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Tips and Trick to Perform Echo during COVID-19 Outbreak

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NO DISCLOSURE
Echocardiography and COVID-19

- pre-existing cardiac disease,
- cardiovascular complications
- acute cardiac injury
- drug-related myocardial damage

highly contagious diseases

Droplets transmission
Airborne transmission (?)

Physical Distance

The echocardiogram as it is performed is actually quite an intimate procedure

James N. Kirkpatrick

SARS-CoV-2 exposure
ASE Statement on Protection of Patients and Echocardiography Service Providers During the 2019 Novel Coronavirus Outbreak

Endorsed by the American College of Cardiology
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COVID-19 pandemic and cardiac imaging: EACVI recommendations on precautions, indications, prioritization, and protection for patients and healthcare personnel

Indonesian Society of Echocardiography
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West Jakarta 11430 - Indonesia
E-mail: contact.ise@indonesianecho.org

Jakarta, 18 Maret 2020

No. : 266/ise/2020
Lampiran : 3 lembar
Perihal : Protokol Tindakan Ekokardiografi Transtorakal / Transesofageal dalam konteks kewaspadaan infeksi Covid-19
The Algorithm for Echocardiography during COVID-19
(Indonesian Society of Echocardiography)

Step I: Evaluate indication (to perform this time)

- Pemeriksaan ekokardiografi
- Evaluasi ulang indikasi pemeriksaan

Tunda/Jadwalkan ulang bila memungkinkan*

Lanjutkan prosedur jika pemeriksaan dianggap dapat mengubah tatalaksana pasien atau ada indikasi pemeriksaan saat ini

Step II: COVID-19 status

- Pasien COVID-19 negatif atau risiko rendah dan asimptomatik*
- Pasien COVID-19 positif atau diduga positif atau tidak jelas status COVID

Pasien COVID-19 negatif atau risiko rendah dan asimptomatik*

- Pemeriksaan dilakukan dengan APD level 2 (droplet precaution)

Pasien COVID-19 positif atau diduga positif atau tidak jelas status COVID

- Pemeriksaan Ekokardiografi dikerjakan

- Bila memungkinkan dikerjakan di Ruangan pemeriksaan khusus COVID
- Batasi jumlah personel medis
- Batasi durasi pemeriksaan – pemeriksaan dilakukan oleh personel yang berpengalaman
- Pasien dikenakan masker bedah
- Pastikan kebersihan pada mesin echo, peralatan dan kabel EKG yang digunakan

* Disesuaikan dengan kebijakan rumah sakit setempat

Step III: The procedure

- Selalu mengikuti protokol keamanan rumah sakit

Gunakan APD level 3 (airborne precaution) pada:
- Pasien dengan ventilasi invasif & non invasif
- ICU dan ruang operasi
- Selama prosedur TEE

Gunakan APD level 2 (droplet precaution) di:
- Bangsal
- Echo lab
- IGD
TIPS and TRICKS (?)

• The Indication

• The Protocols

• The Operators

• The logistics \(\rightarrow\) safety aspects and preventing transmission; PPE, cleaning, disinfecting
The Indication

Suspected/Confirmed COVID-19

- Echocardiography should **not** routinely be performed
- only if:
  - expected to have clinical benefit to the patient
  - likely to affect/change patient management
The Indication

**NO sign & symptom of covid-19, but with known or acute cardiac disease**

- **Should be done:**
  - symptomatic heart disease (NYHA III–IV) in this phase
  - acute heart failure, valvular heart disease with severe symptoms
  - Suspected endocarditis

- **Should not be done:**
  - follow-up echocardiographic studies of non-severe symptoms,
  - Including; stable congenital heart disease, not eligible for intervention/ surgery
The protocols

Point Of Care Cardiac Ultrasound (POCUS)

The first-line application of ultrasound

- Screen important cardiovascular findings
- Cardiac contribution to signs & symptoms
- Triage for candidate for full echocardiography

store images

→ remote interpretive by experienced echocardiographers
→ to focus future imaging studies
→ comparisons of cardiac structure and function over time.

