THE AUSTRALIAN INSTITUTE OF SPORT (AIS) FRAMEWORK FOR REBOOTING SPORT IN A COVID-19 ENVIRONMENT

May 2020

CONTENTS

GLOSSARY OF TERMS

ACE2 receptors	Angiotensin converting enzyme 2 receptors
AIS	The Australian Institute of Sport
ARDS	Acute Respiratory Distress Syndrome
COVID-19	The clinical disease state resulting from an infection with SARS-CoV-2
CFR	Case fatality rates
CMO	Chief Medical Officers
Community sport members	Community and individual sport participants, parents/guardians of participants, coaches, spectators, officials and volunteers
CRP	C-reactive protein
FBE	Full blood examination
GDP	Gross Domestic Product
ICU	Intensive Care Unit
NIN	National Institute Network
NSO	National Sporting Organisation
PCR test	Polymerase chain reaction test
PoC	Point of Care
RNA	Ribonucleic acid
Other personnel	Staff, coaches, officials
SARS-CoV-2	Virus causing COVID-19
SARS-CoV	Virus causing Severe Acute Respiratory Syndrome (SARS)
SARS	Severe Acute Respiratory Syndrome
The AIS Framework	The AIS Framework for Rebooting Sport in a COVID-19 Environment
MERS-CoV	Virus causing Middle East Respiratory Syndrome (MERS)
MERS	Middle East Respiratory Syndrome
WHO	The World Health Organisation

INTRODUCTION

Sport is an integral part of Australian society. Annually, 3 million children and 8.4 million adults participate in sporting activities and 8 million Australians attend live sporting events annually.[1] Sport participation at all levels and abilities makes an important contribution to the physical, psychological and emotional well-being of individuals. At a population level, benefits of sport include direct economic benefits; healthcare benefits; educational benefits; and contribution to social capital through connectivity, resilience and creating stronger, cohesive communities. At high performance level, Australia also has an exceptional track record – in 2016, there were 25 reigning World Champions (individuals and teams).[1] The sport sector employs >220,000 individuals and engages >1.8 million volunteers. The economic contribution is equivalent to 2–3% of Gross Domestic Product (GDP).[2] Regular community-based sport participation in Australia generates an estimated $18.7B value per annum in social capital including direct economic benefits.[3] Australia has enjoyed many benefits as a result of a rich sporting culture.

The COVID-19 pandemic has had devastating effects on communities globally, leading to significant restrictions on all sectors of society, including sport. COVID-19 has impacted people in varying ways with many experiencing deterioration in their mental health and financial wellbeing.[4, 5] Resumption of sport can significantly contribute to the re-establishment of normality in Australian society, in a COVID-19 environment. Sport organisations and participants will be faced with complex decisions regarding resumption of training and competition in the current circumstances. The Australian Institute of Sport (AIS), in consultation with sport partners (National Institute Network (NIN) Directors, NIN Chief Medical Officers (CMOs), National Sporting Organisation (NSO) Presidents, NSO Performance Directors and NSO CMOs), has developed a framework to inform the resumption of sport. Given the recency of the advent of COVID-19 there is a paucity of research, particularly in athletic populations. National Principles for Resumption of Sport were used as a guide in the development of 'the AIS Framework for Rebooting Sport in a COVID-19 Environment' (the AIS Framework). The AIS Framework is based on current best evidence, and guidelines from the Australian Federal Government extrapolated into the sporting context by specialists in sport and exercise medicine, infectious diseases and public health. The AIS Framework will be regularly updated to reflect the evolving scientific evidence about COVID-19.

The AIS Framework is a timely tool of minimum baseline of standards, for '**how**' reintroduction of sport activity will occur in a cautious and methodical manner, based on the best available evidence to optimise athlete and community safety. The principles outlined in this document apply equally to high performance/professional level, community competitive and individual passive (non-contact) sport. Decisions regarding the timing of resumption (the '**when**') of sporting activity **must** be made in close consultation with Federal, State/Territory and/or Local Public Health Authorities. The priority at all times must be to preserve public health, minimising the risk of community transmission.

NATIONAL PRINCIPLES FOR THE RESUMPTION OF SPORT AND RECREATION ACTIVITIES

1. Resumption of sport and recreation activities can contribute many health, economic, social and cultural benefits to Australian society emerging from the COVID-19 environment.
2. Resumption of sport and recreation activities should not compromise the health of individuals or the community.
3. Resumption of sport and recreation activities will be based on objective health information to ensure they are conducted safely and do not risk increased COVID-19 local transmission rates.
4. All decisions about resumption of sport and recreation activities must take place with careful reference to these National Principles following close consultation with Federal, State/Territory and/or Local Public Health Authorities, as relevant.
5. The AIS 'Framework for Rebooting Sport in a COVID-19 Environment' provides a guide for the reintroduction of sport and recreation in Australia, including high performance sport. The AIS Framework incorporates consideration of the differences between contact and non-contact sport and indoor and outdoor activity. Whilst the three phases A, B and C of the AIS Framework provide a general guide, individual jurisdictions may provide guidance on the timing of introduction of various levels of sport participation with regard to local epidemiology, risk mitigation strategies and public health capacity.
6. International evidence to date is suggestive that outdoor activities are a lower risk setting for COVID-19 transmission. There is no good data on risks of indoor sporting activity but, at this time, the risk is assumed to be greater than for outdoor sporting activity, even with similar mitigation steps taken.
7. All individuals who participate in, and contribute to, sport and recreation will be considered in resumption plans, including those at the high performance/professional level, those at the community competitive level, and those who wish to enjoy passive (non-contact) individual sports and recreation.
8. Resumption of community sport and recreation activity should take place in a staged fashion with an initial phase of small group (<10) activities in a non-contact fashion, prior to moving on to a subsequent phase of large group (>10) activities including full contact training/competition in sport. Individual jurisdictions will determine progression through these phases, taking account of local epidemiology, risk mitigation strategies and public health capability.
    - This includes the resumption of children's outdoor sport with strict physical distancing measures for non-sporting attendees such as parents.
    - This includes the resumption of outdoor recreational activities including (but not limited to) outdoor-based personal training and boot camps, golf, fishing, bush-walking, swimming, etc.
9. Significantly enhanced risk mitigation (including avoidance and physical distancing) must be applied to all indoor activities associated with outdoor sporting codes (e.g. club rooms, training facilities, gymnasia and the like).
10. For high performance and professional sporting organisations, the regime underpinned in the AIS Framework is considered a minimum baseline standard required to be met before the resumption of training and match play, noting most sports and participants are currently operating at level A of the AIS Framework.
11. If sporting organisations are seeking specific exemptions in order to recommence activity, particularly with regard to competitions, they are required to engage with, and where necessary seek approvals from, the respective State/Territory and/or Local Public Health Authorities regarding additional measures to reduce the risk of COVID-19 spread.
12. At all times sport and recreation organisations must respond to the directives of Public Health Authorities. Localised outbreaks may require sporting organisations to again restrict activity and those organisations must be ready to respond accordingly. The detection of a positive COVID-19 case in a sporting or recreation club or organisation will result in a standard public health response, which could include quarantine of a whole team or large group, and close contacts, for the required period.
13. The risks associated with large gatherings are such that, for the foreseeable future, elite sports, if recommenced, should do so in a spectator-free environment with the minimum support staff available to support the competition. Community sport and recreation activities should limit those present to the minimum required to support the participants (e.g. one parent or carer per child if necessary).
14. The sporting environment (training and competition venues) should be assessed to ensure precautions are taken to minimise risk to those participating in sport and those attending sporting events as spectators (where and when permissible).
15. The safety and well-being of the Australian community will be the priority in any further and specific decisions about the resumption of sport, which will be considered by the COVID-19 Sports and Health Committee.

BACKGROUND

On 12 January 2020, the World Health Organisation (WHO) reported a cluster of 41 confirmed cases of viral severe acute respiratory syndrome in Wuhan, Hubei Province, People's Republic of China, following a novel coronavirus outbreak in December 2019.[6] Coronaviruses, enveloped Ribonucleic acid (RNA) viruses with surface spikes, are a group of viruses that affect both animals and humans, and several are known to cause the common cold.[7] Two strains of coronavirus namely Severe Acute Respiratory Syndrome (SARS-CoV) and Middle East Respiratory Syndrome coronavirus (MERS-CoV) have been associated with epidemics in 2002-03[8] and 2012[9] respectively (Figure 1).[10] The novel coronavirus is formally named SARS-CoV-2. The clinical disease state resulting from an infection with SARS-CoV-2 is known as COVID-19. Full-length genome sequencing has shown that SARS-CoV-2 is closely related to SARS-CoV. SARS-CoV-2 has been shown to enter cells via angiotensin converting enzyme 2 (ACE2) receptors.[11]

Figure 1. History of Coronavirus epidemics over the past two decades [9, 12, 13]

Severe Acute Respiratory Syndrome (SARS-CoV)

8,098 cases and 774 deaths in 26 countries in 2003

Middle East Respiratory Syndrome (MERS-CoV)

2,494 cases and 912 deaths in 27 countries between 2012–2019

Novel coronavirus (SARS-CoV-2)

>3.1 million confirmed COVID-19 cases and >224,000 deaths in 210 countries and territories and 2 international conveyances. (30 April 2020)

From January to early February 2020, the majority of cases occurred in the Peoples Republic of China. Global spread of COVID-19 led to the WHO declaring a pandemic on 11 March 2020 with 118,000 cases and over 4,000 deaths reported across 114 countries.[14] There were >3.1 million confirmed cases and >224,000 deaths worldwide by 30 April 2020[13] (Figure 2). The first case of COVID-19 to occur in Australia was confirmed on 25 January 2020, when a man who had returned from Wuhan, People's Republic of China tested positive.[15] At 0600hrs on 30 April 2020, Australia has had 6,746 cases with 90 deaths.[16]

Figure 2. Timeline of COVID-19 pandemic

KEY: COVID-19 GENERAL EVENTS GLOBAL DEATHS/CASE NUMBERS

DEC 2019

A series of pneumonia cases of unknown cause with clinical presentations resembling viral pneumonia emerged in Wuhan, Hubeiin Province, People's Republic of China

31 DEC 2019

Cluster of respiratory infections in Wuhan reported to World Health Organisation (WHO) China Country Office

JAN 2020

7 JAN 2020

Chinese authorities identified a new type of coronavirus (novel coronavirus, nCoV)

9 JAN 2020

First death of COVID-19 in People's Republic of China

12 JAN 020

People's Republic of China shared the genetic sequence of COVID-19

12 JAN 2020

WHO first reported a cluster of cases in Wuhan, Hubeiin Province, People's Republic of China

13 JAN 2020

First case of COVID-19 outside of China (in Thailand)

20 JAN 2020

Person-to-person transmission confirmed

20 JAN 2020

Australian Federal Government list 'human coronavirus with pandemic potential' in the Listed Human Disease under the Biosecurity Act 2015, enabling the use of enhanced border measures.

