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Rural and Remote Cardiology During the COVID-19 Pandemic: Cardiac Society of Australia and New Zealand (CSANZ) Consensus Statement[☆]



Ruth H. Arnold^{a,*}, Philip A. Tideman^b, Gerard P. Devlin^c,
 Gerard E. Carroll^{d,e}, Alex Elder^a, Harry Lowe^{a,f,g,h}, Peter S. Macdonald^{e,i},
 Paul G. Bannon^g, Craig Juergens^{a,e,j}, Mark McGuire^{g,h,k}, Justin A. Mariani^l,
 Sean Coffey^m, Steven Faddyⁿ, Alex Brown^o, Sally Inglis^p,
 William Y.S. Wang^q

^aOrange Health Service, Orange, NSW, Australia

^bIntegrated Cardiovascular Clinical Network SA, Adelaide, SA, Australia

^cNew Zealand Heart Foundation, New Zealand

^dCalvary Hospital, Wagga Wagga, NSW, Australia

^eUniversity of New South Wales, Sydney, NSW, Australia

^fConcord Hospital, Sydney, NSW, Australia

^gRoyal Prince Alfred Hospital, Sydney, NSW, Australia

^hThe University of Sydney, Sydney, NSW, Australia

ⁱSt Vincent's Hospital Sydney, Sydney, NSW, Australia

^jLiverpool Hospital, Sydney, NSW, Australia

^kPrince of Wales Hospital, Sydney, NSW, Australia

^lAlfred Hospital, Melbourne, Bairnsdale Hospital, Bairnsdale and Monash University, Melbourne, Vic, Australia

^mUniversity of Otago, Dunedin, and Southern District Health Board, Dunedin, New Zealand

ⁿNSW Ambulance, Sydney, NSW, Australia

^oSouth Australian Health and Medical Research Institute (SAHMRI) and University of Adelaide, Adelaide, SA, Australia

^pCSANZ Cardiovascular Nursing Council, University of Technology, Sydney, NSW, Australia

^qCSANZ Indigenous Health Council, Princess Alexandra Hospital, Brisbane, and University of Queensland, Brisbane, QLD, Australia

The Challenges

Rural and remote Australians and New Zealanders have a higher rate of adverse outcomes due to acute myocardial infarction, driven by many factors. The prevalence of cardiovascular disease (CVD) is also higher in regional and remote populations, and people with known CVD have increased morbidity and mortality from coronavirus disease 2019 (COVID-19). In addition, COVID-19 is associated with serious cardiac manifestations, potentially placing additional demand on limited regional services at a time of diminished visiting metropolitan support with restricted travel. Inter-hospital transfer is currently challenging as receiving centres enact pandemic protocols, creating potential delays, and cardiovascular resources are diverted to increasing intensive care unit (ICU) and emergency department (ED) capacity. Regional and rural centres have limited staff resources, placing cardiac services at risk in the event of staff infection or quarantine during the pandemic.

*Corresponding author at: Email: ruth@coldhearts.com.au

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Main Recommendations Health districts, cardiologists and government agencies need to minimise impacts on the already vulnerable cardiovascular health of regional and remote Australians and New Zealanders throughout the COVID-19 pandemic. Changes in management should include:

- Improved access to telehealth consultation for regional and rural outpatients. Specialist-led 24/7 electrocardiograph (ECG) reading and acute cardiology services, uniformly covering all rural inpatients, to minimise potential impacts on acute care.
- Transfer models incorporating discussion between clinicians and ambulance, balancing urgency with considerations of ambulance capacity in rural locations.
- Protection of the role of specialist cardiovascular nurses, avoiding COVID-19 redeployment to maintain rural cardiac service capacity.
- An urgent shift to regional models for pacing services, utilising remote monitoring supported by local device implantation and local technicians.

Keywords COVID-19 • Rural • Cardiac services • Telehealth • Remote monitoring

Background

In December 2019, a severe acute respiratory syndrome coronavirus was detected in China. Rapid virus spread led the World Health Organization to declare a COVID-19 pandemic on March 11, 2020.

