

Document Addressed to Cardiovascular Echography Operators at the Time of COVID-19: A Document by the “Società Italiana di Ecocardiografia e CardioVascular Imaging” Board 2019–2021

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Abstract

The epidemic of COVID-19 has grown to pandemic proportions and the preventive and mitigation measures have been widely spread through the media. The cardiologists are called as consultants for the cardiovascular pathologies and echocardiography is a fundamental examination in many clinical situations, but not without risks for health staff. Società Italiana di Ecocardiografia e CardioVascular Imaging Council has decided to formulate a document aimed to highlight the importance of a correct indication and execution procedure of the echocardiogram during a COVID-19 pandemic.

Keywords: COVID-19, echocardiography, healthy safety

INTRODUCTION

The epidemic of COVID-19, defined a public health emergency of international concern according to the World Health Organization (WHO),^[1] has grown to pandemic proportions, as stated by the WHO itself on the 10th of March. Preventive and mitigation measures, essential on a health and social level, have been widely spread through the media.

According to evidences, the COVID-19 is transmitted from person to person through close contact and droplets.^[2] Therefore, the people at higher risk of infection are those who are in close contact with a COVID-19 patient or with those who take care of him/her.

Echocardiography is a fundamental examination in many clinical situations, but the impossibility of maintaining a minimum operator–patient safety distance makes it one of the most dangerous tests for health-care staff.

SOCIETÀ ITALIANA DI ECOCARDIOGRAFIA E CARDIOVASCULAR IMAGING POINT OF VIEW

Società Italiana di Ecocardiografia e CardioVascular Imaging (SIECVI), as well as other companies, given the importance of this health situation, has decided to formulate a document aimed to highlight the importance of a correct indication and execution procedure of the echocardiogram during a COVID-19 pandemic.

In consideration to the indications on the management of cases in health-care facilities, on specific clinical pathways, on the

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use of personal protective equipment (PPE) for health-care personnel, and on the standard biosafety precautions variously suggested with notes by the Italian Council of Ministers^[3] as well as what specifically indicated by the WHO and for what established by the Prime Ministerial Decree of March 9, 2020, which declines the epidemiological criteria, it is considered necessary to integrate these indications for those who use cardiovascular ultrasound.

SIECVI believes that it is important to ensure the execution of urgent and nondeferrable examinations, leaving the possibility to the cardiologist to be able to refuse the performance of tests not considered appropriate in his/her own judgment and favoring the various possible forms of remote image consulting, thus limiting access to infected areas.^[4]

SIECVI draws attention to the use of stationary ultrasound scanners, which should be moved as little as possible from an environment to another favoring the use of an echocardiograph dedicated to infected areas. It also believes must be ensured the training of health personnel on the correct methodologies of wearing and, especially, removing PPE as indicated by the WHO^[5] and shown in Tables 1 and 2.

Cleaning and disinfection of the echocardiograph and probes

According to literature, it is demonstrated that coronaviruses (including the ones responsible for SARS and MERS) can survive up to 9 days on inanimate surfaces with optimal humidity and temperature.^[6] In-hospital virus transmission via inanimate surfaces has not been demonstrated, but is considered possible.

However, evidence has proved that these coronaviruses can be successfully inactivated by appropriate sanitization procedures using common disinfectants such as sodium hypochlorite (0.1–0.5%), ethanol (62%–71%), or hydrogen peroxide (0.5%), applied for an adequate period of time. So far, there is no evidence of longer survival or major susceptibility of the SARS 2-CoV to the previously listed disinfectants. Therefore, according to the WHO suggestions, “an accurate cleaning of inanimate surfaces with water and detergents followed by the application of disinfectants commonly used in the hospital setting” is an efficient and sufficient procedure.^[7]

Regular cleaning of the echocardiograph can be performed using swabs soaked with 70% alcohol solution, commonly used in hospital setting (e.g. *Neoxidina*).

Transthoracic probes are used many times and are exposed to several pathogens, secretions, and small amounts of blood from microlesions of the skin or mucosae. Therefore, disinfection must be efficient against every transmissible agent. Cleaning and disinfection procedures must have complex and contradictory characteristics such as effectiveness of disinfection, harmless material, safety for the patient and personnel, and ease of use.

