



COVER SHEET / Notes to Versions

SARS-CoV-2 / COVID-19

Recommendations (non-mandatory) in the context of Antarctic Operations

Working Paper – Version 7 (19 March 2020)

0.0 Changes from Version 6 (16 March 2020)

0.1 Deleted: Paragraph 9.3.1 Sample calculation: Administering 4l of Oxygen/Minute for 10 days, requires 57,600 l, the equivalent of 288 l of compressed oxygen.



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1.0 Objective: To provide guidance to the COMNAP Membership to collectively strengthen national efforts to avoid introducing the SARS-CoV-2 virus into Antarctica through national Antarctic program actions and activities.

2.0 Background: This guidance was prepared under the leadership of Dr Tim Heitland, Medical Officer of the Alfred Wegener Institute Helmholtz Center for Polar and Marine Research with contributions and community engagement through the Joint (COMNAP and SCAR) Expert Group Human Biology and Medicine (JEGHBM).

3.0 Introduction & Preliminary Remarks: Facing the current pandemic of the virus SARS-CoV-2 that causes the COVID-19 disease, the question arises, how to proceed in respect to Antarctic operations. Those operations, in some cases, may also include activity in the Southern Ocean and the sub-Antarctic islands.

3.1 The situation is constantly changing.

3.2 It will be necessary to continuously adjust whatever actions might be taken.

3.3 The following recommendations are based on currently available information by the World Health Organization (WHO)¹, various national health authorities and medical publications.

3.4 The commonly known facts and general suggestions have deliberately not been incorporated in this guidance, as they're ubiquitous.

3.5 Importantly the ability to respond to a highly infectious novel virus with significant mortality and morbidity in the extreme and austere environment of Antarctica with limited sophistication of medical care and public health responses is **High Risk** with potential catastrophic consequences including death.

3.6 COVID-19 medical case management and response is rapidly changing and will be communicated in national and international clinical fora and remains out of scope of this document.

4.0 Objectives Identified are:

4.1 Objective 1: Prevent the intercontinental spread of SARS-CoV-2

4.2 Objective 2: Prevent the intracontinental spread of SARS-CoV-2

4.3 Objective 3: Prevent the spread of SARS-CoV-2 within a station

4.4 Objective 4: Dealing with COVID-19 in Antarctica

¹ Refer to the WHO technical guidance web-site: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance>.

		Likelihood of COVID-19 occurring in Antarctica without urgent control		
		1 <i>(Rare)</i>	2 <i>(Possible)</i>	3 <i>(Likely)</i>
Ease of management	1 <i>(Easy)</i>	1	2	3
	2 <i>(Moderate)</i>	2	3	4
	3 <i>(Difficult)</i>	3	4	5

5.0 Objective 1: Prevent the intercontinental spread of SARS-CoV-2

Key message – Act Early, Act Strongly as containment and prevention must be the priority to prevent introduction of SARS-CoV-19 in Antarctica.

5.1 Given the unique situation that Antarctica can only be reached through a small number of air gateways or via ship, the attempt to prevent the virus from reaching the continent should be undertaken IMMEDIATELY.

5.2 Recognising that there are still a number of Antarctic air and ship gateways in “open” mode, all national Antarctic programs who have not already closed their seasonal facilities or who have not yet entered TOTAL winter-over/winter isolation mode, should urgently reconsider any scheduled access, personnel and freight transport into Antarctica given the potential risks of the pandemic and limited ability to medically respond in Antarctica.

5.3 The Antarctic gateways are themselves currently impacted by national and regional measures including supply chains, travel restrictions, isolation requirements and response capabilities. Cease and defer travel through the gateways, given widespread COVID-19 risks at all the Antarctic gateways, seems highly advisable.