Health care services in many countries have been overwhelmed. As hospitals in Australia and New Zealand adapt to this new reality, changes to services have been extensive and rapid. Currently, the largest number of cases in both countries are in metropolitan centres, but locally acquired cases have now been reported in regional areas (see NSW COVID-19 case statistics by local health district (www.health.nsw.gov.au)). The pattern, speed and magnitude of COVID-19 spread cannot be accurately predicted.

The Rural and Regional Context

One (1) in four New Zealanders and 30% of Australians live in rural or regional locations. There is a greater percentage of Māori, Aboriginal, Torres Strait Islander and older people living in these areas [1,2]. The health care needs of these communities are greater than for metropolitan populations and yet the number of doctors, particularly specialists, per capita is lower and access to cardiovascular services remains challenging in usual, non-pandemic circumstances.

Rural and remote Australians and New Zealanders have a higher rate of adverse outcomes due to acute myocardial infarction, driven by many factors [3,4]. The prevalence of cardiovascular disease (CVD) is also higher in regional and remote populations.

The settings do vary from very remote and remote in Australia, to outer regional and inner regional, with some large regional cardiac centres in Australia and New Zealand providing a high level of care to a wide geographical area. Staff resources in different settings include nurses, primary care doctors, general physicians, cardiac technicians, locally based cardiologists and travelling metropolitan based cardiologists.

Pre-Existing Cardiovascular Disease and COVID-19

Common comorbidities such as hypertension, diabetes and particularly established CVD confer the highest risk for developing severe, versus mild, COVID-19 [5–7]. Rural and regional populations are older, with higher rates of CVD [1]. In addition, the burden of CVD in both Australia and New Zealand is higher in Indigenous people [2]; many of whom live in remote rural settings. These factors could result in a higher rate of severe disease in the event of COVID-19 infection placing an increased burden on already limited resources and driving further inequity between populations defined by geography or ethnicity.

Fundamental Link of COVID-19 Pathophysiology to the Vascular System

It is anticipated that COVID-19 may cause more cardiovascular manifestations in the rural population, due to high rates of cardiovascular risk factors. The pathophysiology of COVID-19 is fundamentally linked to the vascular system, due to viral infection and down-regulation of the angiotensin converting enzyme-2 (ACE-2) system [8]. This system usually protects against endothelial damage [9], hence ACE-2 dysfunction results in high rates of acute cardiac injury and left ventricular dysfunction seen in COVID-19 [6,7,10,11]. Low tissue ACE-2 levels are found in the elderly and may be linked to increased COVID-19 severity [12–14]. Commonly used cardiovascular drugs, such as angiotensin receptor blockers (ARBs), increase ACE-2 levels. Many patients already take ARBs for valid cardiovascular indications and without appropriate clinical data to indicate otherwise, the Cardiac Society of Australia and New Zealand (CSANZ) and international societies recommend their continuation [15]. A broader role for ARBs in the treatment of COVID-19 is being trialled [12].

Delivery of cardiac care in regional and remote Australasia during the COVID-19 pandemic faces many challenges. These include anticipation of a significant impact on rural

communities as underlying CVD confers the highest mortality with COVID-19 disease [5], and a greater rate of COVID-19-induced cardiac manifestations. Managing increased cardiac presentations in rural areas will require careful resource allocation and protection of health care workers from COVID-19 exposure, where any impacts on a limited workforce could have major impacts on rural cardiac service provision.

An additional challenge for cardiologists will be applying guidelines in triaging the need for transfer of patients with acute coronary syndromes between hospitals and ensuring access for patients to emergency cardiac care, whilst minimising the risk of staff infection and using limited resources in a pandemic setting wisely.

This consensus document makes recommendations for the provision of relevant, locally based, cardiac services in rural and remote areas during the COVID-19 pandemic, in accordance with other published CSANZ living document consensus statements [15,16], to ensure equity of access to emergency cardiac care within and between health districts across the Australia and New Zealand.

Recommendations

1. Acute Cardiac Care

1A. Provide Telehealth Services

Recommendation: *Telehealth ECG reading and cardiology consultation 24/7 should be uniformly available to support regional and rural patient care in each rural health district.*

In providing acute cardiac care, there is a need to support the diagnostic and treatment capabilities of all rural facilities. Increased availability of point of care pathology services improves diagnostic accuracy at the site of presentation. In larger regional hospitals without cardiac catheterisation facilities, access to echocardiography and cardiac computed tomography (CT), if available, may reduce the number of patients requiring transfer.