23 JAN 2020

Lock down in Hubei province, People's Republic of China

23 JAN 2020

Confirmed COVID-19 cases People's Republic of China = 628 and deaths = 17

24 JAN 2020

Australian Federal Government increased level of travel advice for Wuhan and Hubei Province in People's Republic of China to 'level 4 – do not travel', highest travel advice level (level 4 of 4)

25 JAN 2020

First case of COVID-19 in Australia (in Victoria)

29 JAN 2020

Australian Federal Government advice return travellers who have been in the Hubei province, People's Republic of China must self-isolated at home for 14 days

30 JAN 2020

WHO declared COVID-19 as a global health emergency

FEB 2020

1 FEB 2020

Australian Federal Government closed borders for non-citizens and non-residents arrivals from People's Republic of China

1 FEB 2020

Global COVID-19 cases >11,900 and >250 deaths (in People's Republic of China)

2 FEB 2020

First death of COVID-19 outside People's Republic of China (in Republic of the Philippines)

5 FEB 2020

COVID-19 cases in the Diamond Princess cruise ship docked Yokohama, Japan

11 FEB 2020

WHO named 2019nCoV disease A COVID-19

MAR 2020

1 MARCH 2020

Global confirmed COVID-19 cases >88,500 and >3,000 deaths

2 MARCH 2020

First cases of community transmission of COVID-19 in Australia

7 MARCH 2020

Global confirmed COVID-19 cases >100,000 in 100 countries

8 MARCH 2020

French Government bans gatherings of >1,000 people

11 MARCH 2020

WHO declared COVID-19 as a global pandemic

13 MARCH 2020

Europe becomes epicenter of the COV-19 pandemic

13 MARCH 2020

Global COVID-19 cases >145,400 and >5,400 deaths

13 MARCH 2020

French Government bans gatherings of >100 people

14 MARCH 2020

New Zealand Government impose mandatory 14-day self-isolation for all returning travellers

16 MARCH 2020

Australian Federal Government impose mandatory 14-day self-isolation for all returning travellers

16 MARCH 2020

Australian Government banned international cruise ship arrivals for 30 days

18 MARCH 2020

WHO launches SOLIDARITY trial (international clinical trial to help find an effective treatment for COVID-19)

18 MARCH 2020

Australian Federal Government impose a limit of <100 people for non-essential indoor gatherings and <500 people for outdoor gatherings, and call to limit non-essential domestic travel

19 MARCH 2020

Ruby Princess cruise ship docked in Sydney Harbor

20 MARCH 2020

Australian Federal Government border closure to all non-citizens and non-residents

22 MARCH 2020

Most Australian State/Territory governments advised against non-essential interstate travel

24 MARCH 2020

Australian Federal Government impose a ban on all overseas travel 'level 4 – do not travel', highest travel advice level (level 4 of 4)

24 MARCH 2020

Global COVID-19 cases >423,100 and >19,000 deaths

28 MARCH 2020

Australian Federal Government impose mandatory 14 day supervised self-isolation at designated facilities (e.g. a hotel) for all returning international travellers

28 MARCH 2020

The United States is the new epicentre of the COVID-19

APR 2020

3 APRIL 2020

Global COVID-19 cases >1,117,200 and >60,600 deaths

30 APRIL 2020

Global COVID-19 cases >3,230,400 and >228,300 deaths

TRANSMISSION

COVID-19 is highly transmissible from person-to-person and readily spreads to close contacts of infected individuals. The disease can spread from person to person through small droplets from the nose or mouth which are spread when a person with COVID-19 coughs or exhales. These droplets land on objects and surfaces around the person. Other people then catch COVID-19 by touching these objects or surfaces (fomites), then touching their eyes, nose or mouth. People can also catch COVID-19 if they breathe in droplets from a person with COVID-19.[17] The virus can persist in the air for up to three hours and on a variety of surfaces for up to 72 hours.[18] Despite a small minority experiencing gastrointestinal symptoms, 67% of COVID-19 patients tested positive for SARS-CoV-2 RNA in faecal specimens.[19] Viral shedding continues in faeces for 6–10 days after pharyngeal swabs became negative. SARS-CoV-2 has been successfully cultured from faecal samples confirming viable viral particles,[20] indicating the possibility of faecal-oral route transmission.[19]

PATHOPHYSIOLOGY

The clinical manifestations of COVID-19 are being regularly updated as clinicians around the world publish their clinical and laboratory findings. The initial picture of COVID-19 was that of a respiratory disease that in most people was a mild illness but had the potential to cause severe disease, acute respiratory distress syndrome (ARDS) and death due to respiratory failure. Reports of the extra-respiratory manifestations are now emerging, including the effect of COVID-19 on cardiac, neurologic, haematologic and renal functioning.[21-25]

Commonly reported symptoms in the early course of COVID-19 include fever (89%), dry cough (58%) and dyspnoea (46%).[26] Other reported symptoms include myalgia and fatigue[19], anosmia (loss of smell) and ageusia (loss of taste).[27, 28] Less commonly reported symptoms include headache, abdominal pain, nausea, vomiting and diarrhoea.[19, 24, 29]

In a review of clinical presentations from China, 81% of infected people have mild symptoms (no respiratory distress), 14% have severe illness (dyspnoea, tachypnoea and hypoxia) and 5% have critical illness (respiratory and other organ failure, septic shock).[30] The observed timeline of symptoms and pathological changes in symptomatic individuals is an influenza like illness (fever, cough and myalgia) in the first few days followed by respiratory symptoms (dyspnoea +/- hypoxia) in the second week of the illness. The characteristic features on chest CT are bilateral, peripheral, multifocal ground glass opacities.[31] These imaging findings can also be seen in asymptomatic and pre-symptomatic individuals. The median time from onset of symptoms to intensive care unit (ICU) admission in the critically ill is 10 days.[32] In most instances the cause of death is respiratory failure, septic shock or myocardial injury and cardiac failure.[24] Hospitalisation and mortality rates increase with age.

Case fatality rates (CFR) vary from country to country and are likely to reflect the extent of testing (if only severe cases who present to hospital are tested CFR will appear higher), demographics (regions with a higher proportion of elderly will have higher CFRs) and stress on the health systems (the size of the outbreak versus the capacity to provide ventilatory support).

While people of all ages can be affected by COVID-19, children tend to have a milder illness, lower rates of hospitalisation and asymptomatic carriage is not uncommon.[33] The proportion of infected individuals who remain asymptomatic is not known as widespread population screening has not been undertaken. Statistical modelling based on testing data from the Diamond Princess cruise ship estimated that 18% of the passengers who tested positive (the majority were elderly) were asymptomatic.[34] The proportion of asymptomatic carriage is likely to be higher in a younger population. Unlike SARS-CoV which was most infectious approximately one week after symptom onset, the most infectious period for SARS-CoV-2 is the 48 hours prior to onset of symptoms and the day of symptom onset.[35] It is estimated that 44% of infections are transmitted prior to the onset of symptoms in the index case.[35] This has significant implications for community transmission.