Advantages:
- by (daily) caring clinician
- at bed side

- reduction of exposure (personnel & locations)
- conservation of PPE
Disadvantages:
• potentially poorer imaging resolution
• missed findings
• operator in/less experienced

Who perform POCUS:
• Daily physician taking care of the patients
• POCUS trained
• Should not be performed by novice/inexperienced operator
## COVID-19 POCUS Protocol

<table>
<thead>
<tr>
<th>COVID19 POCUS Protocol</th>
<th>Structure Imaged</th>
<th>Assessment</th>
<th>Disease Associations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiac</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left Ventricle</td>
<td>Size, Global and Regional Function</td>
<td>Myocarditis ACS Cardiomyopathy Shock</td>
<td></td>
</tr>
<tr>
<td>Right Ventricle</td>
<td>Size and Function; TR for PASP if available</td>
<td>PE Cardiomyopathy</td>
<td></td>
</tr>
<tr>
<td>Pericardium</td>
<td>Effusion</td>
<td>Tamponade</td>
<td></td>
</tr>
<tr>
<td>Valves</td>
<td>Gross Regurgitation or stenosis</td>
<td>Pre-existing CV disease</td>
<td></td>
</tr>
</tbody>
</table>

### Lung

<table>
<thead>
<tr>
<th>8 or 12 point exam</th>
<th>B Lines (A lines, pleural sliding are normal)</th>
<th>Edema or Pneumonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>Sub-pleural Consolidation Thickened Pleura</td>
<td>Pneumonia ARDS</td>
</tr>
<tr>
<td></td>
<td>Lobar consolidation with air Bronchograms</td>
<td>Pneumonia ARDS</td>
</tr>
<tr>
<td></td>
<td>Effusion</td>
<td>CHF</td>
</tr>
</tbody>
</table>

### Vascular

<table>
<thead>
<tr>
<th>JVP or Subcostal IVC</th>
<th>Fluid Status</th>
<th>CHF, hypovolemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>+/- Leg Veins*</td>
<td>2 point compression*</td>
<td>DVT</td>
</tr>
</tbody>
</table>
Handheld echocardiography

- for screening of SARS-COV-2 related cardiac conditions
  [major cardiac complications ]

- Decreasing sonographer exposure: (traditional echo vs handheld)
  - The total time: 42 ± 5.5 min vs 12 ± 2.2 min
  - Scanning time: 24 ± 6.8 min vs 5.4 ± 1.9 min

- Simplifying decontamination (echo machine vs handheld echo)
  - 30 ± 3.5 min vs 4 ± 0.9 min

McMahon SR. et al. JASE 2020. In press
https://doi.org/10.1016/j.echo.2020.05.005
The protocols

Critical Care Echocardiography (CCE)

- should not be routinely performed
- restricted to cardiovascular instability
  - acute circulatory/respiratory failure
  - filling pressure
  - fluid responsiveness
  - Tamponade
  - pulmonary embolism
  - Ao dissection
- the diagnostic work-up and to guide therapy
- TEE only if TTE information is inadequate

- by (daily) intensivist
- at bed side

Advantages:
- reduction of exposure (personnel & locations)
- permitting conservation of PPE
TEE procedure during COVID-19 pandemic

**TEE → a heightened risk of SARS-CoV-2 spread**

**TEE should be avoided and alternative imaging modalities should be considered** *(EACVI and ASE)*

- **in non-intubated patient**: direct droplet transmission and/or viral aerosolization and inhalation during insertion/removal of the probe and/or coughing.

- **intubated patient**: reduce the risk of viral aerosolization. Viral transmission → direct contact with the patient’s secretions, resulting in contaminated hands and surfaces.

- **Infection risks**: echocardiographers, other patients and personnel in the vicinity, (cross-contamination → improper handling or cleaning of the equipment)
Specific Considerations for the Protection of Patients and Echocardiography Service Providers When Performing Perioperative or Periprocedural Transesophageal Echocardiography During the 2019 Novel Coronavirus Outbreak: Council on Perioperative Echocardiography Supplement to the Statement of the American Society of Echocardiography

Emergent cardiovascular surgery case in suspected or COVID-19 positive patient posted

Is a perioperative TEE indicated (essential)?