Rural clinical networks, providing integrated cardiac care between smaller rural hospitals, and regional and metropolitan centres, have been proven to reduce mortality for acute cardiac patients [17]. Established systems such as the State Cardiac Reperfusion Strategy (SCRS) in New South Wales (NSW), Australia, and the Integrated Cardiovascular Clinical Network (iCCnet) in South Australia (SA), Australia, provide 24/7 cardiologist support. However, telehealth support structures and existing health infrastructure vary between states and health districts in their resource allocation, staffing and scope of service. Uniform coverage would be particularly beneficial during the COVID-19 pandemic, when all resources will be stretched and appropriate utilisation essential. Early specialist input improves outcomes and delivers more cost-effective care closer to patients' homes [18].

Cardiologist-led ECG-reading and consultation services aim to:

- (i) Provide immediate support for ST-elevation myocardial infarction (STEMI) management.
- (ii) Ensure all appropriate adjunctive therapies are administered.
- (iii) Triage and expedite transfer to an appropriate centre for ongoing care, or
- (iv) Provide support for ongoing care in the presenting healthcare facility.

Video-consultation in acute situations can significantly improve the comprehensiveness and accuracy of remote specialist assessment.

1B. Adopt Fibrinolysis-First Model of Care

Recommendation: *Regional centres should have equitable access to thrombolytics, and stock rotation systems are imperative to ensure supply.*

For the duration of the COVID-19 pandemic, CSANZ has suggested that fibrinolysis-first models of care for STEMI be considered, including in metropolitan percutaneous coronary intervention (PCI) centres [15,16]. This is likely to affect the availability of tenecteplase, which is imported from Europe in limited supply.

Minimisation of wastage is an imperative. Stock rotation systems are essential to ensure short-dated stock in smaller centres can be moved to higher-volume centres for use before expiry. Where ambulance services carry tenecteplase, they must be included in stock-sharing with regional health networks. State or federal legislation that restricts such sharing should be urgently reviewed and modified.

Regional areas reliant on thrombolysis and many hours from a cardiac catheter facility should have expedited supply in the event of thrombolysis shortages.

1C. Enable Multidisciplinary Decision-Making

Recommendation: *Remote access to multidisciplinary heart team meetings should be provided to facilitate decision-making before complex PCI.*

The rate of failed fibrinolysis in rural areas is approximately 30% [18,19], requiring rescue PCI. Many rural health districts have existing protocols to expedite immediate transfer of STEMI patients to regional PCI centres. COVID-19 era disruption to protocols could result in greater morbidity and mortality due to delayed revascularisation.

Monitoring of impacts, by centralised acute cardiac telehealth services in each rural health district, allowing discussion and prioritisation of patients, could ensure rational and equitable use of limited resources throughout the pandemic and beyond. Appropriate case selection for PCI in rural labs, without on-site surgical backup, should follow CSANZ guidelines [20].

Careful case-by-case discussion with networked metropolitan colleagues will become increasingly important in balancing resource availability, risks of transfer and risks of performing higher risk PCI in the regional setting. Some health districts may need to increase catheter lab days in regional centres to minimise delays, reduce length of stay and transfers costs, if metropolitan transfer becomes limiting for patient care.

1D. Optimise Patient Transfers

Recommendation: *Patient transfer should be limited but, when required, should be actioned in a timely manner within available resources.*

Increased community transmission of COVID-19, should it occur, will place huge strain on already fragile health care and emergency transport systems throughout Australia and New Zealand. This could prevent or delay timely access of unstable rural acute coronary syndromes patients to PCI-capable facilities. Bed availability in cardiac centres has already diminished, as administrators enact pandemic plans to expand ED and ICU services. Stringent patient assessment procedures, in place at all receiving hospitals, impose further delays.

Transfers that normally occur across state boundaries may be subject to high level negotiations in the unprecedented era where states in Australia have closed borders.

Transport of COVID-19 patients between hospitals, either by regular ambulance or medical retrieval services, will incur additional unavailability required for decontaminating the vehicle after transport, which will add to the loss of operational capacity in smaller towns.