Several risk factors, other than advanced age, have been found to be associated with severe disease and death. These include; male sex and co-morbidities including diabetes, cardiovascular disease, hypertension, respiratory disease and immunosuppression.[24, 36, 37] The laboratory findings associated with an increased risk of severe disease and death were; leucocytosis, lymphopenia, elevated liver enzymes, elevated inflammatory markers, elevated D-dimer, elevated troponin, eosinophilia and abnormal renal function.[24] It has been postulated that more severe cases of COVID-19 may be associated with hyperinflammatory syndrome characterised by a fulminant and fatal hypercytokinaemia (cytokine storm) causing multi-organ pathology.[24, 38]

Reports of non-respiratory manifestations of COVID-19 are increasingly being described. While pneumonia is still the most frequent serious manifestation, cardiomyopathy has been reported in one third of critically ill patients in the United States of America.[21] Approximately one third of hospitalised patients display neurological symptoms including headache, dizziness, agitation, delirium, ataxia and corticospinal tract signs.[39] Neurological symptoms are more common in those with severe respiratory disease.[22] Coagulopathies with thrombotic events and elevated phospholipid antibodies have also been described.[23]

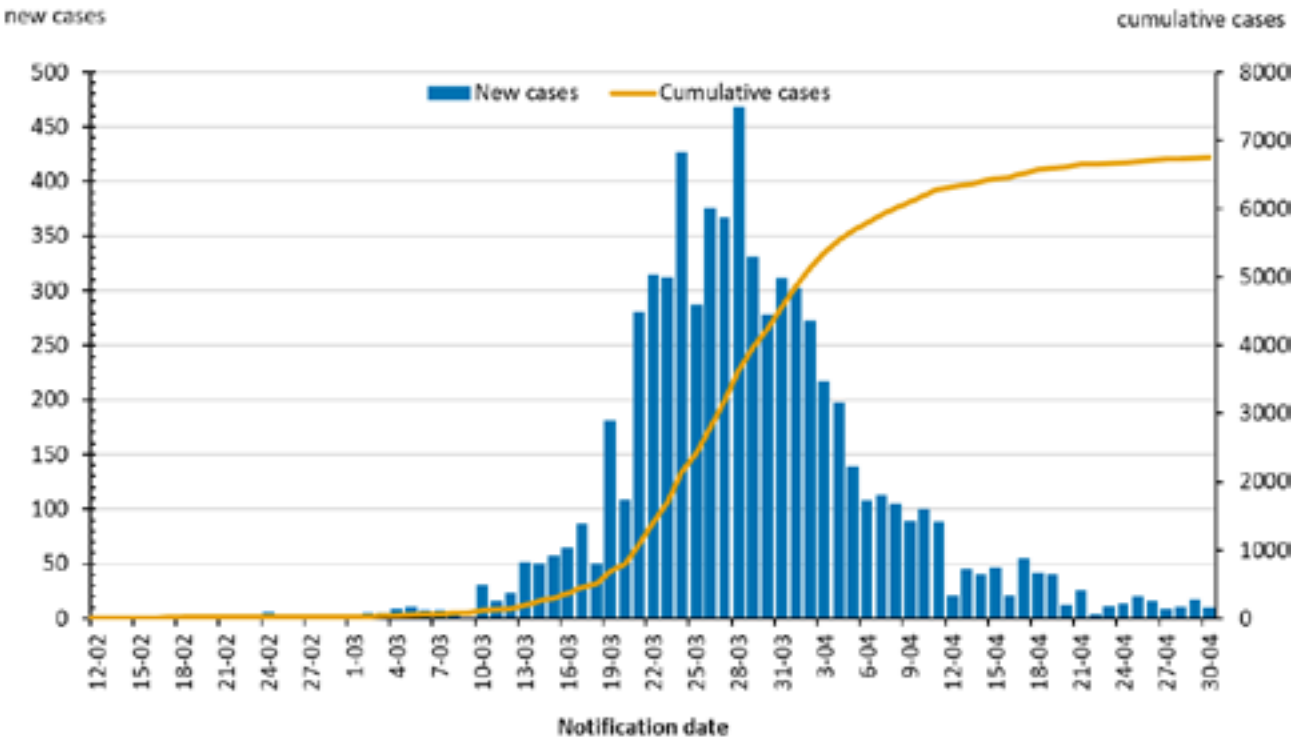
To date, there are no clinical data on possible long-term complications of COVID-19. Whether individuals who have been infected and "recovered" have residual organ damage, in particular respiratory or cardiac complications, is unknown at this time. The other current unknown is whether infection confers immunity to future infection and if so, how long that immunity lasts.

PREVENTION

Pre-emptive low-cost interventions such as enhanced hygiene and social distancing measures reduce numbers of cases through several mechanisms. Social distancing decreases the risk of transmission by reducing incidence of contact while enhanced hygiene reduces disease transmission, if a contact occurs.[40] Education of the public and enhanced medical resources have also been shown to reduce transmission.[40-42]

The Australian Governor-General declared a 'human biosecurity emergency period' on 18 March 2020 in response to the risks posed by COVID-19.[43] This empowered the Australian Government to make a series of decisions including prohibition of cruise ships, travel bans (domestic and international), limiting gatherings to two persons (with exceptions for people of the same household and other select groups), and closing a range of indoor and outdoor public facilities.[44] After peaking in Australia in mid to late March 2020, the number of daily new cases of COVID-19 began to drop in response to strict containment interventions (Figure 3).

Figure 3. New and cumulative confirmed COVID-19 cases by notification date in Australia.[16]



TESTING

In Australia, indications for conducting testing for COVID-19 have changed over the course of the pandemic, as case definitions have evolved, and testing kits have become more available.[45, 46] Testing availability was initially limited to patients with relevant symptoms who were returned overseas travellers or known contacts of a COVID-19 case. Testing criteria have now broadened gradually, and doctors should refer to current local health guidelines.[45]

There are currently two main types of tests available for SARS-CoV-2:

— Nucleic acid detection tests: commonly referred to as polymerase chain reaction (PCR) tests detects SARS-CoV-2 genetic material.

— Serology tests: detect antibodies produced by the patient against SARS-CoV-2

The preferred test to confirm the diagnosis of COVID-19 is PCR testing of nasopharyngeal and/or throat swabs, combined with relevant clinical findings. Despite the potential for faecal-oral transmission, [19, 20] the role of faecal PCR testing remains unclear.

The absence of SARS-CoV-2 on a PCR test on a single occasion is insufficient to definitively rule out COVID-19 infection. Public Health Authorities in Australia have recommended using multiple samples over multiple days in those whose symptoms are strongly suggestive of COVID-19.[46, 47] In general, PCR tests for other respiratory viral infections tend to have a high sensitivity and specificity, although there is limited data specific to COVID-19.

Serology tests are available, including Point of Care (PoC) serology tests that can provide results from venous or finger prick samples in 15-30 minutes.[45, 48] It is likely that antibodies take 5–10 days to become detectable after infection, and around 30% of patients may not produce detectable levels at all.[49] At present the sensitivity and specificity for serology testing is not well known. In addition to false negatives, false positives may arise from exposure to other coronavirus strains. As serology is testing antibodies and not the presence of the virus, it does not provide clinically useful information as to whether a patient could be infectious.[45] It should not be assumed that the presence of antibodies confers immunity against SARS-CoV-2.[50]

Given asymptomatic transmission of SARS-CoV-2,[51] there may be a role for screening for COVID-19 with PCR in asymptomatic groups in higher risk situations, for example where social distancing measures are logistically difficult to implement.[52]

MANAGEMENT

The aims of infectious disease management must be to optimise the health of the individual as well as to mitigate subsequent risk within the wider community. The focus for individual medical management after clinical assessment is to provide supportive care, optimise the management of any co-morbid conditions and provide regular clinical monitoring for deterioration or the development of a secondary bacterial infection. Most patients (approximately 80%) will have mild clinical symptoms. Many patients can be managed by isolation at home if they are appropriately monitored and counselled on signs/symptoms that should prompt further medical assessment, with a plan for how to seek assessment.[53-55] Patients should be monitored particularly closely 5–8 days post symptom onset, as this is when progression to severe illness is most common.

Patients with more severe symptoms and signs such as dyspnoea, tachypnoea, hypoxaemia, hypotension, altered mental state or extensive pulmonary infiltrates on chest imaging should be managed as an inpatient.[30, 53-56] Inpatient management focuses on supportive care and may include measures such as supplemental oxygen and breathing manoeuvres. For severe cases with ARDS, intubation and mechanical ventilation may be indicated.[54-56]

Off label use of medications such as remdesivir, lopinavir/ritonavir, hydroxychloroquine, azithromycin, corticosteroids and IL-6 inhibitors have been described.[57] At present, these medication options should only be considered if they are part of a recognised clinical trial or after discussion with an infectious disease specialist.

Other novel therapies such as convalescent serum from recovered patients is also being actively researched.[53] Therapeutic use exemptions would likely be required for athletes as the provision of convalescent serum would be in breach of the World Anti-Doping Agency guidelines as it includes the administration of a blood product.

PANDEMIC IMPACTS ON SPORT

Preventative measures taken in Australia and other countries, while required to limit the spread of COVID-19, have impacted upon a range of work and social pursuits including sport activities. The ability to hold sporting events at both the community and professional level became increasingly untenable as a result of the necessary government restrictions and a growing community expectation that all sections of society should cease travel and contact activities for the greater good. On 24 March 2020, the International Olympic Committee, the International Paralympic Committee and the Japanese Government formally announced a rescheduling of the Tokyo 2020 Olympic and Paralympic Games (Figure 4) 'to safeguard the health of the athletes, everybody involved in the Olympic Games and the international community'.[58, 59]

In Australia, from mid to late March 2020 there was a progressive and rapid increase in the number of COVID-19 cases. There was a corresponding escalation of restrictions put in place by the Federal and State/Territory Governments. Many sport organisations (e.g. Australian Football League, Cricket Australia, Netball Australia, National Rugby League) had initially closed the door to spectators while matches continued to TV audiences only. From 22 March 2020, most State/Territory governments advised against non-essential interstate travel, which impacted several sporting bodies and codes.
The Australian Institute of Sport and the National Institutes Network recommended the closure of all non-essential services within the National Institute Network from 24 March 2020 (Figure 4).[60]

There is contested uncertainty about the likely course of the pandemic and the resulting timelines for safe return to training and competition. In professional sport, loss of revenue from sponsorship, gate-takings and broadcast deals has resulted in job losses and reappraisal of operational imperatives.[61] It is unclear what long-term effects there will be on other factors such as fan engagement, sport participation, employment in the sport industry and athlete/staff welfare. Global and national economic conditions will also have repercussions for sport.

Figure 4. Timeline of COVID-19 pandemics impact on sport

KEY: GENERAL COVID INFORMATION SPORT-SPECIFIC EVENTS GLOBAL DEATHS/CASE NUMBERS

JAN 2020

12- 30 JAN 2020

WHO first reported a cluster of cases in Wuhan, Hubeiin Province, People's Republic of China

Australian Federal Government list 'human coronavirus with pandemic potential' in the Listed Human Disease under the Biosecurity Act 2015, enabling the use of enhanced border measures.

WHO declared COVID-19 as a global health emergency

FEB 2020

19 FEB 2020

Champions League match between Atalanta and Valencia "Game Zero" attended by >40,000 fans in Italy

MAR 2020

1 MARCH 2020

Global COVID-19 cases >88,500 and >3,000 deaths

2 MARCH 2020

First cases of community transmission of COVID-19 in Australia

2 MARCH 2020

Australian Women's National Basketball League (WNBL finals)

7 MARCH 2020

Global COVID-19 cases >100,000 in 100 countries

8 MARCH 2020

International Cricket Council (ICC) Women's T20 World Cup final

11 MARCH 2020

WHO declared COVID-19 as a global pandemic

11 MARCH 2020

National Basketball Association (NBA) in the United States of America suspended season

12 MARCH 2020

Cancellation of Australian Grand Prix

12 MARCH 2020

Australia's ODI series with New Zealand to be played behind closed doors

13 MARCH 2020

Europe becomes epicentre of the COV-19 pandemic

13 MARCH 2020

Global COVID-19 cases >145,400 and >5,400 deaths

13 MARCH 2020

Suspension of English Premier league

13 MARCH 2020

Cricket Australia postponed the Women's tour of South Africa

14 MARCH 2020

New Zealand Government impose mandatory 14-day self-isolation for all returning travellers

14 MARCH 2020

Cricket Australia postponed Men's ODI series with New Zealand

15 MARCH 2020

International Super Rugby season (played in Australia and New Zealand) suspended

15 MARCH 2020

Cricket Australia postponed domestic competition

15 MARCH 2020

Football Federation Australia announce A-league to be played behind closed doors

16 MARCH 2020

Australian Federal Government impose mandatory 14-day self-isolation for all returning travellers

16 MARCH 2020

Football Federation Australia (FFA) announced condensed A-league season with games played on three-day turnarounds

18 MARCH 2020

The Union of European Football Associations (UAEFA) announced postponement of Euro 2020

18 MARCH 2020

The South American Football Confederation (CONMEBOL) announced postponement of Copa America 2020

18 MARCH 2020

Australian Federal Government impose a limit of < 100 people for non-essential indoor gatherings and <500 people for outdoor gatherings, and call to limit non-essential domestic travel

18 MARCH 2020

Netball Australia announce postponement of community netball

19 MARCH 2020

Ruby Princess cruise ship docked in Sydney Harbour

19 MARCH 2020

Men's National Basketball League (NBL) season cancelled

20 – 22 MARCH 2020

Australian Federal Government border closure to all non-citizens and non-residents

Australian Federal Government impose mandatory 14-day self-isolation for all returning travellers

22 MARCH 2020

Most Australian State/Territory governments advised against non-essential interstate travel

22 MARCH 2020

Australian Football League AFL announce postponement of 2020 season (men's)

23 MARCH 2020

WHO and the Fédération Internationale de Football (FIFA) launched the "Pass the message to kick out coronavirus" campaign

23 MARCH 2020

Australian Olympic Committee (AOC) announce plans for postponed Olympic Games

23 MARCH 2020

FFA postponement of A-league

23 MARCH 2020

National Rugby League (NRL) announce postponement of 2020 season

23 MARCH 2020

Postponement of Australian Super Rugby 2020 domestic season

Rugby Australia stand down teems to commence 4 weeks annual leave

23 MARCH 2020

Netball Australia announce postponement of Super Netball season (due to start May 2) and Australian Netball League seasons

24 MARCH 2020

Australian Federal Government impose a ban on all overseas travel 'level 4 – do not travel', highest travel advice level (level 4 of 4)

24 MARCH 2020

Global COVID-19 cases >423,100 and >19,000 deaths

24 MARCH 2020

The Australian Institute of Sport (AIS) National Institute Network (NIN) Directors, AOC and Paralympics Australia recommended the closure of all non-essential services within NIN

24 MARCH 2020

The International Olympic Committee (IOC), International Paralympic Committee (IPC), Tokyo2020 Organising Committee and Tokyo Metropolitan Government announce postponement of Tokyo 2020 Olympic Games

27 MARCH 2020

AFL announce players agree to 'pay-cut deal'

27 MARCH 2020

Super Netball players agree to 70% pay cut for 5 weeks

28 MARCH 2020

Australian Federal Government impose mandatory 14 day supervised self-isolation at designated facilities (e.g. a hotel) for all returning international travellers

APR 2020

3 APRIL 2020

Global COVID-19 cases >1,117,200 and >60,600 deaths

3 APRIL 2020

NRL players and executives agree to 70% pay cut

6 APRIL 2020

WHO launches #BeActive campaign with FIFA

16 APRIL 2020

Cricket Australia announce staff cutbacks with 80% pay cut

30 APRIL 2020

Global COVID-19 cases >3,230,400 and >228,300 deaths

FRAMEWORK FOR RESUMPTION OF COMMUNITY AND INDIVIDUAL SPORT

Sport plays a vital role in the lives of Australians with 3 million children and 8.4 million adults participating in sport and enjoying the associated improvements in health and well-being. At a population level, there are financial, educational and social benefits.[3, 62] The COVID-19 pandemic has impacted people in varying ways with many experiencing deteriorations in mental health.[4, 5] The resumption of community and individual sport can significantly contribute to the re-establishment of normality in Australian society.

All community and individual sport participants, parents/guardians of participants, coaches, spectators, officials and volunteers (collectively termed community sport members) and sport organisations must play a role to help slow the spread of COVID-19. The safe reintroduction of community and individual sport requires thorough planning and safe implementation. Community and individual sport activities should be reintroduced in a cautious and methodical manner, based on the best available evidence to optimise athlete and community safety (the '**how**') is described below. Federal, State/Territory and/or Local Public Health Authorities **must** be closely consulted in decisions regarding the resumption of community and individual sport activities (the '**when**'). All individuals and community sport clubs **must** follow directions of the Local Public Health Authorities.

Preparation for community and individual sport resumption

Prior to the resumption of community sport, it is important for sports clubs/groups to safely prepare the sporting environment. A thorough risk assessment must be carried out and preparation will be specific to the sporting environment. A resumption of sport activity should not occur until appropriate measures are implemented to ensure safety of community sport members.

Education

Education of community sport members about COVID-19 risk mitigation strategies is crucial. Some established norms associated with community sport from sharing drink bottles, hugging and shaking hands to arenas packed with spectators are the antithesis of social distancing. Education will help to promote and set expectations for the required behaviours prior to recommencing activities. Improved health literacy including awareness of self-monitoring of respiratory symptoms (even if mild). Community sports may benefit from consulting with local Government and Public Health Authorities on education materials and options available.

Possible education measures include:

— Provide education material for community sport members to promote required behaviours (e.g. regular and thorough handwashing, covering mouth and nose with a tissue or sleeve during coughing/sneezing). Suggested Australian Government and WHO resources:
  - Good hygiene for coronavirus (COVID-19)
  - Hand washing guidance
  - Keep that cough under cover
  - Self-isolation (self-quarantine) for coronavirus (COVID-19)
  - Advice for people at risk of coronavirus (COVID-19)
  - Coronavirus (COVID-19) resources

— Display appropriate education material within sporting environments and facilities. Suggested Australian Government and WHO resources:
  - Good hygiene practices poster for businesses
  - Good hygiene is in your hands
  - Hand washing guidance
  - Keep that cough under cover

— Education of community sport members on hygiene practices and promote required behaviours relevant to their sport and environment.
  - No sharing of drink bottles and towels.
  - No sharing of mats, or equipment without an appropriate cleaning protocol, in between training sessions

— Recommend community sport members download the Australian Government COVID-19 contact tracing app (COVIDSafe).

Preparation of training/competition environments

The specific considerations for a safe resumption of community sport will be dependent on the sport and the environment. Considerations include:

— Anticipated number of community sport members
- What training can still be adequately be done from home?
- How can training be staggered to minimise numbers and reduce contact?
- How can the numbers at training and competitions be managed to maintain some social distancing?
- Modifying training and competition times so that there are less people present at one time.

— Cleaning
- What sporting equipment will athletes be sharing?
  - > Balls
  - > Training equipment (e.g. skipping ropes, weights, mats)
- What are the shared facilities?
  - > Bathrooms/change rooms and kitchens
  - > What is the protocol and frequency of cleaning shared facilities?
- Suggested Government resources for environmental cleaning and disinfection principles
  - > In a healthcare setting
  - > Routine household cleaning

— Handwashing facilities
- Are there any facilities to regularly wash hands?
- How many sanitising hand rub dispensers are required in prominent places around the facility/event?
  - > How often should they be refilled?

— '**Get in, train and get out**'. Strategies to limit time and person-to-person contact on site should be implemented
- Arrive dressed and ready to train
- Minimise use of change rooms, bathrooms and communal areas
- Where possible, community sport members showering at home instead of at training venues
- community sport members should eat off site
- Between training efforts, maintain at least 1.5m apart (e.g. in the gym, pool, between sets or efforts)
- Any tasks that can be done at home, should be done at home (e.g. recovery sessions, online meetings).