- No
  - Consider repeat TTE before the start of the procedure to confirm LV and RV function/valvular lesions

- Yes*
  - Proceed with TEE during surgery & apply airborne PPE precautions
  - Unexplained hemodynamic instability or suspected procedural complications (e.g., iatrogenic aortic dissection)
The TEE protocols
(in Critical Care Unit and perioperative/periprocedural)

- **Goal-directed** protocol to limit personnel exposure time
- **focused but extensive enough** for detecting and adequately evaluating any significant unexpected pathology
- **record and store** the acquired imaging data and cine loops
- performed by a **single experienced operator** (incl; probe insertion, manipulation, image acquisition, and probe removal)
Preparing A New Normal
Reintroduction of Echocardiography Service (ASE 20 May 2020)

Due to various reasons →

re-open non-urgent and elective medical services (??)

- institutional policies and recommendations of regional authorities.
- local COVID-19 disease prevalence and new case trends
- institutional resources; facilities, staffing, and equipment (adequate supply of appropriate PPE).
- the gradual introduction of a phasic reopening plan (vary by institution and region)
# Prioritization tier for rescheduling echo exam

<table>
<thead>
<tr>
<th>Priority Tiers</th>
<th>Basis for Priority Rating</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tier 1 (High Priority)</strong></td>
<td>• Active or recent change in cardiovascular symptoms</td>
<td>Dyspnea, chest pain, syncope, TIA, new arrhythmia, child with new cardiovascular symptoms and/or cyanosis.</td>
</tr>
<tr>
<td></td>
<td>• Recent procedure requiring urgent follow-up</td>
<td>Post-device implantation arrhythmias or pericardial effusion. Post-cardiac surgery assessment, including VAD complications.</td>
</tr>
<tr>
<td></td>
<td>• Safety monitoring for therapy (even if asymptomatic)</td>
<td>Chemotherapy, clinical trial safety endpoint.</td>
</tr>
<tr>
<td></td>
<td>• Echo required prior to therapy (preoperative-urgent)</td>
<td>Preoperative workup for surgery that is required for significant functional limitation; LVEF assessment prior to CIED procedure for primary prevention. Baseline assessment prior to initiation of chemotherapy.</td>
</tr>
<tr>
<td><strong>Tier 2 (Medium Priority)</strong></td>
<td>• Asymptomatic but with chronic cardiac disease that requires monitoring for progression</td>
<td>Cardiomyopathy; severe valve disease (AS, MR, AR); pulmonary hypertension; arrhythmias; pericardial effusion. Progression of disease after intervention (recurrent coarctation, conduit stenosis)</td>
</tr>
<tr>
<td></td>
<td>• Therapy that requires ongoing monitoring</td>
<td>Pulmonary artery systolic pressure estimation in patients receiving parenteral therapy for pulmonary hypertension. Anti-rejection therapy after cardiac transplant. Treatment for Kawasaki disease. Follow-up assessment of VAD function in stable patients.</td>
</tr>
<tr>
<td></td>
<td>• Echo required prior to therapy (preoperative but non-urgent)</td>
<td>Preoperative workup for non-urgent surgery</td>
</tr>
<tr>
<td><strong>Tier 3 (Low Priority)</strong></td>
<td>• Routine follow up for chronic disease</td>
<td>Hypertension, coronary artery disease; annual evaluation for aortic disease or prosthetic valve function (normal function on prior exam and no new symptoms)</td>
</tr>
</tbody>
</table>
Take home message

Protecting healthcare workers and preventing transmission of SARS-CoV-2 should be a top priority during the ongoing COVID-19 pandemic.

Always consider risk vs benefit !!

- Should do it at the present time (?)
  - expected to have clinical benefit to the patient
  - likely to affect/change patient management
- Consider alternative imaging modalities (to avoid TEE procedure)
- Reopening the echo service:
  - Prioritizing Tier (if to reopen the echo service)
  - Local condition (case prevalence, logistics, staff, etc)
Take home message

minimize exposure (time, personnel, location, logistic) → decrease the risk of contamination/ transmission

• **Focused** echocardiography study → answer the specific questions

• **Comprehensive** enough → avoid the need to return for additional image

• **Experienced operator** → for accurate and minimum scanning time

• **Store all images** → calculate parameters, re-evaluation, monitoring, comparing data

• **Echocardiography machine** → simple device or portable or console
Eid Mubarak to You All!
May your home and hearts be filled with the joyful spirit of Ied.

The Indonesian Society of Echocardiography Board Members: