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Rolf Dörr
Praxisklinik Herz und Gefässe, Dresden, Germany

Protecting patients and healthcare personnel from COVID-19: considerations for practice and outpatient care in cardiology

Only 3 months after the first description of the new disease in Wuhan, China, at the end of December 2019, the COVID-19 pandemic has emerged as the biggest global health challenge since World War II [1]. By April 12, 2020, 1,800,791 people worldwide were infected with the novel SARS-CoV-2 virus, and the global death toll of the life-threatening disease COVID-19 was 110,892 [2]. Healthcare professionals are at greater risk than the general population [3]. The following considerations are based on early experiences reported from Wuhan, recent recommendations of the European Association of Cardiovascular Imaging (EACVI; [4]), a subspecialty community of the European Society of Cardiology (ESC), and the author's personal experience after four members of his medical staff were infected with SARS-CoV-2 (**Table 1**).

Recommendations for healthcare personnel

Screen for COVID-19 symptoms by telephone and at the front desk

All patients should be screened for COVID-19 symptoms using a coronavirus checklist. The first check should be made during the initial telephone contact by asking about the most common symptoms: fever, cough, and shortness of breath. The second check should be made at the front desk. If there is any suspicion of acute coronavirus infection, the planned cardiology visit should be postponed, and the patient should be immediately referred to an outpatient coronavirus center for SARS-CoV-2 laboratory testing.

Consider non-contact body temperature checks at the entrance

Infrared non-contact temperature measurement may be used to check patients' body temperature at the entrance, although this method is controversial and not very reliable. A normal body temperature should never be the only parameter used to rule out COVID-19 with certainty. However, an elevated body temperature is a reason for further SARS-CoV-2 testing.

Review all scheduled visits and examinations for urgency

All previously scheduled visits and examinations should be reviewed to determine their urgency level. Non-essential appointments may have been made long before the COVID-19 pandemic emerged in Europe at the end of January 2020.

Postpone all visits and examinations without relevant subsequent changes in patient management

All elective check-up visits and examinations without relevant impact on subsequent patient management should be postponed. Exceptions may only be made for patients with new onset of symptoms, especially in patients with suspected acute coronary syndrome.

Postpone elective invasive and interventional procedures in stable patients with chronic ischemic heart disease

Elective invasive and interventional procedures in patients with chronic ischemic heart disease should also be postponed. This recommendation is further justified by the scientific evidence from the ISCHEMIA trial [5]. Among 5179 patients with stable coronary disease and moderate or severe ischemia, there was no evidence that an initial invasive strategy, as compared with an initial conservative strategy, reduced the risk of ischemic cardiovascular events or death from any cause over a median of 3.2 years.

Avoid all elective testing with an increased risk of virus spreading and contamination

Transesophageal echocardiography (TEE) should be avoided and only performed on patients with indications in which the procedure is absolutely indispensable. Electrocardiography leads should be avoided with transthoracic echocardiography (TTE). Because of increasing evidence that virus transmission may also be caused by respiratory air and aerosoliza-

Table 1 Take-home messages for practice and outpatient care in cardiology[a]

1.	Screen for COVID-19 symptoms by telephone and at the front desk
2.	Consider non-contact body temperature checks at the entrance
3.	Review all scheduled visits and examinations for urgency
4.	Postpone all visits and examinations without relevant subsequent changes in patient management
5.	Postpone elective invasive/interventional procedures in stable patients with chronic ischemic heart disease (this is also based on recent evidence from the ISCHEMIA trial)
6.	Perform transesophageal echocardiography (TEE) only if absolutely indicated. Avoid all cardiopulmonary exercise stress tests (spiroergometry, exercise ECG, exercise stress echocardiography, etc.). Pharmacological stress testing is preferable
7.	Provide personal protective equipment (PPE) for all medical staff members (gloves, N95 masks, gowns, caps, goggles/face shields)
8.	Maintain segregation and social distancing between patients and medical personnel
9.	Ensure meticulous hygiene and disinfection of medical equipment and rooms after every patient
10.	Consider a lung CT scan as a first-line testing method in patients with acute dyspnea of unknown origin and elevated body temperature

[a]The author is well aware that this list may still be incomplete and that all recommendations will be subject to frequent updating and scientific revision in the near future

tion, all cardiopulmonary stress tests (spiroergometry, exercise ECG, exercise stress echocardiography) should be avoided or postponed. Pharmacological stress testing should be preferred if stress testing is absolutely required.

Provide personal protective equipment for all medical staff members

A shortage of PPE for medical personnel has been one of the biggest issues of the COVID-19 pandemic. There should be a sufficient supply of PPE (gloves, N95 masks, gowns, caps, goggles/face shields) for all members of the medical staff. A plexiglass shield should be in place at the front desk to protect against droplet infection.

Maintain segregation and social distancing between patients and medical personnel

Segregation and social distancing between patients and personnel are of utmost importance. Whenever possible, at least 1.5 m of distance should be maintained between healthcare personnel and patients. Patients should be prevented from congregating at the front desk and in waiting areas. Patient contact times should be minimized, and traffic flow should be organized to go in only one direction in order to prevent patients and personnel from encountering each other unnecessarily.

Ensure meticulous hygiene and disinfection after every patient

Meticulous hygiene is absolutely mandatory. Medical equipment, ECG leads, tables, chairs, door handles, and rooms should be meticulously disinfected after every patient. If it is absolutely necessary to examine a patient who has tested positive for SARS-CoV-2, that patient should be scheduled as the last patient of the day.

Consider a lung CT scan as first-line testing method in patients with acute dyspnea and elevated body temperature

In patients with acute dyspnea of unknown origin and elevated body temperature, a lung CT scan may be considered for confirmation of COVID-19. However, in patients with congestive heart failure and pulmonary edema, the differential diagnosis may be very difficult.

Corresponding address

Rolf Dörr, MD
Praxisklinik Herz und Gefässe
Heinrich-Cotta-Strasse 12, 01324 Dresden, Germany
doerr@praxisklinik-dresden.de

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