5.4 Travel to/from Antarctic gateways will likely be affected by airlines struggling to provide services.

5.5 Arguments have been raised that the probability of a severe case of COVID-19 in an Antarctic population can be considered relatively low based on the assertion that assumes a younger age profile of expeditioners, and given that the population is medically screened for deployment and the selection of healthy individuals. This is potentially off set by the potential for immune changes associated with remote deployment. However, the majority of healthy individuals will still experience a mild illness, which will impact severally on operational capability.

5.6 Critically asymptomatic (up to 48 hours prior to symptoms) and prolonged viral shedding (days to weeks) has been demonstrated and increases risk of spread.

5.7 The virus is highly aerosolized and can survive most probably up to 9 days on surfaces. Cold/dry conditions most probably help the virus to stay viable longer.

5.8 Documented viral reactivation may pose risks of reinfection and reseeding of isolated communities.

5.9 A remotely operating ship, with no feasible way of timely evacuation in case of a SARS-CoV-2

infection/COVID-19 outbreak on-board, is most certainly a challenging environment.

5.10 Tourists should be prevented from entering national Antarctic program facilities and from any interaction with national Antarctic program personnel (i.e. passengers and crew to stay aboard of cruise ships, no flying to Antarctica). Tourists **MUST** be prevented from visiting research stations noting also the risk of medical support requests from Antarctic national medical facilities. Due to logistical interactions, cruise ships should not be disembarking. Tourists are most likely the population at risk to develop severe complications (cf national Antarctic program personnel) considering age and lack of medical screening. We recommend early discussion with IAATO as between any national Antarctic programs that had scheduled visitations planned with IAATO Member vessels/aircraft. Note that many national Antarctic programs have already banned interaction in Antarctic between tourists/tour vessel crews and expeditioners.

5.11 Travel Recommendations

5.11.1 In regards to **non-essential travel**: All non-essential travel should be ceased immediately.

5.11.2 In regards to **essential travel** (including medevac or critical operational need):

a) Travellers to be isolated/quarantined for 14 days prior to departure to Antarctica for 14 days.

b) For CRITICAL and URGENT travel, such as a medevac situation, when it is not feasible to take transportation staff (ship/air crews etc.) into quarantine, strict separation of untested crew and negatively-tested passengers should be considered.

c) All travellers should be fully vaccinated including current seasonal influenza and pneumococcus vaccinations.

d) Pre-departure screening, observations and testing should be undertaken bearing in mind that current PCR testing and thermal screening does not exclude risk of travel during incubation period and thus importation of COVID-19.

e) All travellers (whether by air or ship) should be tested negative for the virus prior to boarding.

f) No one with positive test results to be deployed.

g) All travellers with symptoms of COVID-19 or with positive test results returned to be reported to the local health authorities and handled as per local policies and instructions.

5.12 Future tests might allow the virus' detection after a shorter quarantine and/or might be possible without a PCR test (e.g. antigene-tests), thus being more readily available and might facilitate procedures.

5.13 The exact organization of the quarantine certainly poses a logistical challenge and should most likely be discussed separately for each of the gateways. Self-directed quarantine/isolation, in hotel or accommodation room, with no contact with staff, other travellers. It is important to establish regular, phone/internet contact with the traveller to ensure their well-being.

6.0 Objective 2: Prevent the intracontinental (between Antarctic locations) spread of SARS-CoV-2

Key message – Proactively and immediately act to block intracontinental propagation paths.

6.1 If SARS-CoV-2 should reach Antarctica, intracontinental propagation paths should be blocked. This includes between stations/facilities and through vessel landings at coastal facilities, including sub-Antarctic facilities and any vessel to vessel transfers of personnel, cargo or rotary-wing aircraft. The necessity to deviate from this approach might arise in cases of emergency on a risk-assessed basis.

6.2 Mutual visits and social events between stations/facilities should be ceased and require prior

national approval and confirmation of risks if essential. We recognise that some Antarctic facilities share infrastructure which requires regular maintenance-ensure review of shared infrastructure and shared maintenance in order to carry out safe and, in some cases, separate (as between different facility personnel) works and services.