— Organisation of community sporting activities
- What spaces can be used for isolation if an athlete/other personnel becomes unwell?
- What is the strategy to ensure that social distancing of at least 1.5m is maintained by community sport members attending training or competition?
- What strategies can be used to communicate/inform community sport members of preventive actions?
- What is the strategy to reduce in-person contact between athletes and other personnel?
- What is the strategy to manage increased levels of staff/volunteer absences?
- What is the strategy to reduce risk to vulnerable groups?

Proposed criteria for resumption of sporting activity

Initial resumption of community and individual sport will be governed by public health policy and Federal, State/Territory Government directives. It is worth noting that different States/Territories may permit the resumption of some sporting activities at different times, dependent on local COVID-19 transmission, resources and other variables influencing local policy. Even within a State/Territory there could be geographical variability. All community sporting organisations must ensure that the activities undertaken in training and competition are consistent with the applicable guidance from Local Public Health Authorities. Resumption of sporting activity may not be linear. Relaxing/increasing restrictions may be required in response to fluctuating numbers of COVID-19 cases.

An initial resumption of sporting activity is dependent on several factors:

— A sustained decrease in COVID-19 transmission

— Healthcare system capacity

— Community sport clubs/groups and individuals making their own risk assessment guided by their Local Public Health Authorities (i.e. community sports clubs and individuals cannot restart sport before permitted by Local Public Health Authorities but may decide to delay a restart due to their own circumstances/risk assessment).

Three levels (Levels A, B, C) of sporting activities are recommended in the context of a COVID-19 environment (Table 1). For each level, permitted activities, general hygiene measures, and spectators, additional personnel considerations are provided as recommendations for community and individuals sport before the resumption of community or individual sport. A more detailed description of the sport-specific activities has been developed in conjunction with medical staff working within sport (See Appendix A).

Table 1. Description of recommendations for Level A, B, C activities in community and individual sport

All Sports	Level A	Level B	Level C
General description	Activity that can be conducted by a solo athlete or by pairs where at least 1.5m can always be maintained between participants. No contact between athletes and/or other personnel. Examples for all sports - general fitness aerobic and anaerobic (e.g. running, cycling sprints, hills). Strength and sport-specific training permitted if no equipment required, or have access to own equipment (e.g. ergometer, weights). Online coaching and resources (e.g. videos, play books).	As per Level A plus: Indoor/outdoor activity that can be conducted in small groups (not more than 10 athletes and/or other personnel in total) and with adequate spacing (1 person per $4m^2$). Some sharing of sporting equipment permitted such as kicking a football, hitting a tennis ball, use of a skipping rope, weights, mats. Non-contact skills training. Accidental contact may occur but no deliberate body contact drills. No wrestling, holding, tackling or binding. Commercial gyms, bootcamps, yoga, Pilates, dance classes (e.g. barre, ballet, hip hop, not partnered), cycling 'spin' classes permitted if other measures (above) are met.	As per Level B plus: Full sporting activity that can be conducted in groups of any size including full contact (competition, tournaments, matches). Wrestling, holding, tackling and/or binding (e.g. rugby scrums) permitted. For larger team sports, consider maintaining some small group separation at training. For some athletes full training will be restricted by commercial operation of facilities.
General hygiene measures	No sharing of exercise equipment or communal facilities. Apply personal hygiene measures even when training away from group facilities - hand hygiene regularly during training (hand sanitisers) plus strictly pre and post training. Do not share drink bottles or towels. Do not attend training if unwell (contact doctor). Spitting and clearing of nasal/respiratory secretions on ovals or other sport settings must be strongly discouraged.	Communal facilities can be used after a sport-specific structured risk assessment and mitigation process is undertaken. 'Get in, train and get out' – be prepared for training prior to arrival at venue (minimise need to use/gather in change rooms, bathrooms). Minimise use of communal facilities (e.g. gym, court) with limited numbers (not more than 10 athletes/other personnel in total). Have cleaning protocols in place for equipment and facilities. Hand hygiene (hand sanitisers) on entry and exit to venues, as well as pre, post and during training. Thorough full body shower with soap before and after training (preferably at home). Where possible maintain distance of at least 1.5m while training. No socialising or group meals.	Return to full use of sporting facilities. Continue hygiene and cleaning measures as per Level B. If any massage beds are being used, hygiene practices should include no bed linen except single use towels. Cleaning of treatment beds and key surfaces should occur before and after each athlete treatment. Appropriate hand hygiene before and after each treatment. Limit unnecessary social gatherings.
Spectators, additional personnel	No spectators unless required (e.g. parent or carer).	Separate spectators from athletes. Spectators should maintain social distancing of at least 1.5m.	Minimum contact of non-essential surfaces to occur and hands on treatment should be kept to essential only. Non-essential personnel should be discouraged from entering change rooms.

General considerations:

- Change rooms, surfaces and objects in other relevant spaces should be cleaned between exercise sessions/matches with disinfectant
- '**Get in, train and get out**'. Athletes should prepare for exercise at home, to minimise need to congregate in change rooms/sporting facilities. Athletes should get dressed to train/compete at home and shower at home on completion
- Any tasks that can be done at home, should be done at home (e.g. recovery sessions, online meetings)
- When practical, athletes and other personnel should maintain social distancing of at least 1.5m (e.g. between training drills/efforts)
- There should be no unnecessary body contact (e.g. hand shaking, high fives)
- Community sport organisations should minimise unnecessary huddles of spectators. Spectators should be encouraged or directed to spread out and maintain social distance
- Consideration should be given as to whether it is appropriate to serve food and drink at community events, as this will likely encourage spectators to come into close proximity with each other
- Hand hygiene stations should be placed in high traffic areas and entry/exit points.

The timing of progression between levels will be influenced by any evidence of transmission issues within the local community or sporting cohort.

Return to community and individual sport

Community sport members and individuals should not return to sport if in the last 14 days they have been unwell or had close contact with a known or suspected case of COVID-19. In an environment of community transmission of COVID-19, any individual with respiratory symptoms (cough, sore throat, fever or shortness of breath), even if mild, should be considered a possible case of COVID-19. All community sport members must be made aware not to attend sport environments if they are unwell and should use a cautious approach. Anyone who is unwell should be referred to a doctor in accordance with local Public Health Authority guidelines. An athlete with a possible case of COVID-19 should refrain from training (even at home) until they have been cleared to do so by a doctor, given the potential for worsening illness.

It should also be considered that anyone returning to sport and exercise after a period of social isolation and not exercising regularly may be at an increased risk of injury. Clubs and individuals should apply a graded return to mitigate injury risk, understanding that sudden increase in training load will predispose to injury.[63]

Vulnerable groups

Vulnerable groups such as para-athletes and others with medical conditions may be at increased risk. Those with concomitant medical conditions need individualised management in consultation with their regular treating doctor(s) prior to return to training environments. Considerations include increased susceptibility to respiratory infections, unique equipment (e.g. wheelchairs) that requires cleaning, accessibility of medical resources, risk of medical sequalae from COVID-19, and access to alternate training options.

Athletes/other personnel with concurrent medical conditions including; respiratory or cardiac disease, hypertension, diabetes[64, 65], obesity[29] and immunosuppression due to disease or medication may be at increased risk. Other groups that require special consideration include; individuals over 70 years of age, carers for or a household contact of a vulnerable person, athletes with suboptimal access to medical care (e.g. remote) and Aboriginal and Torres Strait Islander Communities.

Potential interventions for vulnerable athletes/other personnel include:

- Delaying a return to sport
- Training scheduled at designated 'lower risk' times (i.e. with no one else around)
- Staff working off-site where possible
- Maintaining social distancing measures
- Exclusion of 'high risk' athletes/other personnel from the training environment.

Returning to sport after recovering from COVID-19

There are two separate points to consider for athletes/other personnel who have been infected with COVID-19, prior to returning to sport:

— Ensure they no longer pose any infection risk to their community and

— Ensure they have sufficiently recovered to safely participate in exercise (specifically for athletes/other personnel undertaking physical roles).

In both instances, clearance from their doctor is required.

Athletes and other personnel who have recovered from COVID-19 must satisfy the Communicable Disease Network of Australia (CDNA) criteria to ensure they are no longer infectious.

While there is increasing research on the multi-organ nature of COVID-19 in the acute phase, there is currently limited research on medium to long-term complications. Long-term decreased exercise capacity has been noted following previous coronavirus infections (SARS and MERS).[66] Athletes and volunteers/officials with physical roles may be at increased risk of health complications after COVID-19 and warrant multidisciplinary specialist medical assessment before resuming high exertion activities.[67, 68] They should be instructed to see their local doctor for a full medical review. An outline of the recommended assessment process following a COVID-19 case is illustrated in Table 2.