Ambulance services that utilise multi-stage transfers may need to reconsider the implications of COVID-19 on this practice in order to avoid having multiple resources out-of-service for decontamination. Dedicated COVID-19 vehicles (either ambulances or non-emergency patient transport vehicles staffed by medical and nursing resources) should be commissioned.

2. Maintain Outpatient Cardiac Care

Recommendation: *Outpatient cardiac care and rheumatic heart disease management should be maintained for rural cardiac patients with metropolitan centre support.*

Access to cardiology outpatient outreach services has rapidly declined since mid-March 2019. Regional airlines have severely curtailed their schedules. Many specialists have had their ability to travel, especially interstate, restricted or terminated, related to metropolitan hospital pandemic plans.

Telephone consultation to a patient in the home, whilst useful for short-term follow-up, has significant limitations in patient assessment. Clinic-to-clinic video-consultations provide greater clinical capability than telephone consultations but require more time, staff and infrastructure to establish. Cardiologists with many years of experience in rural telehealth and video consultations recommend supplementation with a 12-lead ECG or rhythm strip, and provision of basic

minimum observations recorded by a clinician, prior to a consultation.

Assessment of patients presenting with increasing dyspnoea, via telehealth, can be difficult without access to investigations such as chest x-ray (CXR), echocardiography, N-terminal prohormone B-type natriuretic peptide (NTproBNP) and routine blood tests, prior to the consultation.

Given the COVID-19 disruption to services is likely to continue for 6-12 months, it is essential that outreach cardiology services continue to provide some level of physical presence of a cardiologist and, wherever possible, a cardiac sonographer, for urgent assessment for new or deteriorating rural cardiac patients. Systems should also provide culturally appropriate connecting care for rural patients returning from cardiac procedures.

Movement of medical staff between health services may carry a risk of COVID-19 transmission, but with appropriately applied rules of self-isolation for exposed or symptomatic staff, this risk can be minimised. Outreach service providers should liaise with local authorities to determine the optimal mix of in-person and telehealth services provision during the pandemic period.

Patients with rheumatic heart disease who are receiving regular antibiotics should continue to do so during the pandemic. Routine echocardiography could be postponed, with the timing of such postponement determined by the treating clinician.

3. Ensure Staff Health and Safety

Recommendation: *Staff safety, provision of appropriate personal protective equipment (PPE), and onsite COVID-19 polymerase chain reaction testing are a priority for regional cardiac services.*

Many health care workers around the world have been exposed to, or have died from, COVID-19 [5]. Minimising this risk in rural and regional services needs to be a priority, not only because staff resources are already limited, but also because the average age of rural and regional cardiologists and cardiac nursing staff is higher than in metropolitan centres, placing more staff at higher personal risk due to COVID-19. Infection or prolonged self-isolation due to exposure of even a single regional interventional cardiologist and/or cardiac catheter nursing staff member, could easily incapacitate an entire regional roster and service.

CSANZ guidelines recommend full PPE for cardiac catheterisation procedures in STEMI, and in patients with suspected and confirmed COVID-19. All state and district health services have an obligation to staff to ensure that PPE for a relevant cardiac procedure is available, as recommended by professional society guidelines [15,16,21].

Cardiac sonographers are a limited resource in regional and rural areas. As indicated in the CSANZ statement on cardiac imaging during COVID-19, all echocardiograms (echoes) need to be carefully risk assessed, the duration of

echo procedures minimised, and full echo machine cleaning and protection protocols put in place [22].

The availability of rapid-turnaround onsite polymerase chain reaction testing for COVID-19 in major regional hubs may reduce the number of staff undergoing prolonged quarantine while awaiting COVID-19 results in patients, contact or themselves. It would also allow appropriate planning for local patient care and transfers to tertiary hospitals.

4. Conserve Specialist Cardiac Nursing Staff

Recommendation: *Use of specialist cardiac nursing staff in regional centres must balance risk to patient care in both inpatient and outpatient settings.*

Deployment of cardiovascular nurses to COVID-19 pandemic roles in the ED and ICU is more likely to compromise patient care in regional settings, where fewer nursing staff are skilled in critical care. Redeployment of heart failure nurses may impact vulnerable patients at a time when avoidance of hospital admission is essential. Health services need to ensure that the level of cardiovascular patient care in rural hubs is not compromised by reassignment of skilled cardiovascular nurses and nurse practitioners to EDs and ICUs.