6.3 No tourism activities.

6.4 Shared feeder flights or ship calls should be discussed in advance of planned activity and, if possible, avoided. If they cannot be avoided, then possible safe scenarios could be:

a) Flights: Antarctica-based air crews with 14 days free of signs of an infection can be considered virus-free and can perform shared feeder flights of expeditioners coming from 14 days of quarantine.

b) Ship calls: No direct contact between expeditioners and the crew. Ship freight that remains untouched for more than 9 days might be considered as low risk. Where possible, external washing with soap of cargo reduces risk, and avoids need to quarantine cargo.

7.0 Objective 3: Prevent the spread of SARS-CoV-2 within a station/facility

Key message – Proactively and immediately act to block propagation paths within the station.

7.1 If SARS-CoV-2 should reach an Antarctic station/facility, propagation paths within the station have to be blocked. This is recognized as extremely difficult given the infectious risk in isolated confined environments.

7.2 Suspected cases/contacts/patients have to be totally isolated for 14 days with separate air conditioning (negative pressure if possible).

a) In suspected cases, **frequently reported signs and symptoms of patients** admitted to the hospital include fever (77–98%), cough (46%–82%), myalgia or fatigue (11–52%), and shortness of breath (3–31%) at illness onset. Among 1,099 hospitalized COVID-19 patients, fever was present in 44% at hospital admission, and developed in 89% during hospitalization. Other less commonly reported respiratory symptoms include sore throat, headache, cough with sputum production and/or hemoptysis. Some patients have experienced gastrointestinal symptoms such as diarrhea and nausea prior to developing fever and lower respiratory tract signs and symptoms.²

b) In regards to all contacts with suspected cases or confirmed cases all contact persons have to be identified:

- In case of unprotected medical intervention or close contact (less than 2 meters distance face-to-face and greater than 15 cumulative minutes exposition), contact persons should be isolated and placed under observation.
- In case of lesser contact, measures should be individually discussed. Given the remote location and limited medical infrastructure of most Antarctic stations and the possible extent of damage, a liberal isolation regime seems advisable.³
- All contacts to use personal protection equipment (Mask FFP 2 or 3, Eye protection, disposable clothing, gloves).

² <https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-guidance-management-patients.html>

³ An example, in German, can be found here:

https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Kontaktperson/Management.html

7.3 If there is a suspected case or confirmed case on a station, anxiety amongst all expeditioners should be expected and support should be given to reassure all expeditioners, and especially any expeditioner that becomes infected and requires medical care.

7.4 Regularly communicate and share information with all personnel at the station, raise awareness on how to act to block propagation, communicate to your national Antarctic program and to any other national Antarctic programs operating in the same region.

7.5 Remind everyone at the station to follow usual hygiene regimen.⁴ Wash hands for at least 20 seconds with soap or use hand sanitizer, sneeze-etiquette, keep distance, no handshakes, don't touch your face.

7.6 Use appropriate disinfectant on surfaces (at least 2/d).

7.7 In preparedness, **all national Antarctic program should immediately review and enhance:**

7.7.1 Current healthcare staffing levels at Antarctic facilities, training and remote medical support requirements.

7.7.2 Current diagnostic capability.

7.7.3 If maintaining essential winter operations, review and if possible implement PCR respiratory panel diagnostic testing (e.g. BioFire PCR with FilmArray Respiratory Panel testing for 20 common respiratory pathogens).⁵

7.7.4 Current Teleradiology and Telemedical support capability.

7.7.5 Current infection control and isolation capability.

7.7.6 Current aeromedical evacuation capability.

7.7.7 Current ICU capability including prolonged capabilities.

7.8 In preparedness and given that all COVID-19 cases should be evacuated from Antarctica if possible according to national aeromedical, maritime-infection-control and biosecurity procedures, national Antarctic programs should review their medavac capabilities in consultation with regional and gateway partners and Rescue Coordination Centres to ensure clear lines of communications.