Table 2. Organ systems affected by COVID-19 in the acute phase and recommended assessment considerations for athlete and other personnel returning to sport environment

Organ system	Acute complications associated with COVID-19	Potential implications for returning athletes/other personnel	Assessment and investigation considerations
Respiratory	Pneumonia- Lung abnormalities have been seen on CT chest of symptomatic and asymptomatic cases[32, 69, 70] ARDS[71]	Reduced aerobic capacity and increased respiratory distress. Potential persisting restrictive lung patterns and reduced diffusion capacity. These long-term respiratory complications been reported follow previous coronavirus epidemics (SARS, MERS) in non-athlete populations.[66]	Clinical assessment Graded exercise testing, VO_2 max testing FBE, CRP, spirometry, lung ultrasound, chest x-ray, CT chest Respiratory review
Cardiovascular	Cardiomyopathy[21] Myocarditis[72] Pericardial effusion[73] Arrythmias[19, 72] Autoimmune mimicry of vasculitis and thrombosis[23, 74]	A return to exercise with underlying cardiac complications could be contraindicated for some.[67] Return to contact sports/trauma could be contraindicated for some. Persisting inflammatory states.	Clinical assessment 12-lead ECG, troponins, coagulation profile, CRP, echocardiogram, cardiac MRI D-dimer, ferritin, C-reactive protein, erythrocyte sedimentary rate Cardiology review
Neurological	Multiple symptoms and signs have been described.[39] Guillain–Barré syndrome[75] Elevated D-dimer [76, 77] Stroke[78] Encephalopathy[79]	Currently unclear as the neurological sequalae from mild to moderate cases is yet to be elucidated. Post intensive care syndrome	Clinical assessment FBE, D-dimer, MRI brain Neurology review
Gastrointestinal / hepatic	Deranged liver function tests (LFTs)[80] Some acute COVID-19 cases present with gastrointestinal and respiratory symptoms.	Consider COVID-19 in patients presenting with combined respiratory and gastrointestinal symptoms.[80] Increased risk from hepatically excreted medications.	Clinical assessment LFTs Gastroenterology review
Renal	Acute renal impairment[81]	Persistent subclinical renal impairment could be a risk on returning to high intensity training.	Clinical assessment. UECs, urine dipstick/specific gravity Renal review
Fatigue	Commonly associated with viremia	Post-viral fatigue is known to occur following other viral infections[82] and may occur with COVID-19.	Monitoring of self-report measures, fatigue symptoms and training loads.
Mental health	Symptoms of depression and anxiety[4] Both were more common in patients with less social support[5]	Potential increased risk of post-traumatic stress disorder (PTSD), depression, anxiety.[67] Persistent depression and anxiety have been reported following previous coronavirus epidemics in non-athletic populations.	Clinical assessment Screening questionnaires Psychology review and psychiatrist review

‘RETURN TO WORK’ FRAMEWORK FOR HIGH PERFORMANCE/PROFESSIONAL ATHLETES

Australia has enjoyed many benefits as a result of a rich sporting culture. At high performance level, Australia also has an exceptional track record – in 2016, there were 25 reigning Australian World Champions (individuals and teams).[1] High performance/professional athletes are ‘returning to work’ and safe resumption of sport in a COVID-19 environment will be a complex process. The AIS Framework provide minimum baseline of standards for ‘**how**’ high performance/professional sport activities can be reintroduced based on the best available evidence to ensure the safety of athletes/other personnel and the wider community (Figure 5). Federal, State/Territory and/or Local Public Health Authorities **must** be closely consulted in decisions regarding the resumption of (‘**when**’) high performance/professional sport activities. All individuals and sport organisations **must** follow directions of the Local Public Health Authorities.

Figure 5. Framework for resumption of sport in a COVID-19 environment.

Preparation for sports resumption

- Education
- Assessment of training environment
- Agreed protocol for a possible case of COVID-19

Proposed criteria for resumption of sporting activities

- Level A, B, C sporting activities

Assessment of athletes/ other personnel prior to resumption of formal training activity

- Athletes/staff returning to training after COVID-19 infection
- Vulnerable groups

Ongoing management

- Monitoring athletes/ other personnel
- Managing a suspected COVID-19 case
- Managing a confirmed COVID-19 case

Preparation for sports resumption

Prior to a resumption of formal training activity, individual sport organisations and CMOs should begin preparing athletes, other personnel, and the sporting environment for a safe return. A thorough risk assessment must be carried out. A resumption of formal training should not occur until appropriate measures are implemented. The required measures will be specific to the sport and the training environment.

Education

To reduce the risk of COVID-19, education of athletes and other personnel about risk mitigation strategies is crucial. It should not be presumed that athletes and other personnel have an accurate appreciation of the health risks. Education will help to promote and set expectations for the required behaviours prior to recommencing activities. A structured process to improve health literacy around COVID-19.

Possible education measures include:

- Mandatory completion of Australian Government COVID-19 infection control training module for all medical staff. This is designed for doctors, nurses and allied health personnel working in a medical/health setting. Click here to register.
    - The module completion certificate should be a requirement for relevant support staff before returning on site to training facilities
- Provide education material for athletes and other personnel to promote required behaviours (e.g. regular and thorough handwashing, covering mouth and nose with a tissue or sleeve during coughing/sneezing). Suggested Australian Government and WHO resources:
    - Good hygiene for coronavirus (COVID-19)
    - Hand washing guidance
    - Keep that cough under cover
    - Self-isolation (self-quarantine) for coronavirus (COVID-19)
    - Advice for people at risk of coronavirus (COVID-19)
    - Coronavirus (COVID-19) resources
- Display appropriate education material within sporting environments and facilities. Suggested Australian Government and WHO resources:
    - Good hygiene practices poster for businesses
    - Good hygiene is in your hands
    - Hand washing guidance
    - Keep that cough under cover
- Education of high performance/professional athletes and other personnel on hygiene practices and promote required behaviours relevant to their sport and environment.
    - No sharing of drink bottles and towels.
    - No sharing of mats, or equipment without an appropriate cleaning protocol, in between training sessions
- Recommend high performance/professional athletes and other personnel download the Australian Government COVID-19 contact tracking app (COVIDSafe), to reduce the risk of COVID-19 spread to the community and/or sport.

Assessment of training environment

The specific considerations for a safe resumption of formal training will be dependent on the sport and the environment. Considerations are:

- Number of athletes and other personnel
  - What training can still be adequately be done from home?
  - How can training be staggered to minimise numbers and reduce contact?
  - What staff can continue to work from home?
- Cleaning
  - What sporting equipment will athletes be sharing?
    - > Gymnastics apparatus
    - > Balls
    - > Training equipment (e.g. skipping ropes, weights, mats)
  - What are the shared facilities?
    - > Bathrooms/change rooms
    - > Recovery areas
    - > Medical and physical therapy beds and equipment
    - > Swimming pools
  - What is the protocol and frequency of cleaning shared facilities?
    - > Suggested Government resources for environmental cleaning and disinfection principles in a healthcare setting
- Handwashing facilities
  - Are there any facilities to regularly wash hands?
  - How many sanitising hand rub dispensers are required in prominent places around the facility/event?
    - > How often should they be refilled?
- '**Get in, train and get out**'. Strategies to limit time and person-to-person contact on site should be implemented
  - Arrive dressed and ready to train
  - Minimise use of change rooms, bathrooms and communal areas
  - Where possible, athletes showering at home instead of at training venues
  - Athletes/other personnel should eat off site
  - Between training efforts, maintain at least 1.5m apart (e.g. in the gym, pool, between sets or efforts)
  - Any tasks that can be done at home, should be done at home (e.g. recovery sessions, online meetings).
- Organisation of high performance/professional sporting activities
  - What spaces can be used for isolation if athlete or other personnel becomes unwell?
  - What is the strategy to ensure that social distancing of at least 1.5m is maintained by athletes and other professionals attending training or competition?
  - What strategies can be used to communicate/inform athletes and other personnel of preventive actions?
  - What is the strategy to reduce in-person contact between athletes and other personnel?
  - What is the strategy to manage increased levels of staff absences?
  - What is the strategy to reduce risk to vulnerable groups?

Agreed protocol for a possible case of COVID-19

In an environment of community transmission of COVID-19, any individual with respiratory symptoms should be considered a possible case of COVID-19. Sporting organisations must have a clear protocol for managing unwell athlete/other personnel as a potential COVID-19 case until COVID-19 has been excluded and they have been medically cleared by a doctor to return to the training environment. All athletes/other personnel must be made aware not to attend sport environments if they are unwell with any of the following symptoms, even if only mild:

— Cough

— Sore throat

— Fever (e.g. night sweats or chills)

— Shortness of breath

Sport organisations should refer to local State/Territory guidelines on the assessment process for a possible case. A doctor must make decisions about investigations, treatment, and management. Unwell athletes/other personnel must always call ahead before attending for assessment. Importantly, an athlete with a possible respiratory tract infection should refrain from training (even at home) until they have been cleared to do so by a doctor, given the potential for worsening illness. Successful implementation of the management plan includes effective communication to ensure athletes/other personnel understand the importance and implications.

Proposed criteria for resumption of sporting activity

Initial resumption of sporting activity will be governed by public health policy and Federal, State/Territory Government directives. It is worth noting that different States/Territories may permit the resumption of some sporting activities at different times, dependent on local COVID-19 transmission, resources and other variables influencing local policy. Even within a State/Territory there could be geographical variability. Outbreaks or clusters may result in a local shutdown (e.g. ring fence). Resumption of sporting activity may not be linear. Relaxing/increasing restrictions may be required in response to fluctuating numbers of COVID-19 cases.

An initial resumption of sporting activity is dependent on several factors:

— A sustained decrease in COVID-19 transmission

— Healthcare system capacity

— Individual circumstances of sports organisation and risk assessment.

Three levels (Levels A, B, C) of sporting activities are recommended in the context of a COVID-19 environment (Table 3). For each level, permitted activities, general hygiene measures, and medical servicing considerations are provided as minimum baseline of standards required to be met by high performance/professional sport before the resumption of training and competition. A more detailed description of the sport-specific activities has been developed in conjunction with medical staff working within sport (See Appendix B).

The timing of progression between levels will be influenced by any evidence of transmission issues within the local community or sporting cohort.

