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ANMCO POSITION PAPER: The cardiological clinical activities in the transition phase of the COVID-19 pandemic

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Infections by SARS CoV2 - COVID-19 became in a short time a worldwide health emergency. The present SARS-CoV-2 pandemic induced in a short time, an unprecedented impact on public health and on the pre-existing care pathways. In order to appropriately address this epidemiological emergency, urgent solutions were needed, such as remodelling or stopping hospitalization and deferrable clinical activities to avoid spreading the SARS-CoV-2 infection. After the first emergency lockdown phase, care pathways must guarantee healthcare to patients and preserve the safety of the healthcare personnel and of all the other subjects that refer to the cardiological

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surgeries. Rigorous prescriptive appropriateness of the requested exams with consequent reduction of unnecessary examinations is an essential requirement to preserve prioritized diagnostic and care pathways to patients in need, minimizing the risks connected to the SARS-CoV-2 contagion in hospitals. Telemedicine services represent a valid answer to cardiovascular disease patients' need for care and assistance, including those in quarantine and voluntary isolation. These services successfully contribute to fight the spread of the virus guaranteeing at the same time therapy and support through remote services that must therefore be considered a resource to be implemented and enhanced. This document has to be used by the healthcare personnel working in hospitals and in district offices, if applicable, and aims at managing patients, in complete safety and considered not suspect/not probable ('not at risk') of SARS-CoV-2 infection, eligible for diagnostic activity and subsequent therapy in outpatient surgeries. In particular, this document provides indications for patient evaluation to prevent COVID-19 exposure, gives general indications on managing appointments and waiting rooms, on how to strictly adhere to environmental safety measures, on the proper use of Individual Protective Equipment (IPE). It also provides specific indications for outpatient service procedures, like electrocardiogram, cardiologic examination, cardiologic checkup, Dynamic Holter Electrocardiogram, Transthoracic Echocardiography, Echo Stress, Transoesophageal Echocardiography, Bike Ergometer stress test, Ergospirometry, Outpatient Checkup of implantable electronic cardiac devices.

Introduction

The present SARS-CoV-2 pandemic has induced in a short time deep changes in healthcare, causing an unprecedented impact on public health and on the pre-existing care pathways. In order to appropriately address this epidemiological emergency, urgent solutions were needed, such as remodelling or stopping hospitalization and deferrable clinical activities to contain the spreading of the SARS-CoV-2 infection.¹⁻³

After the first emergency lockdown phase, it is now necessary to restore care pathways that can guarantee healthcare to patients and at the same time preserve the safety of the healthcare personnel and of all the other subjects that refer to the cardiologic surgeries. In this context, it is crucial that the restoration of the cardiologic services be led by the principle of prescriptive appropriateness of the requested exams. The reduction of unnecessary examinations is an essential requirement to reserve prioritized diagnostic and care pathways to patients in need, minimizing risks connected to the SARS-CoV-2 contagion in hospitals.

Early diagnosis of the SARS-CoV-2 infection can be very difficult especially in asymptomatic or mildly symptomatic patients with cardiovascular diseases and requires a careful stratification of the risk of infection and an adequate sanitation of the setting and diagnostic instruments.

Telemedicine services represent a valid answer to cardiovascular disease patients' need for care and assistance, including those in quarantine and voluntary isolation. These services successfully contribute to fight the spread of the virus guaranteeing at the same time therapy and support through remote services that must therefore be considered a resource to implement and favor in this state of need.⁴

This document has to be used by the healthcare personnel who work in hospitals and in district offices, if applicable, and aims at managing patients, in complete safety and considered not suspect/not probable ('not at risk') of SARS-CoV-2 infection, eligible for diagnostic activity and subsequent therapy in outpatient surgeries or not urgent hospitalization. At the same time, it also aims at reducing infection of the healthcare personnel by rationalizing the use of Individual Protective Equipment (IPE).⁵⁻⁸

Patient evaluation to prevent COVID-19 exposure

The first mandatory precaution in order to avoid the spread of the COVID-19 infection to healthcare personnel and patients waiting in the outpatient surgeries is his (or her) remote assessment for the presence of risk elements.

