Bernard Katz legacy—Professor Murray Esler

Professor Murray Esler is a clinical cardiologist at the Alfred Hospital, Melbourne, and Adjunct Professor of Medicine, Monash University, Australia.

Professor Esler said that in laboratories in Australia and the UK, Bernard Katz demonstrated that neurotransmitter release is invariably ‘quantal’ and is released in discrete packages of transmitter. He continued: ‘Release cannot be less than this quota, can be of a number of quotas, but cannot be a continuously distributed amount. Katz’s discovery was soon subsumed into the general concept that neurotransmitter release is by discharge from vesicles’.

Conflict of interest: none declared.

doi:10.1093/eurheartj/ehaa457

Acute coronary syndromes during COVID-19

COVID-19 pandemic is a global public health burden, with progressively growing number of infected subjects, which are often asymptomatic. In this emergency condition, Cardiologists have to improve management of acute coronary syndromes (ACS), in order not only to guarantee the appropriate treatment to ACS patients, but also to protect hospital environment and workers from virus spreading. Accordingly, each patient referred to hospital, or directly sent to Cath lab for invasive coronary angiography, should be regarded as possible COVID-19 carrier, therefore, SARS/CoV2/Nucleic Acid test should be performed before any procedure, standard or total protection personal equipment should be worn by all healthcare workers and patients should be admitted in dedicated COVID Units or similar-wards with the appropriate intensity of care depending on his clinical condition. This document provides a guide for clinicians to manage different cases of STEMI/NSTEMI ACS with potential or known COVID-19 infection, based on recent worldwide evidence and standardization protocols.

STEMI and high-risk NSTEMI

Pre-hospital stage

The early admission of patients with suspected ACS, according to the most recent ESC guidelines, is implemented by the emergency medical system throughout Europe. In the case of ST-elevation myocardial infarction (STEMI), the ambulance crew should promptly provide to the cardiologist at the hub centre both electrocardiogram (ECG) and clinical information regarding ACS, a detailed history of the patient’s possible contact with COVID-19 illness, and details of the presence of suspected symptoms within the last 14 days.
Likewise, this history screening should be accurately performed in outpatients referred to the emergency department (ED) or transferred from spoke centres. For NSTEMI with high, intermediate, or low risk, we suggest nasal and/or oropharyngeal swabs if possible before admission to the cardiology department. A surgical mask must be placed on each patient.

In-hospital stage
Following a rapid triage process, ACS patients could be classified into four categories:

i. STEMI or very-high risk NSTEMI patients (STEMI-like) without COVID-19 and/or known contact with infected subjects

ii. STEMI or very-high risk NSTEMI patients with COVID-19 suspected (symptoms and/or known contact with infected subjects) or confirmed infection treated at home

iii. STEMI or very-high risk NSTEMI in patients hospitalized for COVID-19 infection

iv. STEMI or NSTEMI complicated by cardiac arrest

Healthcare professionals must wear the standard PPE: surgical mask, gloves, cap, goggles, and single-use gown.\textsuperscript{15,16}

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In the Cath-lab, epidemiologic and anamnestic information to exclude cough, dyspnoea and fever within 14 days (already collected by ambulance crew), body temperature measure, Blood gas analysis, oropharyngeal swab if not performed yet.

Figure 1 Algorithm for the management of patients presenting with high-risk acute coronary syndrome (ACS) at the time of COVID-19. ICU, intensive care unit; NSTEMI, non-ST-segment elevation myocardial infarction; PCI, percutaneous coronary angiography; PPE, personal protective equipment; STEMI, ST-segment elevation myocardial infarction.

Patients with SCA STEMI or STEMI-like → consider as possible COVID-19

Absence of suspect symptoms and known contacts with infected subjects

COVID-19 suspect symptoms and/or known epidemiologic contacts

COVID-19 infection with in-home treatment or patients hospitalized for COVID-19

Standard PPE with surgical mask, gloves and single-use gown

PPE with total protection (facial protection, waterproof single-use gown and gloves) + FFP3 mask

PCI

Isolation in dedicated rooms

Positive swab?