8.0 Objective 4: Dealing with COVID-19 in Antarctic operations.

Key Message: Be Prepared. Plan Ahead.

8.1 COMNAP EXCOM has established an ad hoc sub-committee, principally of members of the COMNAP SCAR JEGHBM, who will act as the point of contact for all COMNAP Member and Observer national Antarctic programs and their Antarctic stations for reporting suspected or confirmed cases (confidentially) and for latest updates on COVID-19 to be shared amongst COMNAP Members and Observers. The Leader of the sub-committee is:

Dr Tim Heitland (time.heitland@awi.de)

telephone (Central European time) +49 471 48 31 1195 or mobile +49 160 990 61514

fax +49 471 48 31 1355

⁴ See attachment 1 COMNAP "Protect Yourself and Others" graphic (2020).

⁵ Australia has implemented at Macquarie Island pending lack of COVID-19 test access to exclude diagnosed respiratory illness and thus exclude COVID-19. See <https://www.biomerieux.com.au/product/filmarray-multiplex-pcr-system>.

8.2 National experts should be available for telemedicine response team to monitor and respond to the helpline queries with the latest & updated knowledge.

8.3 Note the strong correlation between age, preexisting/chronic conditions and COVID-19 severity and case fatality. “Compared to patients not admitted to an intensive care unit, critically ill patients were older (median age 66 years versus 51 years), and were more likely to have underlying co-morbid conditions (72% versus 37%).”⁶ When possible, persons belonging to a cohort with higher mortality (e.g. over 60, preexisting chronic conditions) might be excluded from traveling to Antarctica and/or should be early evacuated in case of an outbreak as a precaution.

8.4 Review station facilities and identify a possible isolation unit at the station and at Antarctic gateways.

8.5 All COVID-19 cases should be evacuated from Antarctica if possible according to national aeromedical, maritime-infection-control and biosecurity procedures.

8.6 Review medevac plan

a) The plan should include identifying a suitable hospital infrastructure (external to Antarctica) for any COVID-19 patients. Think about where is the next available ICU, where is the next ECMO (extracorporeal membrane oxygenation) at the relevant gateway city or a city close to the relevant gateway city.

b) While the patient remains on the Antarctic station, your medevac plan should consider that the expected time to Medevac will dictate the amount of equipment needed.

8.7 The optimal minimal Personal Protective Equipment (PPE) could be:

- 1 mask (FFP 2 or 3)
- 5 pairs of gloves
- 5 disposable protective gowns per person and day
- 1 device of eye protection per person.

8.7.1 As an example calculation: In case of an expected time to Medevac of 10 days and 2 persons helping the patient/s that would add up to a minimum stock on station of:

- 20 masks
- 100 pairs of gloves
- 100 disposable gowns
- 2 eye protection devices

8.7.2 Additional PPE could be stocked (for at least two patients) at nodal points of entry or exit to Antarctica. It can be collectively utilized by several stations in times of need on first-come, first-served basis.

8.8 Now is the time to review any plan or to establish a plan as to how to proceed in case of (suspected) infection including chain of information for individual stations and allaying fear, anxiety amongst neighbouring stations.

8.9 Have a communications plan, especially in order to keep families of station personnel informed and to inform media requests.

⁶ <https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-guidance-management-patients.html>

9.0 COVID-19 Therapy in Antarctica

(General advice only - given limited medical response capability if at all in Antarctica):

Refer also to:

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-guidance-management-patients.html>

https://www.who.int/docs/default-source/coronaviruse/clinical-management-of-novel-cov.pdf?sfvrsn=bc7da517_2

9.1 Clinical presentation among reported cases of COVID-19 varies in severity from asymptomatic infection to mild illness to severe or fatal illness. Some reports suggest the potential for clinical deterioration during the second week of illness. Acute respiratory distress syndrome (ARDS) developed in 17–29% of hospitalized patients, and secondary infection developed in 10%. In one report, the median time from symptom onset to ARDS was 8 days.