All patients admitted for cardiologic evaluation must be remotely assessed 24-48 h prior to the examination/procedure to detect any suggestion of possible risk of exposure to COVID-19. A nurse will perform the following anamnestic evaluation:

- Is the patient already under health surveillance by the prevention department and if yes for which reason;
- Has the patient ever had a swab or been serologically tested, and if yes for what reason and with which result;
- Does the patient know COVID-19 infected subjects or has been in contact (close face to face for over 15 min, physical contact) with COVID-19 subjects in the 15 days prior to the onset of the symptoms;
- Has the patient experienced any respiratory/flu-like/fever symptoms in the last 30 days;

Table 1. Operational process for the most common instrumental investigations performed in the Cardiology Unit for low-risk COVID-19 patients

Examination	Requested IPE	Timing	Notes
ECG	FacemaskGloves	Not less than 20 min	Favour access on appointment
Cardiological checkup	Facemask/FFP2Gloves	Not less than 45 min	Favour 'telemedicine' process, where possible
DynamicHolter electrocardiogram	Facemask/FFP2Gloves	Not less than 30 min	Instruct the patient on autonomous removal procedures
TransthoracicEchocardiography	FFP2 facemaskGlovesVisor or safety gogglesWaterproof gown	Not less than 45 min	Use transparent barriers between the head of the operator and that of the patient
Echo stress	FFP2 facemaskGlovesVisor or safety gogglesWaterproof gown	Not less than 60 min	Use transparent barriers between the head of the operator and that of the patient
Transoesophageal echocardiography	FFP2 facemaskDouble glovesCapWaterproof gownsVisor or safety gogglesovershoes	Not less than 60 min	Carry out the swab prior to the investigation
Bike ergometer stress test	FFP2 facemaskGlovesVisor or safety gogglesWaterproof gowns	Not less than 60 min	Use equipment, with telemetric signal transmission, positioned to reduce the 'droplet effect'
Ergospirometry	FFP2 facemaskGlovesVisor or safety gogglesWaterproof gowns	Not less than 60 min	Use equipment, with telemetric signal transmission, positioned to reduce the 'droplet effect'
Electronic control of implantable electronic device	Facemask/FFP2Gloves	Not less than 20-25 min	Favour telematic checkups, maximizing the number of remotely controlled patients

During the execution of all the exams the patient must wear a facemask—transoesophageal echocardiography is the only examination in which this is not possible.

- Upon phone contact, did the patient have breathing/fever symptoms and of what nature.

The clinical history has the purpose of classifying the patients based on their personal risk assessment and of addressing them towards the appropriate pathway.

The virus transmission risk can be stratified as follows:

- Low-risk: asymptomatic patients without confirmed risk contacts;
- Intermediate-risk: recovered SARS-CoV-2 infection patients;
- High-risk: asymptomatic patients with confirmed or probable COVID-19; patients with suspect symptoms;
- Very high-risk: confirmed COVID-19 patients.

The risk contact is defined, in accordance with the recent European Guidelines,³ by the exposure 2-14 days prior to the onset of the symptoms:

- Face-to-face contact with suspect or confirmed COVID-19 subjects at less than 1 m for more than 15 min;
- Direct physical contact with suspected or confirmed cases of COVID-19;
- Direct care of suspected or confirmed patients without adequate protective equipment.

High-risk or very high-risk patients will be contacted by phone or teleconsultation (if possible) by the cardiologist who will decide whether to postpone the visit or referring the patients to the dedicated COVID-19 patient pathways.

Low-risk or intermediate-risk patients must be informed on the procedures to access outpatient surgeries. In particular, the use of facemasks, the importance of being on time and of maintaining social distancing (minimum 1 m, if possible 2 m) must be strongly recommended.

The information collected in the questionnaire will be re-proposed during the medical investigation in a dedicated self-certification to be signed by the patient.

