standard lab protocols**
 - **Droplet precautions = hospitalized influenza cases**
 - **Airborne Precautions (N-95) = tuberculosis patient**
 - ***COVID risk is increased due to increased encounters***

Environment of Care

Desks, keyboards, computer mouse, phones, door knobs, exam and Reading Room issues

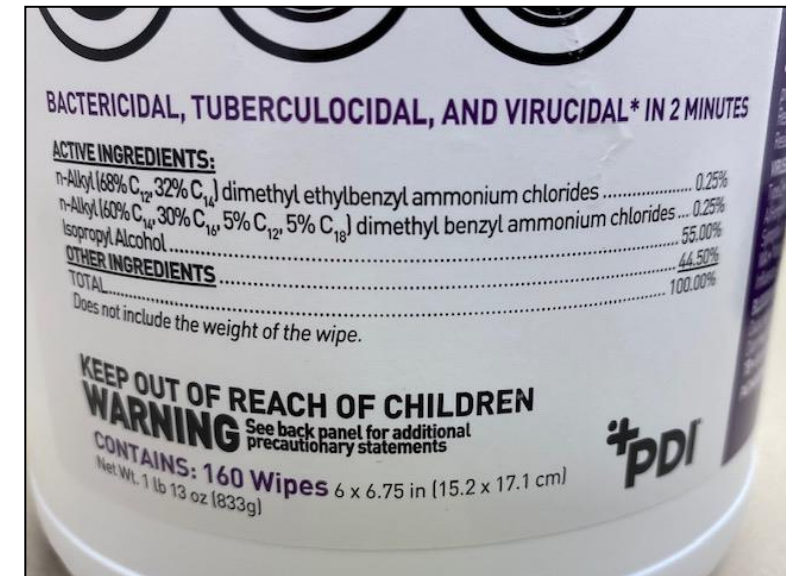
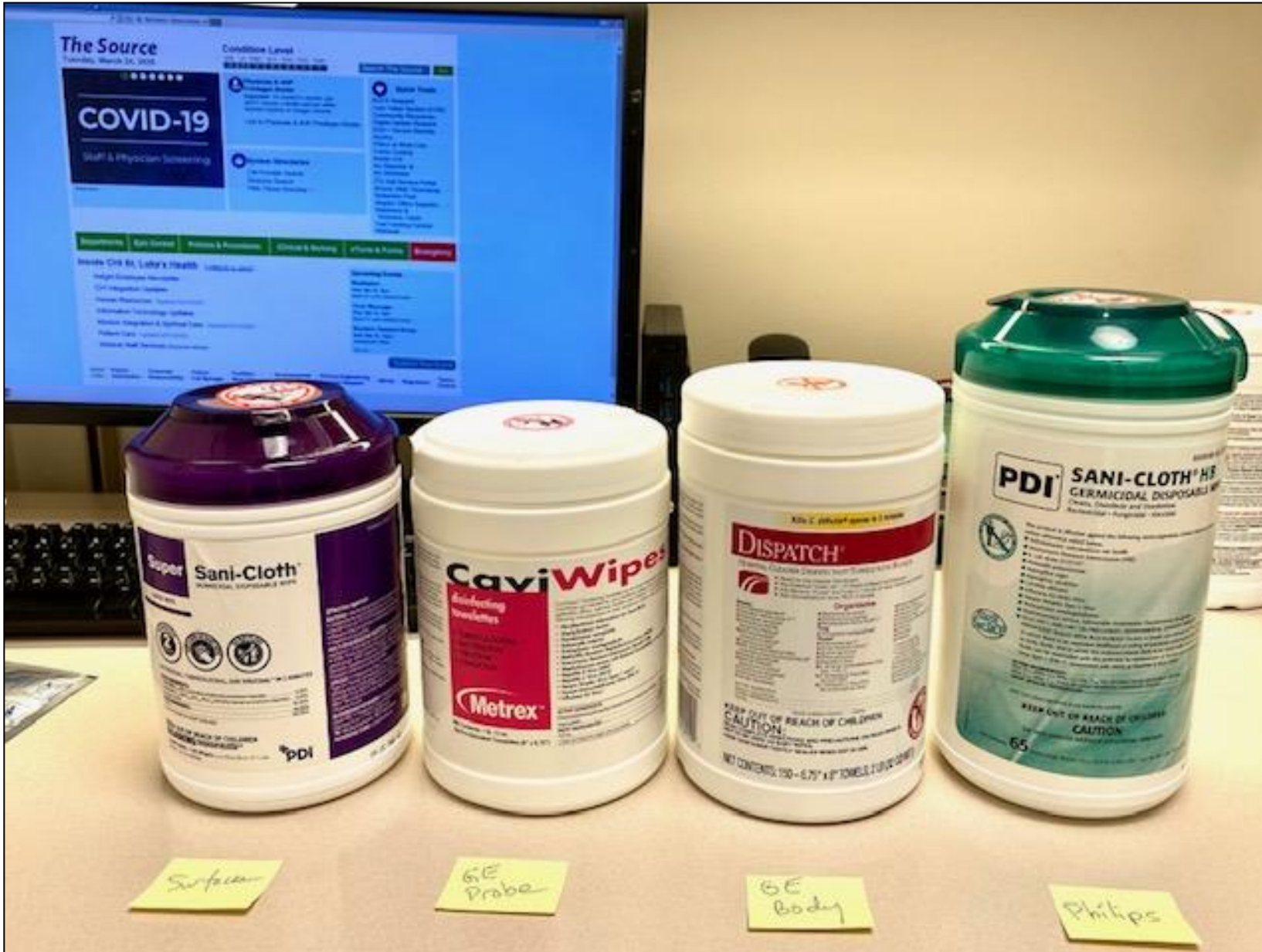
Reading & exam rooms: Environment of Care