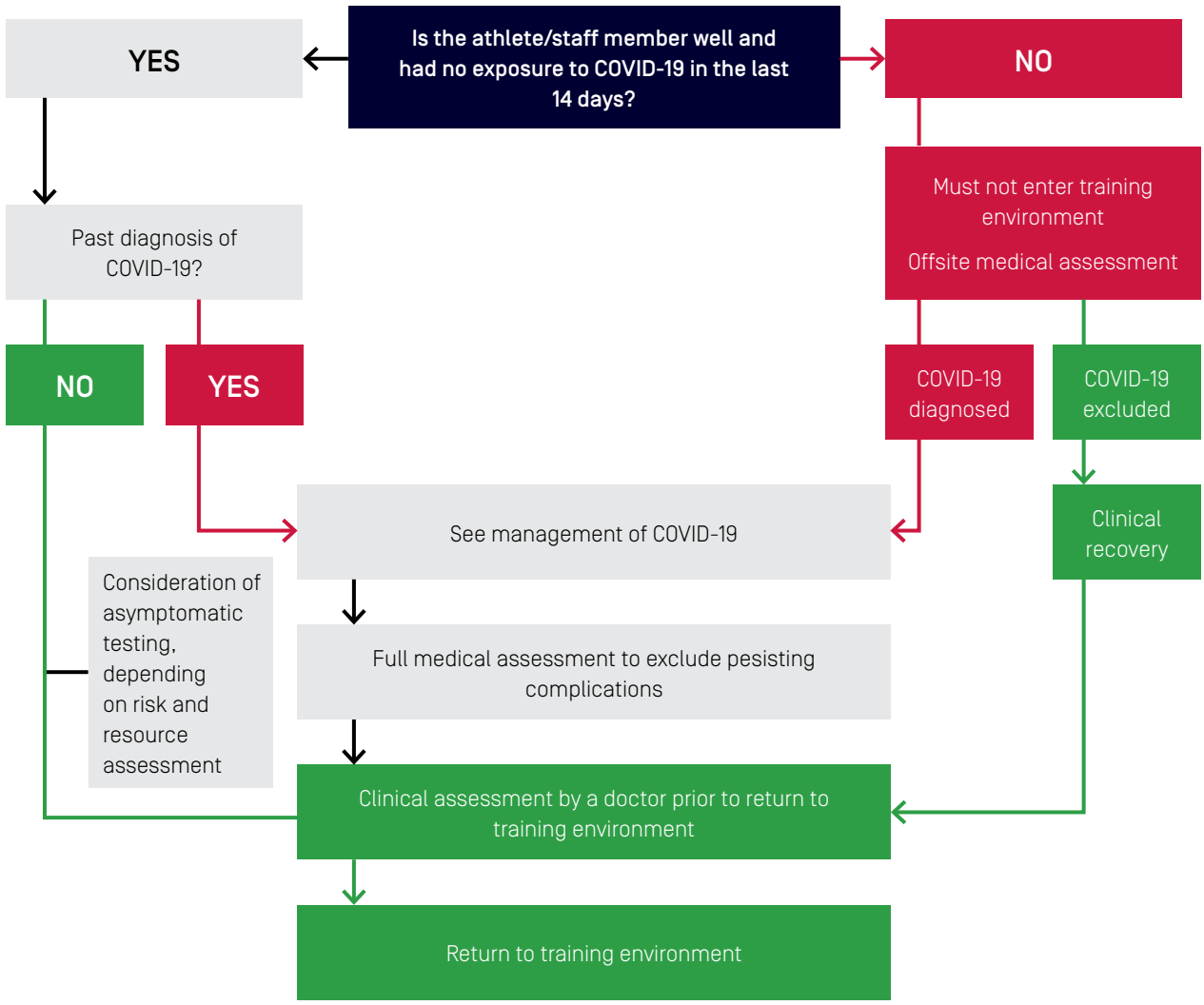
Table 3. Description of minimum baseline of standards for Level A, B, C activities for high performance/professional sport

All Sports	Level A	Level B	Level C
General description	Activity that can be conducted by a solo athlete or by pairs where at least 1.5m can always be maintained between participants. No contact between athletes and/or other personnel. Examples for all sports - general fitness aerobic and anaerobic (e.g. running, cycling sprints, hills). Strength and sport-specific training permitted if no equipment required, or have access to own equipment (e.g. ergometer, weights). Online coaching and resources (e.g. videos, play books).	As per Level A plus: Indoor/outdoor activity that can be conducted in small groups (not more than 10 athletes and/or other personnel in total) and with adequate spacing (1 person per $4m^2$). Some sharing of sporting equipment permitted such as kicking a football, hitting a tennis ball, use of a skipping rope, weights, mats. Non-contact skills training. Accidental contact may occur but no deliberate body-contact drills. No wrestling, holding, tackling or binding.	As per Level B plus: Full sporting activity that can be conducted in groups of any size including full contact (competition, tournaments, matches). Wrestling, holding, tackling and/or binding (e.g. rugby scrums) permitted. For larger team sports, consider maintaining some small group separation at training. For some athletes full training will be restricted by commercial operation of facilities and access to international travel.
General hygiene measures	No sharing of exercise equipment or communal facilities. Apply personal hygiene measures even when training away from group facilities – hand hygiene regularly during training (hand sanitisers) plus strictly pre and post training. Do not share drink bottles or towels. Do not attend training if unwell (contact doctor). Spitting and clearing of nasal/respiratory secretions on ovals or other sport settings must be strongly discouraged.	Communal facilities can be used after a sport-specific structured risk assessment and mitigation process is undertaken. '**Get in, train and get out**' - be prepared for training prior to arrival at venue (minimise need to use/gather in change rooms, bathrooms). Minimise use of communal facilities (e.g. gym, court) with limited numbers (not more than 10 athletes/staff in total). Have cleaning protocols in place for equipment and facilities. Hand hygiene (hand sanitisers) on entry and exit to venues, as well as pre, post and during training. Thorough full body shower with soap before and after training (preferably at home). Where possible maintain distance of at least 1.5m while training. No socialising or group meals.	Return to full use of training facilities. Continue hygiene and cleaning measures as per Level B. Limit unnecessary social gatherings.
Medical Servicing	All consultations undertaken via telehealth unless face to face is considered urgent Avoid all routine and non-essential manual therapy. Five Moments for Hand Hygiene must be used to minimise the risk of transmission between health professionals and patients. Hygiene practises to include no bed linen except single use towels, cleaning treatment beds and key surfaces after each athlete and hand hygiene. Minimum contact of non-essential surfaces to occur and hands on treatment should be kept to essential only.	History taking, or full consultations should be conducted via telehealth if practical. Face to face consults should be conducted from at least 1.5m apart when possible, and hands on treatment should be for essential conditions only. A single source therapist is recommended. During any essential manual therapy, it is recommended that the athlete and practitioner wear a face mask. All non-essential athletes and other personnel should avoid the treatment area, and the number of people in treatment areas should be kept to a minimum, following social distancing guidelines.	Full manual therapy services can be conducted. Non-essential athletes and other personnel should continue to avoid treatment areas. Enhanced hygiene measures and social distancing should be maintained.

Recommended assessment of athletes/staff prior to resumption of formal training

An athlete/staff member must not join the training environment if in the last 14 days they have been unwell or had contact with a known or suspected case of COVID-19. Sport organisations must be proactive and ensure all athletes/staff have been medically cleared prior to return to the training environment (Figure 6). Clearance and management procedures for those affected by COVID-19 must at all times comply and be aligned with the advice of Federal, State/Territory and/or Local Public Health Authorities. Any special arrangements for deviation from standard clearance and management procedures must be prospectively agreed to by relevant Federal, State/Territory and/or Local Public Health Authorities.

Figure 6. The recommended process for medical clearance of athletes/staff



The assessment process will depend on multiple factors including medical resources, athlete risk factors and sport-specific risk factors. It may be appropriate for an initial screening to be conducted via telehealth, with follow up examination and investigations as required. Clinical assessment could include:

- Clinical history to confirm absence of respiratory symptoms and relevant risk factors (e.g. exposure to known COVID-19 case)
- Physical examination including vital signs and systems review
- Blood tests including, but not limited to full blood examination (FBE), C-reactive protein (CRP) and ferritin
- PCR and/or antibody testing used as a screening tool in otherwise well individuals without any known risk factors will have extremely low yield in an environment of low COVID-19 prevalence
- In exceptional circumstances, sporting organisations could give consideration to PCR testing to detect asymptomatic carriage or antibody testing to identify prior exposure to SARS-CoV-2
- No PoC testing for COVID-19 (PCR or antibody) should be conducted without prior approval of the relevant Public Health Authority
- There is currently no evidence that people who have recovered from COVID-19 and have antibodies are protected from a second infection[50]
- A general musculoskeletal review, and counselling on the risk of injury if they have not been able to train during the social isolation period, given the known risk of injuries associated with sudden increase in training loads.[63]

Vulnerable groups

Vulnerable groups such as para-athletes and others with medical conditions may be at increased risk. Those with concomitant medical conditions need individualised management in consultation with their regular treating doctor(s) prior to return to training environments. Considerations include increased susceptibility to respiratory infections, unique equipment (e.g. wheelchairs) that requires cleaning, accessibility of medical resources, risk of medical sequalae from COVID-19, and access to alternate training options.

Athletes/other personnel with concurrent medical conditions including; respiratory or cardiac disease, hypertension, diabetes,[64, 65] obesity[29] and immunosuppression due to disease or medication may be at increased risk. Other groups that require special consideration include; individuals over 70 years of age, carers for or a household contact of a vulnerable person, athletes with suboptimal access to medical care (e.g. remote) and Aboriginal and Torres Strait Islander Communities.

Potential interventions for vulnerable athletes/other personnel include:

- Delaying a return to sport
- Training scheduled at designated 'lower risk' times (i.e. with no one else around)
- Staff working off-site where possible
- Maintaining social distancing measures
- Exclusion of 'high risk' athletes/other personnel from the training environment.

