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COVID-19: A United Kingdom National Health Service cardiology perspective.

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Abbreviations:

BCS – British Cardiovascular Society.

COVID-19 – Coronavirus Disease 2019

NHS – National Health Service.

NICE – National Institute for Health and Care Excellence.

NSTE-ACS – Non-ST segment elevation acute coronary syndrome.

SARS-CoV-2 – severe acute respiratory syndrome coronavirus 2.

STEMI – ST segment elevation myocardial infarction.

UK – United Kingdom.

Introduction

The ongoing COVID-19 pandemic is testing the resilience of societies, services, families and individuals across the world. Despite causing a primarily respiratory illness, cardiology patients and doctors will continue to be affected both directly and indirectly by the pandemic and its aftermath. Here we discuss the UK cardiological response to the pandemic in the provision of front-line care for COVID-19 patients, the re-design of clinical services, and the re-skilling of cardiologists. We describe how the pandemic might affect cardiology patients, how cardiologists can help COVID-19 patients, and how we can support our patients and colleagues during this difficult period. We will draw upon our personal experiences as cardiologists to contribute to the wider published discussion of how cardiology services are changing during this pandemic.

Cardiology patients and COVID-19

Pre-existing cardiovascular disease puts patients at higher risk from the complications of COVID-19 (1). The precise reasons for this are not clear but the presence of established cardiovascular disease or its associated risk factors such as hypertension, diabetes, obesity, smoking, age and male gender are all associated with worse outcomes (1). Although these are not all immunocompromising in the classical sense, it seems likely that they contribute to a state of immune dysregulation that predisposes to severe infection and an exaggerated maladaptive immune response (2). Furthermore, patients with cardiac conditions such as heart failure, cardiomyopathy and ischaemic heart disease may lack the cardiovascular reserve to mount an appropriate physiological response to the virus.

COVID-19 may have primary cardiac manifestations although an associated viral myocarditis is unproven and requires more investigation. Furthermore, whilst COVID-19 can

present with cardiac-sounding symptoms and has been associated with myocardial infarction this link also remains unproven. It is likely that in the absence of typical symptoms the frequent finding of a mildly elevated serum troponin level is secondary to demand ischaemia from hypoxaemia, sepsis, distributive shock and tachycardia rather than plaque rupture *per se* (1). Arrhythmias occur in 17% of patients (1). Cardiologists involved in the care of COVID-19 patients should be prepared to provide timely advice on the management of these cardiovascular complications and comorbidities.

In addition to the direct effects of SARS-CoV-2 viral infection the downstream effects on cardiac patients who avoid infection are likely to be significant but will be difficult to quantify. Cardiac doctors, nurses, physiologists and allied healthcare professionals all work with patients and are being affected by self-isolation and sickness. Reduced staffing levels and increasing healthcare demands are causing services to become overwhelmed. As a result, many outpatient clinics and elective procedures are being postponed; non-acute cardiac imaging has been reduced. The BCS published guidance to help clinical leadership teams scale down cardiology services appropriately and proportionately during the pandemic (3). It is recommended that emergency pathways for cardiac bypass surgery, percutaneous coronary revascularisation and cardiac electronic device implantation be maintained. However, this may require increased patient transfers, treatment delays and the requirement for less effective interim therapies such as thrombolysis for STEMI. Furthermore, delays in the urgent invasive management of cardiac conditions such as aortic stenosis and NSTEMI-ACS could indirectly contribute to downstream morbidity and mortality, even after the infection rate falls. Compounding these changes in healthcare provision, patients are choosing to avoid hospitals for fear of catching the virus. Yet unpublished data reveals a significant reduction in STEMI and NSTEMI-ACS admissions currently compared to this time last year. All of these

deviations from established standards of care may negatively affect outcomes. It remains vital that patients who are unwell with cardiac-sounding symptoms such as chest pain, palpitations and syncope are still encouraged to seek medical attention. Furthermore, it must be carefully considered whether the harms of delaying guideline-based therapy for cardiac disease are appropriately balanced against the harms of COVID-19 itself, as neither group are more nor less deserving of effective healthcare than the other. One way that cardiologists can overcome the issue of reduced hospital attendance is to provide virtual or telephone outpatient consultations where feasible.