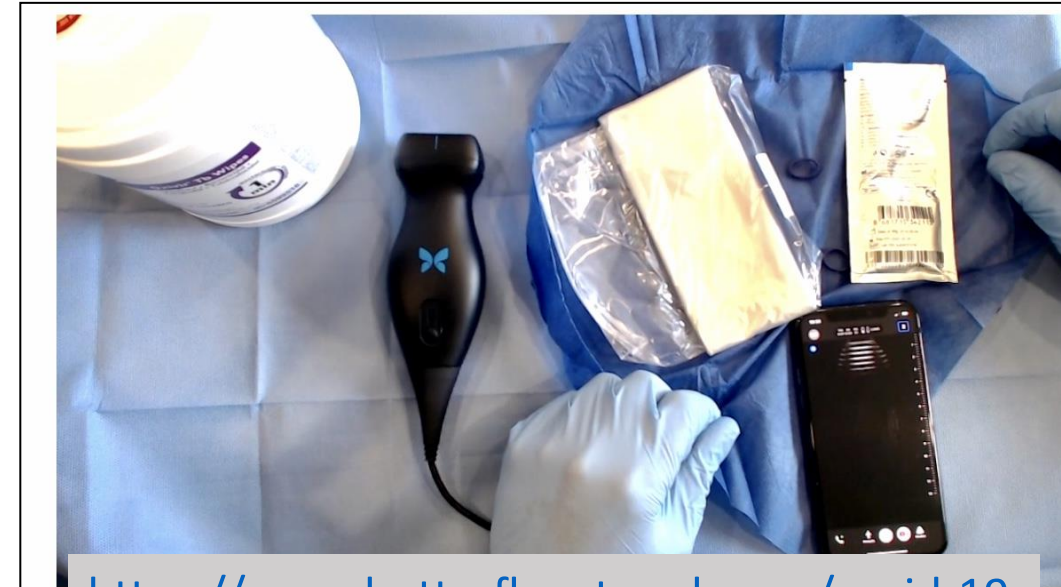
- Gel - entrances
- Surfaces wipe down schedule
- Doors open
- Social Distancing
- Minimize staff
- Keep paperwork, keyboards, mice phones etc low risk
- Remote reading if possible