Hospitalization in cardiac ICU

NO

YES

Hospitalization in COVID Unit or isolation in dedicated rooms

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and an FFP3 mask, following current protocols, both for intubated and for spontaneously breathing patients (e.g. oxygen therapy with nasal cannula, Venturi mask, non-invasive ventilation (NIV), no oxygen therapy).

On arrival at the Cath lab, vital signs, with particular attention to body temperature and SaO₂, should be measured. Furthermore, blood gas analysis and biological specimens (swab) collection for COVID-19 testing should be performed using the necessary PPE according to the severity of respiratory symptoms: (i) low COVID-19 risk, surgical mask; (ii) high COVID-19 risk, PPE with FFP2 or FFP3 mask, depending on the gravity of respiratory impairment. The percutaneous procedure should be performed following the standard protocols of the Centre.

At the end of the invasive coronary angiography, patients with COVID-19 infection should be hospitalized in COVID Units, organized at different levels of care intensity and settings, corresponding to the clinical conditions.

Alternatively, in hospitals without COVID Units, patients should also be hospitalized in COVID-dedicated rooms under the management of specific professionals with the Cardiologist’s support, if not already part of the COVID-Team.

Patients awaiting the COVID-19 test result must be considered as possible COVID-19 carriers, even if asymptomatic; thus, they should be isolated and monitored by dedicated healthcare professionals. If the test is positive, the patients should be admitted to COVID Units or equivalent wards. Asymptomatic patients with negative swabs should be admitted to cardic ICU.

Patients with negative swab and highly suggestive symptoms for COVID-19 infection should be isolated and undergo a second swab; the destination department for the subsequent admission is to be decided on the basis of the test results.

Finally, in patients hospitalized in a COVID Unit showing signs and symptoms suggestive for STEMI, the risk and benefits of a possible coronary revascularization should be assessed, evaluating the patient’s clinical condition and comorbidities and the risk in transport to the Cath lab.

Thrombolysis could be considered as an alternative to percutaneous coronary intervention; however, it should be considered that COVID-19 patients, especially those with severe conditions, are at high risk of haemorrhagic and disseminated intravascular coagulation.

In the case of patients with suspected or confirmed SARS-CoV-2, a sanitization of the Cath lab is necessary, according to hospital protocols.

The complete indications for the methods of dressing/undressing of healthcare professionals can be found in specific documents of the Italian Society of Interventional Cardiology (GISE) and the National Health Institute (ISS).

Low- and intermediate-risk NSTEMI

Since patients with low- and intermediate-risk NSTEMI do not need immediate revascularization, the stratification to reveal COVID-19 patients should be performed with the same modalities before their transfer to the Cath lab or their admittance to the Cardiology ward, preferably in dedicated areas of the ED. Regarding the protective normative of healthcare professionals, the indications are the same as explained above. While waiting for the SARS-CoV-2 test results, a proper risk assessment should be carried out to identify patients needing expedited angiography and to facilitate earlier discharge.

Soon after the test results, patients with NSTEMI with a positive COVID-19 test should be admitted to COVID Units within the appropriate care settings, depending on the clinical condition and the thrombotic and arrhythmic risk, evaluating the risk–benefit ratio deriving from a possible revascularization.

Conversely, patients with NSTEMI with a negative COVID-19 test should follow the standard protocol for therapy and will be admitted to the Cardiology department.

Conclusions

In the present global COVID-19 pandemic, a cardiovascular emergency is faced with balancing timeliness of treatment and the safety of other patients and medical personnel. Each patient referred to the ED or directly to the Cath lab requires exclusion of COVID-19 infection, while, in the cases where this is confirmed, specific measures should be undertaken. High protection levels of healthcare workers are required, due to the potential necessity of performing emergency resuscitation measures at any time during the procedure.

This document provides a simple and short guide to assist clinicians in the management of ACS considering COVID-19, based on recent worldwide evidence and protocols of our country.

References

References are available as supplementary material at European Heart Journal online.