Additional support is available. The BCS rapidly established guidance for hospitals and a COVID-19 'Clinicians Resource Hub', which are both accessible to all clinicians in all countries; NICE have also published relevant guidance on the appropriate use of critical care for COVID patients (3).

Cardiology doctors and COVID-19: Clinical contributions

Cardiologists also have an important role in applying their transferrable skills to the care of non-cardiac COVID-19 patients. Many cardiologists have already transitioned from existing roles in sub-speciality rotas, research and training to front-line management of COVID-19 patients in medical or intensive care units. Many cardiologists dual train in internal medicine and are currently expanding their existing contributions in the acute medical take.

Cardiologists offer 'hard' clinical skills such as the management of respiratory failure, sepsis, resuscitation and escalation planning, as well as 'soft' skills such as team leadership, rota management, communication, teaching and supervision. In critical care cardiologist's translatable skillsets include vascular access, transthoracic echocardiography and the management of unstable patients. The majority of critically unwell COVID-19 patients

require arterial lines, central venous access, cardiovascular support and careful fluid balance management – all familiar areas for cardiologists. Some cardiologists may have already undertaken intensive care rotations, although up-skilling, retraining and supervised support will still be needed to assist with this transition. A subset of patients may also require transthoracic echocardiography, extra-corporeal membrane oxygenation and anti-arrhythmic drugs. The value that cardiologists can bring to the critical care management of COVID-19 patients should therefore not be underestimated and in our experience our contributions have been well-supported and well-received by intensivists and acute physicians alike.

The current focus on COVID-19 may require cardiologists to learn new knowledge and skills specific to this disease such as the management of acute respiratory distress syndrome, mechanical ventilators and ventilated patients. Learning cardiac skills such as angiography, echocardiography and device implantation takes time and there is a risk this pandemic will generate de-skilling and opportunity costs. To this we would say three things. Firstly, training authorities have been sympathetic to our predicament; end of year assessments have already been modified accordingly. Secondly, we have found that the sacrifices made in contributing to this crisis are as rewarding as they are a privilege. Finally, it is possible that the unforeseen benefits outweigh these foreseen negatives; amongst healthcare professionals we are already seeing increased collaboration, a strengthened sense of community and a greater appreciation for our respective contributions.

Cardiology doctors and COVID-19: Non-clinical contributions

Beyond their clinical contributions, cardiologists can assist with non-clinical roles including research, education, leadership and management. There will be countless examples but to name a few – cardiologists from our hospitals have helped create COVID-19 protocols, re-

design medical rotas, deliver vascular access teaching and streamline the return of researchers back into clinical work. All established UK research funders are supporting this move as well as the repurposing of research funds from cardiovascular to COVID-19-based research. The principal investigator for the 'COVID-19 Healthcare Worker Bioresource' study, and the managing director of the new 'NHS Nightingale' critical care COVID-19 field hospital at the ExCeL conference centre in London, are both practising consultant cardiologists at our hospitals.

Cardiology doctors and COVID-19: Staying safe

Last but not least we must protect our health and the health of our colleagues. Without healthy hospital workers inpatients cannot receive excellent care. Physical health must be protected with appropriate training in and use of personal protective equipment, rest between shifts, and time off when health sector workers become unwell. Psychological health must be protected with counselling, de-briefing after clinical events, mentoring, bereavement support and time away from work. Social well-being can be helped by providing food, transport and accommodation where required. The NHS is well-suited to supporting keyworkers in this way; at our hospitals we have access to discounted or free transport, accommodation, food and counselling.

Conclusion

To say that these are stressful or uncertain times is an understatement. The personal perspectives described here are not exhaustive and new issues will be identified en route. During pandemics such as this focussing first and foremost on the needs of patients is of paramount importance. In addition to the personal challenges faced by everyone, we as physicians also face the greatest professional challenge of our lives. This is our reality and as

cardiologists we have a great deal to offer. We appreciate your support and wish you all the best during this testing pandemic.

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