Athletes/staff returning to sport after COVID-19 infection

There will be athletes/other personnel who have been infected with COVID-19 wanting to return to the sport environment. Some individuals may have been infected and not be aware (asymptomatic or minimally symptomatic cases that did not meet testing criteria at the time of illness). Athletes/other personnel who have recovered from COVID-19 must satisfy the Communicable Disease Network of Australia (CDNA) criteria.

While there is growing research on the organ systems affected by COVID-19 in the acute phase, there is currently limited research on medium to long-term complications. Long-term decreased exercise capacity has been noted following previous coronavirus infections (SARS and MERS).[66] Athletes and other personnel with physical roles may be at increased risk of health complications after COVID-19 and warrant multidisciplinary specialist medical assessment before resuming high exertion activities.[67, 68] Medical clearance of staff may be conducted by the sport, or by external doctors, depending on the individual sport organisation resources and policies. An outline of the recommended assessment process following a COVID-19 case is illustrated in Table 2.

Ongoing management

Once training has resumed, it is important that a structured monitoring process is in place to ensure early detection of illness within the training group.

Monitoring of athletes/other personnel

Athletes/other personnel should be educated regarding early reporting of respiratory symptoms.

— For sports utilising daily wellness monitoring, adding a respiratory symptoms checklist, with automated follow up of reported symptoms, should be considered.

— If medical resources are available, regular screening (brief symptom check, resting heart rate and temperature) of athletes should be considered.

Managing a suspected COVID-19 case

In Australia, currently most respiratory tract infections will be tested for COVID-19.

If an individual is being tested for COVID-19:

— They must immediately self-isolate and discontinue training until COVID-19 has been excluded and they have been medically cleared by a doctor to return to the training environment

— Isolation of close contacts will be a decision for medical staff, based on case specific details

Definition of close contacts:

— "Face-to-face contact in any setting with a confirmed or probable case, for greater than 15 minutes cumulative over the course of a week, in the period extending from 48 hours before onset of symptoms in the confirmed or probable case, or

— Sharing of a closed space with a confirmed or probable case for a prolonged period (e.g. more than 2 hours) in the period extending from 48 hours before onset of symptoms in the confirmed or probable case

— Contact is considered to have occurred within the period extending 48 hours before onset of symptoms in the patient, until the patient is classified as no longer infectious by the treating team (usually 24 hours after the resolution of symptoms)".[46]

Managing a confirmed COVID-19 case

COVID-19 is a notifiable disease and Local Public Health Authorities must be informed. Training facilities may be closed on the instruction of the Local Public Health Authority or the CMO. Re-opening of the training facility should only occur after close consultation with the Local Public Health Authority.

Medical servicing considerations

General principles for the provision of medical services should consider:

— All non-essential athletes and other personnel should avoid treatment areas, and the number of people in treatment areas should be kept to a minimum in accordance with the social distance guidelines

— Five moments of hand hygiene must be used to minimise the risk of transmission between health professionals and patients[83]

— Hygiene practices should include no bed linen except single use towels, cleaning treatment beds and key surfaces before/after every patient

— For manual therapy treatment or massage, it is recommended that the athlete and therapist wear a face mask. The therapist must wash their hands before and after treatment, and the athlete should shower before and after treatment

— If unwell, practitioners must not attend work/treat an athlete. Practitioners with respiratory symptoms/illness must be tested for COVID-19 and cleared by a doctor

— Unwell athletes should be instructed to see a doctor and must not receive any other type of medical servicing such as assessment for injury (unless urgent) or manual therapy until cleared to do so.

Detailed description of medical service considerations pertaining to Level A, B, C sporting activity is illustrated in Table 3 and Appendix B. Core principles:

— During Level A sporting activity
  - Medical or Allied Health consultations should be conducted via telehealth unless face-to-face consultation is considered essential
  - Avoid all routine and non-essential manual therapy

— During Level B sport activity
  - If possible, history taking, or full consultations should be conducted via telehealth
  - Face to face consults should be conducted from 1.5m apart when possible, and hands on treatment should be for essential conditions only
  - A single source of therapist is recommended
  - During any essential manual therapy, it is recommended that the athlete and practitioner wear a face mask

— During level C sporting activity
  - Routine hygiene measures must be maintained.

CONCLUSIONS

COVID-19 has had devastating effects on communities globally, leading to significant restrictions on all sectors of society, including sport. In a COVID-19 environment, sport has an important role to play in restoring normality. Sport Organisations and athletes will be faced with complex decisions regarding resumption of training activities in the current circumstances. Given the recent advent of COVID-19 there is a paucity of research, particularly in athletic populations. 'The AIS Framework for Rebooting Sport in a COVID-19 Environment' is based on current available evidence, extrapolated into the sporting context by specialists in sport and exercise medicine, infectious diseases and public health. The AIS Framework provides a timely tool for sport organisations to guide the cautious and methodical resumption of sport activity (the '**how**'). Decisions regarding resumption of sporting activity must be based on objective medical information regarding the transmission of COVID-19. Federal, State/ Territory and/or Local Public Health Authorities must be closely consulted in decisions regarding the timing of resumption of sport (the '**when**'). The AIS Framework will be updated to reflect the evolving evidence regarding COVID-19. While navigating the return to sport, organisations must ensure that the health and wellbeing of athletes and other personnel informs decision making. The overriding priority for sport, however, must ensure that any return to activity does not endanger public health.

AIS KEY POINTS

Background

— Since early the outbreak in December 2019 in Hubei province, the People's Republic of China, global confirmed COVID-19 cases exceed 3.1 million with over 224,000 deaths on 30 April 2020.

Transmission

— The main mode of transmission is via small droplets from the nose or mouth, secreted by an infected individual and transferred to other people by inhalation, touch or surface contamination.

— Asymptomatic and presymptomatic individuals account for a significant proportion of transmissions.

Pathophysiology

— COVID-19 can affect multiple organ systems not just the respiratory system.

— Approximately 20% of infected people develop serious or critical illness.

— People of advanced age and those with co-morbidities are at increased risk of severe illness and death.

— Currently there are no clinical data on possible long-term complications of COVID-19.

Prevention

— Social distancing decreases the risk of transmission by reducing incidence of contact while enhanced hygiene reduces disease transmission, if a contact occurs.

Testing

— PCR testing is the preferred diagnostic test for a suspected case.

— Serology detects antibodies against SARS-CoV-2 and indicates prior exposure.

— Presence of antibodies against SARS-CoV-2 may not indicate immunity.

Management

— COVID-19 management must minimise risk to the public and optimise the health of the athlete.

— Patients with more severe symptoms and signs should be managed in an inpatient setting.

— Early detection and contact tracing is crucial to mitigate risk of an outbreak.

— Currently there are no medications that have been shown to alter the course of the disease.

Pandemic impacts on sport

— COVID-19 has had a significant negative effect on the sport sector.

— Loss of revenue from sponsorship, gate-takings and broadcast deals has resulted in job losses and reappraisal of operational imperatives.

The AIS framework for resumption of sport in a COVID-19 environment

Preparation for sports resumption

— Prior to resumption, education of athletes and other personnel should be a priority.

— Assessment of the sport environment including provisions for cleaning facilities and equipment is crucial.

— Training schedule should focus on '**get in, train, get out**'.

— Resumption of sporting activity may not be linear. Relaxing/increasing restrictions may be required in response to fluctuating numbers of COVID-19 cases.

— Illness management protocols for athlete and other personnel should be pre-planned.

Proposed criteria for resumption of sporting activity

— Special consideration should be made for athletes and other personnel who may be more vulnerable to COVID-19 infection.

— For the purposes of resumption of sport, activity is classified at Levels A, B, C see Table 1 and Appendix A (individual and community level), Table 2 and Appendix B (high performance/professional level).

— The timing of the progression between levels will be influenced by any evidence of transmission issues within the local community or sporting cohort.

Athletes and other personnel returning to sport

— Individuals should not return to sport if in the last 14 days they have been unwell or had contact with a known or suspected case of COVID-19.

— Any individual with respiratory symptoms (even if mild) should be considered a potential case and must immediately self-isolate, have COVID-19 excluded and be medically cleared by a doctor to return to the training environment.

— Clubs and individuals should apply a graded return to mitigate injury risk, understanding that sudden increase in training load will predispose to injury.

— Special consideration should be made for para-athletes and others with medical conditions as they may be more vulnerable to COVID-19 infection.

Athletes and other personnel returning to sport after COVID-19 infection

— While there is increasing research on the multi-organ nature of COVID-19 in the acute phase, there is currently limited research on medium to long-term complications.

— Athlete returning to high intensity exercise may be at increased risk of health complications.

— Athletes returning to sport after COVID-19 infection require full medical assessment to resumption of high intensity physical activity to minimise risk.

— Other personnel with roles involving physical activity should also have a full medical assessment.

Conclusion

— Sport is an integral part of Australian society.

— The AIS Framework is a timely tool for '**how**' reintroduction of sport activity occurs based on the best available evidence to optimise athlete and community safety.

— Decisions regarding resumption of sporting activity must be based on objective medical information regarding the transmission of COVID-19. Federal, State/Territory and/or Local Public Health Authorities must be closely consulted in decisions regarding the timing of resumption of sport (the '**when**').

— The priority at all times must be to preserve public health, minimising the risk of community transmission.

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APPENDICES

Appendix A: Recommended Level A, B, C activities for community and individual sport

Appendix B: Minimum baseline of standards for Level A, B, C activities for high performance/professional sport

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