Probes must not be immersed in sodium hypochlorite, sterilized with autoclave or dry heat, whereas gamma rays, ultraviolet, ethylene oxide, and alcohol are impractical. The products which can be used are disinfectant solutions without glutaraldehyde

Table 1: Personal protective equipment

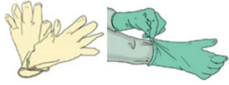



Two pairs of waterproof gloves	
Waterproof boots	
Eye and face protection (goggles or face shields)	
Protective clothing (medical uniform/coverall, apron; head cover)	
Face mask or respirator mask (liquid-proof when worn with goggles or face shields)	

Table 2: Precautions for health-care personnel

Setting	Activity	Type of PPE or procedure
EchoLab	TTE of patients with respiratory symptoms*	Surgical mask Gloves Waterproof surgical gown Eye protection (goggles or face shields)
	TTE of patients without respiratory symptoms*	Surgical mask Gloves
At the patient's bedside	TEE and procedures that can generate aerosol, performed on COVID-19 positive patients	FFP2/FFP3 mask Waterproof surgical gown Two pairs of waterproof gloves Eye protection (goggles or face shields) Boots or shoes
	TTE of patients with respiratory symptoms*	Surgical mask Gloves Waterproof surgical gown Eye protection (goggles or face shields)
	TTE of patients without respiratory symptoms*	Surgical mask Gloves

*Using a surgical mask is recommended if tolerated by the patient. TTE=Transthoracic echocardiography, TEE=Transesophageal echocardiography

and formol (e.g. the following products can be used: *Deconex 53 PLUS*, *Gigasept Med*, *Anioxide 1000*, *Nu-Cidex*, and *Peracetic acid*). Furthermore, quaternary ammonium-based solutions (e.g. *Cleanisept Wipes*) can be used. However, since not all the detergent solutions are compatible with probes, we suggest to check the maintenance or cleaning manual of each echocardiograph. During cleaning procedures with chemical products, adequate environmental ventilation is required.

During cleaning procedures of devices in contact with COVID-19-positive or suspect patients, the personnel

Table 3: Dressing and undressing in the scrub room

Comply with the specified sequences

Dressing

- Remove all jewels, accessories, or personal belonging
- Practice hand hygiene with water and soap or alcohol solution
- Verify the devices integrity, do not use if the device integrity is compromised
- Wear the first pair of gloves
- Wear the single-use gown on top of the medical uniform
- Wear the appropriate face mask
- Wear the appropriate eye protection item
- Wear the second pair of gloves

Undressing

- Avoid any contact between the potentially contaminated PPE and face, skin, or mucous membranes
- The single-use PPE should be disposed of in the designated container
- Decontaminate the reusable PPE
- Remove the single-use gown and dispose of it in the designated container
- Remove the second pair of gloves and dispose of them in the designated container
- Remove the eye protection item and disinfect them
- Remove the mask, handling it from the not contaminated side, and dispose of it in the designated container
- Remove the first pair of gloves
- Wash your hands with water and soap or alcohol solution

PPE=Personal protective equipment

must wear PPE filtering respiratory device FFP2 or FFP3, face shield, goggles, single-use gloves, and long-sleeved water-resistant gown and must follow the rules for the safe removal of the PPE. After the use, PPE must be disposed of as potentially infected material [Tables 1-3].

Management of transesophageal echocardiography and probe

Transesophageal echocardiography can generate aerosol and therefore is a procedure with a high risk of contamination and precautions are necessary [Tables 2 and 4]. Latex envelopes for the probe benefit are that they guarantee a good protection against every pathogen, but they do not protect handle and the echocardiograph (false sensation of safety) and cannot be used in patients with allergy to latex. Difficulties in inserting the probe and the inferior quality of images are irrelevant to expert operators and can be solved using contact maneuvers between the probe and latex.

CONCLUSIVE NOTE

Documentation of every performed procedure must be registered and stored and must be appropriate for legal examination. The nursing staff must monitor and check the application of the correct procedures for environment management and for endoscope disinfection.

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Table 4: Management of transesophageal echocardiography

Before TEE

- Inform the patient on the examination, indications, side effects, and infectious and noninfectious risks
- Ask the patient for any known viral infection and latex allergies, blood and coagulation pathologies, esophageal problems, any other allergy, etc.
- Check the probe identity and report the probe identity number on the registry (in case of multiple probes), the name of the patient, date and time (in relation to disinfection)
- Use a latex envelope if possible

During TEE

- Avoid contamination of the echocardiograph console and the probe's dials and handpiece

Immediately after TEE

- Remove the latex envelope and change gloves (use the gown, goggles, and face mask to protect yourself against droplets)
- Wash (or cleanse) abundantly the probe with the products eventually recommended by the producer, following the instructions
- Dry with tissues or paper
- Check the probe integrity
- Immerse for 15 min in a commonly used disinfectant solution (e.g., 4% Deconex 53 PLUS)
- Remove the gloves and disinfect your hands using an alcoholic solution
- Use a new pair of nonsterile gloves
- Rinse accurately the probe with a large amount of sterile or filtered water
- Dry with tissue or single-use wipes (do not use nonsterile paper), eventually use alcohol to accelerate the drying process
- Disinfect the handpiece and dials with alcoholic solution
- Put away the probe protecting it with paper, plastic, or single-use wipes (avoid foam rubber. Other supports can be used if sterilized)
- Remove the gloves and disinfect your hands with alcoholic solution

TEE=Transesophageal echocardiography

Conflicts of interest

There are no conflicts of interest.

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