General indications

- The clinical activity must be scheduled so as to evenly distribute the appointments to avoid proximity between the different patients (standard standing space—0.4 person per square meter);
- During the examination or diagnostic testing, it will be necessary to reduce the number of potentially exposed healthcare personnel;
- Use disposable equipment for both individual protection and the utilized instruments;

- Strictly adhere to the standards adopted by the hospital in regards to equipment and environmental sanitation;
- Always wear facemasks or FFP2/FFP3 and all other IPE when required, wash hands after removing and disposing of the facemask;
- During the day, regularly ventilate the working environments by opening the windows and doors to the balconies to further increase the air change rate;
- In case of mechanical ventilation system or environmental air-conditioning, these must be inspected by the competent technical department.

Outpatient service procedures

Below is a summary of the most common instrumental exam procedures carried out in the Cardiology Units (*Table 1*); however, in case of special requirements refer to the local documents issued by specific hospital unit.

Electrocardiogram

Access to the hospital units for electrocardiogram (ECG) procedures is generally limited to specific days and/or times (appointments are not required). In this phase, however, this method should be suspended to favour over-the-phone appointments during which the anamnestic investigation can be conducted.

The nurses who perform the ECG must be equipped with suitable IPE, and must use gloves, wash, and cleanse their hands for each exam, and also sanitize the hospital bed. The use of disposable electrodes must be guaranteed for each patient. Should it not be possible to provide the exam results in real time, they should be submitted to the patient electronically or by post. The predicted timing of the exam, taking into account the need for ventilation and sanitization, cannot be less than 20 min.

Electrocardiogram and cardiologic visit/checkup

Both the physician and the nurse are equipped with facemasks and must wash their hands with the supplied sanitizing solution/alcohol gel at the end of each visit. The predicted time for each visit must provide a brief time interval to ventilate the surgery and sanitize the hospital bed. Generally, the time allotted for each cardiologic visit is 45 min. For some types of outpatient activities dedicated to patients already known to suffer from chronic disease (heart failure, chronic coronary syndrome, and adult congenital heart disease), the telemedicine method should be favoured, extending the time intervals for each 'in office' visit based on a strict risk/benefit-risk ratio and reducing in this way the access to the cardiology units. In case of a first visit, the cardiologist will decide whether to investigate further and take charge of the subsequent diagnostic-therapeutic pathway.

Dynamic Holter electrocardiogram

The nurses are equipped with adequate IPE and gloves during the procedure. After each patient, the personnel must wash and cleanse their hands with a solution/alcohol gel. Access for device application is to be scheduled at wide intervals (not less than 30 min apart) as this will guarantee social distancing in the waiting rooms. The personnel must strictly comply with the hygienic regulations and instruct the patient about autonomous removal and subsequent restitution of the device. The ECG results should be submitted electronically or by post. Priority should be given to the use of disposable device cases, alternatively the case must be sanitized after every single use.

Transthoracic echocardiography

The exam is considered to be at increased risk as it involves a close and prolonged physical contact with the patient, therefore the anamnestic investigation of COVID-19 risk is very important. The physicians wear adequate IPE, including a visor, especially in the case of patients with a recent history of dyspnoea. The physicians always use disposable gowns and gloves and must wash and cleanse their hands at the end of the exam. At the end of each procedure, the keyboard is to be cleansed with 70% alcohol swabs, commonly used in hospitals. The transthoracic probe should not be immersed in sodium hypochlorite or sterilized by autoclaving nor dry heat but disinfected with a solution not containing glutaraldehyde or quaternary-ammonium-based formalin. Not all cleansing solutions are compatible with the available transducers: it is recommended to refer to the maintenance manuals and the cleansing of the single appliance or to the clinical engineering service. In consideration of the particular attention and precautions needed during the examination, the scheduled timing for each examination cannot be less than 45 min (including the cleansing/sanitization of the devices and of the room).

Provocative test through echocardiographic imaging techniques (echo stress)

In case of positive asymptomatic COVID-19 subjects, this is a high-risk transmissibility test, very costly in terms of time and resources so it is very important to pay special attention to the appropriateness of prescription. The physician and nurse wear adequate IPE (see above). The scheduled timing, considering the need for sanitation cannot be less than 60 min.