➔ **Fast Medevac seems advisable.**

9.2 Approximately 20–30% of hospitalized patients with COVID-19 and pneumonia have required intensive care for respiratory support.

➔ **Medevac in order to provide intensive care for respiratory support seems advisable.**

9.3 Among critically ill patients admitted to an intensive care unit, 11–64% received high-flow oxygen therapy. Apart from the possible lack of equipment at Antarctic stations, high-flow oxygen therapy requires an oxygen-flow-rate of up to 60 l/Min. It seems nearly impossible to stock enough medical oxygen at an Antarctic facility for this scenario. Never-the-less it seems reasonable to stock as much oxygen as safely possible.

➔ **Increase the stock (safe storage) of medical-oxygen/consider the use of an oxygen concentrator.**

9.4 Among critically ill patients admitted to an intensive care unit, 47–71% received mechanical ventilation; some hospitalized patients have required advanced organ support with endotracheal intubation and mechanical ventilation.

➔ **Endotracheal intubation and mechanical ventilation should be available.**

9.5 A small proportion of patients have also been supported with extracorporeal membrane oxygenation (ECMO, 3–12%). This is an unrealistic therapeutical option in Antarctica.

9.6 Other reported complications include cardiac injury, arrhythmia, septic shock, liver dysfunction, acute kidney injury, and multi-organ failure.

➔ **Appropriate medication (also for possible super infections/ pneumonia) and sufficient i.v. fluids should be on stock. Check stocks at Antarctic facilities.**

9.7 As of now, the treatment of COVID- 19 is supportive. In case of an expected time to Medevac of 10 days, reasonable precautions ideally should include at least per patient:

- 300l of compressed medical oxygen
- Possibility of intubation and mechanical ventilation
- I.V. fluids and possibility to administer
- Appropriate Antipyretics, antibiotics and general medication

9.8 The infection period for the virus will vary from person to person. Mild symptoms in an otherwise healthy individual may resolve over just a few days. German authorities suggest the

following criteria for the repeal of isolation:⁷

➔ Earliest repeal of isolation 10 days after symptom-onset AND if fulfilling ALL following criteria:

- No fever for at least 48 hours
- Symptom-free for at least 24 hours in respect to the acute COVID-19 disease
- Two negative SARS-CoV-2-PCR-tests within 24 hours

➔ As a PCR-test most likely won't be available, a feasible answer to the question of the repeal of isolation (e.g. in case of impossible Medevac) remains open.

10.0 Summary

10.1 **Act early, act strongly** as containment and prevention must be the priority to prevent introduction of SARS-CoV-19 in Antarctica. Shut down Antarctica/operations as far as possible. Prevent, Contain, Act Now.

10.2 **The best prevention of intercontinental spread** of SARS-CoV-19 to Antarctica is to stop travel to Antarctica completely. When that is not possible allow essential travel, medevacs or other evacuations and indispensable supply-operations by persons that, if possible/feasible, have been in quarantine for 14 days and have a negative pcr-testing and screening.

10.3 **Be proactive.** Establish and convene national Antarctic crisis management responses as per usual procedures

10.4 **Be prepared.** Prepare for a suspected respiratory illness and a severe case of COVID-19 with increased medical staffing, diagnostics and therapeutical options.

10.5 **Re-evaluate plans,** including your Medevac plans and Antarctic gateway capabilities and support.

10.6 **Enhance mental-health and well-being support** to allay concern and anxiety amongst Antarctic expeditioners and their families.

10.7 **Plan ahead to next season.** Commence consideration and planning of responses to short-, medium- and long-term impacts of pandemic to national Antarctic programs Antarctic season 2020/21 and beyond.

⁷ https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Entlassmanagement.html

Attachment 1: COMNAP Protect Yourself and Others (2020) graphic