Nurses in general practice could provide support for specialist telehealth and video consultations, with observations and monitoring. Extended telehealth item numbers for nursing and allied health services may help address gaps in rural/ regional areas. Support for patients with chronic cardiovascular conditions and connecting care programs for patients discharged from acute care could be provided in conjunction with hospital-based services.

Palliative care and end-of-life planning should be a component of comprehensive cardiovascular services. In an older rural population, at higher risk of poor outcomes due to COVID-19, support will be necessary. Suitable resources can be accessed through Palliative Care Australia (<https://palliativecare.org.au/covid-19-updates>).

5. Establish Regional Pacing and Defibrillator Services

Recommendation: *Regional and rural pacing and defibrillator services, including remote monitoring, local implantation and local technician capacity, require urgent development.*

Regional and rural pacemaker and defibrillator clinics are provided under different models: in many cases, pacemakers are managed by rural cardiologists, whereas implantable defibrillators and cardiac resynchronisation therapy (CRT) devices are commonly managed by visiting specialist cardiac electrophysiologists. In both models, device companies usually fly technicians to rural areas to support large volume

clinics. Remote patient monitoring requires access to the monitoring device and a mobile phone network. An estimated 25% of rural patients have this facility. Remote monitoring checks diagnostic function but has no capacity to re-program devices to “work-around” malfunctions.

Due to COVID-19 travel restrictions, device companies have already cancelled all rural clinics, leaving under-resourced local services searching for alternatives. Identification of patients with device malfunction or approaching battery end-of-life is a potentially life-threatening issue, particularly if the pandemic-related decline of services continues for several months.

Regional hospitals may need to provide small clinics, avoiding overcrowding, to check devices of patients without access to remote monitoring, or who require device re-programming. Clinics staffed by a single health professional could access telemedicine support from technical staff and cardiac electrophysiologists. Establishing these clinics is an urgent priority.

Pacemaker implantation in regional and rural Australia is highly variable and deficient in many areas. Establishing local implantation services starting with procedures such as urgent generator changes would minimise movement of frail and elderly patients during the pandemic and have long-term benefits of equity of care for regional and rural communities.

6. Referral for Cardiothoracic Surgery

Recommendation: *Patients requiring urgent cardiothoracic surgery should continue to be referred during the COVID-19 pandemic.*

The Australian government has currently stopped elective surgery, other than Category A and urgent Category B patients. As a result, most cardiac surgical units have had their operative lists reduced. Patients will however continue to require cardiac surgery.

Some rural health districts have established models of video multi-disciplinary team (MDT) meetings, allowing cardiothoracic surgeons and cardiologists to discuss patients. Resources to extend this model would improve the ability to assess patients and balance the risks and benefits of performing cardiac surgery and guide the undertaking of PCI in some of these patients where locally available. The “virtual hospital”, providing referral centres with mobile devices allowing the surgical centre to participate in a real-time ward virtual round, is one such model (e.g. www.slhd.nsw.gov.au)

Provision of COVID-19–negative ICU capacity with access for regional and rural patients requiring urgent cardiac surgery, needs to be preserved during the COVID-19 pandemic, with due consideration to minimising infection risk in potentially high-risk cardiac patients and avoiding viral transmission to rural communities on their return. Negotiations between the private and public sectors on resource

utilisation during the pandemic are ongoing. Once a suitable model is agreed, service agreements may benefit from structures that can be utilised in any future crisis.

Conclusion

COVID-19 will place a significant demand on cardiovascular services. Meeting these demands in regional and rural Australia and New Zealand will bring particular challenges. Systems will need to be agile in providing additional support to ensure this already vulnerable population in both countries, which includes a high proportion of Indigenous people, and with a high burden of CVD, is not further disadvantaged by reduced access to services.

Enhanced systems of telehealth and video support 24/7, including relevant enhancements of technical infrastructure and models of multi-disciplinary care could allow uniform standards of inpatient cardiac assessment and mitigate the impact of the COVID-19 pandemic in regional and rural Australia and New Zealand. System improvements could build greater long-term capacity, supporting existing regional centres and networks to provide a greater proportion of cardiac care locally on an ongoing basis.

Conflicts of Interest

None declared.

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