Transoesophageal echocardiography

The examination is considered to be at very high-risk (production of aerosol), must be requested by a cardiologist, and the outpatients must perform a screening swab during the 2 days prior to the exam. The swab result must be communicated to the outpatient surgery before the execution of the exam (except for emergencies). The healthcare personnel (physicians and nurses) must be provided with FFP2/FFP3 facemasks, double gloves, caps, disposable

waterproof gowns, visor, or safety goggles. The patient is provided with a cap. At the end of each exam the keyboard must be cleansed (see above) and the probe cleansed with the usual disinfectant. The scheduled timing, considering the need for sanitation cannot be less than 60 min.

Bike Ergometer stress test

The examination is considered to be at increased risk (polypnea) and is reserved only to non-deferrable cases in which the result could significantly change the diagnostic-therapeutic strategy. The healthcare personnel must wear FFP2 facemasks, visors or safety goggles, and gloves. The device, preferably in telemetry electrocardiographic signal transmission mode, must be positioned so as to reduce the 'droplet effect' for the duration of polypnoea. The patient must be provided with a facemask. The personnel stands to the side or behind the patient during the test. The hand sanitation treatment with alcohol solution/gel is imperative at the end of the procedure. The cleansing of the equipment with a 70% alcohol solution must be performed at the end of each procedure and together with the sanitization procedures of the room. The scheduled timing of the examination, considering the need for ventilation and sanitization, cannot be less than 60 min.

Ergospirometry

The examination is considered to be at very high-risk (production of aerosol without facemask) and must be requested by a cardiologist. Outpatients must perform a screening swab during the 2 days prior to the exam. The swab result must be communicated to the outpatient surgery before the execution of the exam. The device preferably in telemetry electrocardiographic signal transmission mode must be positioned so as to reduce the 'droplet effect' for the duration of polypnoea. The healthcare personnel must be provided with FFP2/FFP3 facemasks, gloves, visors, or safety goggles. During the procedure, the personnel stand to the side or behind the patient.

The hand sanitation with alcohol solution/gel is imperative at the end of the procedure. The cleansing of the equipment with 70% alcohol solution must be performed at the end of each procedure and when the room is sanitized. The scheduled timing for the examination, considering the need for sanitation, cannot be less than 60 min.

Outpatient checkup of implantable electronic cardiac devices

Both physicians and nurses are provided with adequate IPE and cleanse their hands with an alcohol-based solution/gel at the end of the procedure. Telematic controls are to be favoured maximizing the monitoring of patients through remote control, reducing the number and frequency of 'in office' checkups, also in patients without auto-limitation devices (i.e. not pacemaker dependent) and trying to resolve any possible issues over the phone. The scheduled timing, considering the need for ventilation and sanitation, cannot be less than 20-25 min.

Tilt test and flecainide tests or similar

In regards to the tilt test and flecainide test or similar, it is recommended in this phase to perform only non-deferrable cases with type 1 indication, so as to reduce the influx of patients. It is recommended to follow, in accordance with the implemented local regulations, the indications for clinical tests and for day hospital admission.

Interventional cardiology in stable patients

A personalized clinical rigorous evaluation of each case and a careful assessment of the risk/benefit ratio is necessary. The following procedures are potentially deferrable:

- Coronary angiogram/coronary angiography for stable coronary disease;
- Pre-operative coronary angiography for non-cardiac invasive surgeries;
- Total chronic coronary occlusion interventions;
- Aortic valve transcatheter implant.

Cardiological consultation in the emergency room or other hospital units

Consultations to be performed in the emergency room or in other hospital units must follow the same safety measures suggested for outpatients. The colleague who requests a consultation must provide the cardiologist with the COVID-19 risk profile of the patient that needs to be assessed or submitted to instrumental investigation, so that the consultant may wear the most suitable IPE. In subjects with a high- or very high-risk profile and in need of a non-deferrable cardiological consultation, not performable by teleconsultation, the patient must be considered as positive COVID-19 and therefore follow the COVID-19 pathway—in any case, the maximum safety measures must always be adopted. The same protective attitude is to be adopted in case of negative COVID-19 swab result subjects but with suspected or suggestive symptoms for COVID-19.

In all other cases, it is necessary consultation be performed using disposable gowns, facemask/FFP2, gloves, visor, and proceed with hand-washing, and the use of alcohol gel immediately after the requested consultation.

Data availability

The data that support the findings of this study are available from the corresponding author, SV upon reasonable request.

Disclaimers

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