Disinfectant Inventory

- Know your facilities approved disinfectant agents and approved applications
- Observe “wet” times (alcohol based – 2 min)
 - Included on instructions
 - Adequate supplies



Probe Sheaths & use of Handheld US devices



<https://www.butterflynetwork.com/covid-19>



- Inventory facility sheath / probe covers
- Handheld Advantages
 - Complete containment system →
 - If adequate exam– no need to decontaminate CART
 - Lung exam – progression of illness
 - PPE conservation - Performance by personnel already caring for patient if adequately trained

Green “clean covered” TEE to go pack – including contaminated bag container for return



Screen and console cover (cath lab x-ray shield cover)



- Gown
- Gloves
- Eye-shield mask over N-95
- N-95 respirator due to high flow oxygen
- Screen & console cover

Post Exam Probe / machine disinfection High Risk:

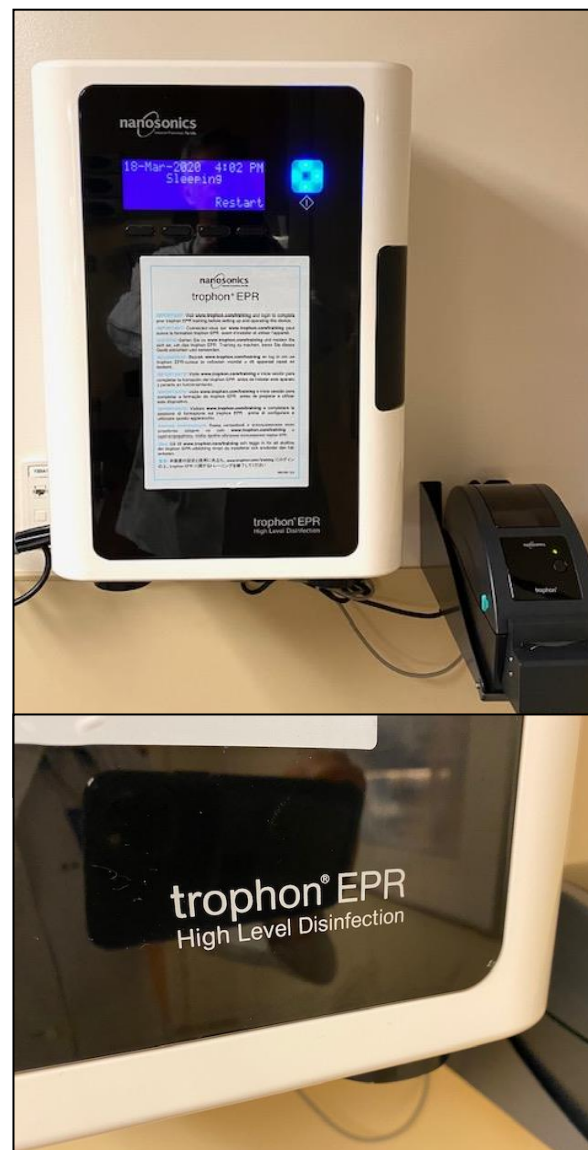
1. High Level Decontamination –

- Req: Wounds, Blood, mucous membrane contact –

2. Low Level Decontamination

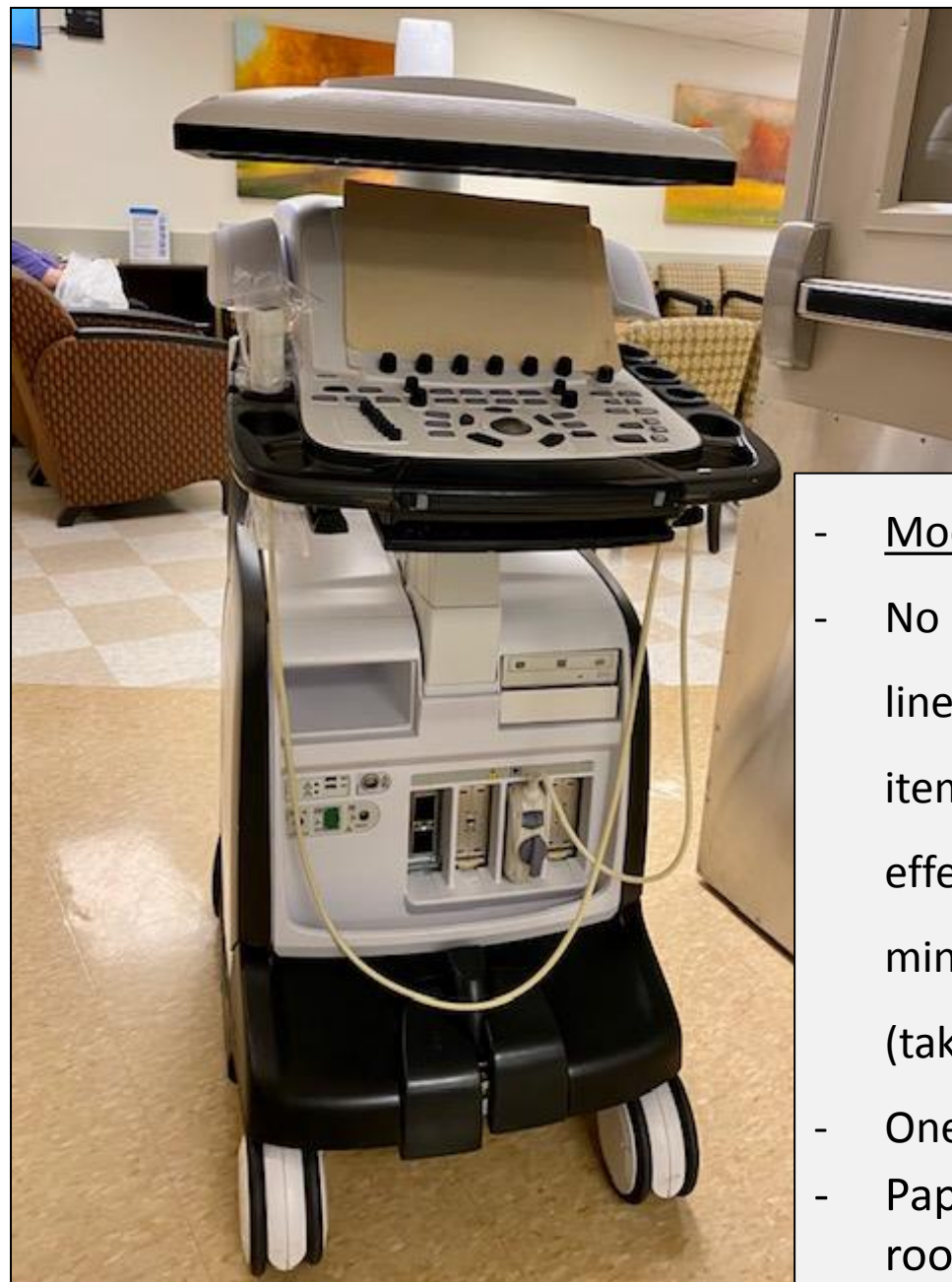
Immediate post procedure wipe down - hospital and vendor approved disinfection wipes, observing “wet time” found on the label (keep wiping, keeping surfaces wet – usually in range of ≥ 2 min). Second machine and probe quick wipe down on return to lab.

** Use of Probe Sheaths is encouraged*

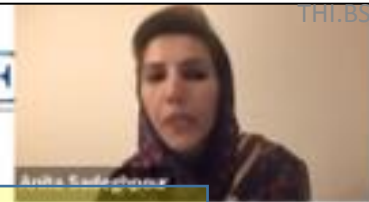




- Individual imaging Gel packs
- No Gel bottles
- Can make small portable gel packs using with disposable containers.
- Remove ECG cables, & ecg stickers
- Single transducer (probe)
- No misc accessory equipment



- Modified Machine
- No ECG cables, ECG stickers, linens or any other accessory items – to ensure easy effective disinfection and minimize exposure time (taking leads on and off)
- One probe
- Paperwork is not taken into room.



- As I have been, updated, till now, none of the echo lab personnel who have followed the PPE, have been infected with COVID 19, which is great news.
- Here is a clear message : COVID-19 is a serious disease, but it should not be scary for health care providers if they follow the recommended precaution protocols.
- **Life is different at the time of Corona**
- Need to pay more attention to everything that could transmit the virus

Anita Sadeghpour, MD, FASE, Duke University Medical Center – report from Iran Colleagues Rajaie Cardiovascular Medical & Research Center, Vali-Asr St., Tehran, IRAN
Screen shot – ASE COVID-19 Echo Lab Preparedness 3/20/20 webinar (resource 3)

Summary Recommendations for Policies/Procedures During COVID-19 Outbreak

- **Defer/Reschedule Options**
 - Identify and defer all elective exams
 - Identify and perform only urgent/emergent exams
- **Assess patient COVID-19 status**
 - None
 - Suspected
 - Confirmed
- **Provide for appropriate levels of self-protection**
- **TEEs are high risk – defer whenever possible, perform in suspected / confirmed cases with airborne PPE precautions**
- **Institutional PPE conservation**
 - Defer non-urgent/emergent exams in suspected/confirmed cases
 - POCUS: Imaging by trained clinician already caring for a patient
- **Limiting exposure during exams**
 - Problem-focused, limited examinations
 - Guided by prior studies, other imaging (including POCUS findings)
- **Reading room methods to reduce transmission**
 - Facilitate remote report generation and echo consultation
 - Frequent disinfection of computer keyboard, mouse, surfaces, chairs, doorknobs
 - Discourage congregating in the echo lab reading room
- **Identify and appropriately re-assign special at-risk personnel (>60 yrs, immunosuppressed, chronic disease / cardiopulmonary conditions, pregnancy, etc.)**

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Precaution types and PPE

	Hand washing	Gloves/double gloves	Isolation gown	Surgical mask	N-95 or N-99 mask	Face shield	PAPR system	Surgical cap	Shoe cover
Standard	X	X		X					
Special Droplet	X	X	X	X*	X*	X	X	X	X
Airborne**	X	X	X		X	X	X	X	X

*Surgical mask may be used for droplet precautions in order to conserve N-95/N-99 respirators

**Patient location may determine level of protection (e.g. airborne precautions employed for all patients in the ICU setting)

This is a general guide based on current practice/recommendations at the present time and is subject to change and modification to fit local procedures and practice patterns.

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Indications – case by case basis

- **Shortness of Breath** – cardiac causes (including shunt) vs pulmonary
- **Hemodynamic instability** - septic vs cardiogenic shock, other
- **Abnormal ECG -Troponin** - STEMI / NSTEMI / COVID Myocarditis (see below)
- **Assess HF signs / symptoms** - HFpEF vs HFrEF vs pericardial effusion vs valve dz
- **Guide weaning** – mechanical ventilation / ECMO
- **Lung Ultrasound** – monitoring progression of COVID pulmonary involvement

“Use of echocardiography or coronary angiography for COVID-19 patients with myocardial injury or elevated natriuretic peptide should be restricted to those patients in whom these procedures would be expected to meaningfully affect outcome.”

<https://www.acc.org/latest-in-cardiology/articles/2020/03/18/15/25/troponin-and-bnp-use-in-covid19>

“Troponin measurements in the absence of suspicion for plaque rupture myocardial infarction should be avoided to minimize unnecessary downstream testing”

<https://www.acc.org/latest-in-cardiology/journal-scans/2020/03/24/16/01/cardiac-troponin-i-in-patients-with-coronavirus>

Thank you!

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