Questions and comments from participants during the
Supporting National responses through COMNAP guidance:
COMNAP On-line ZOOM Meeting with a **m**edical focus in preparation for
Antarctic season 2020/21 in the context of COVID-19

Facilitator: Dr Tim Heitland
UTC Monday, 8 June 2020 at 19:00:00

Question 1: What about mounting molecular biology test in our bases?
Response 1: On site, that is in Antarctica, Polymerase Chain Reaction (PCR) testing could facilitate the decision-making process (stay or medevac) when confronted with symptomatic patients while bearing in mind that PCR tests can be false negative. The tests need to be done properly and, ideally, repeatedly. Regardless of availability of testing in Antarctica, any person at an Antarctic facility that is symptomatic should be placed in isolation and that facility should not allow visitations from other personnel until all clear.

Notes for the non-medical among us: At the moment, the majority of the current Covid-19 tests that all the reports are coming from are using PCR. They detect the genetic information (RNA) of the virus. That's only possible if the virus is there and someone is actively infected. PCR tests are used to directly detect the presence of an antigen (a toxin or other foreign substance, which induces an immune response in the body) rather than the presence of the body's immune response, or antibodies. By detecting viral RNA, which will be present in the body before antibodies form or symptoms of the disease are present, the tests can tell whether or not someone has the virus very early on. PCR give a good indication of who is infected. The infected can be isolated and we get in contact with people they have been in touch with so they can be quarantined too, just in case-this helps to break the transmission chain.

Comment 2: Please note when we [South African National Antarctic Program] made an enquiry for testing asymptomatic persons we had to get special permission as testing of asymptomatic people was discouraged due to limited national resources.

Question 3: How are other [other than South Africa] gateways handling this [situation as presented above related to testing of asymptomatic presenting persons]?
Response 3: The "*COMNAP Desktop Study: Preparing for the 2020/21 Antarctic season in the context of global COVID-19*" specifically asked each of the five gateway countries about the availability of COVID-19 testing to transiting (asymptomatic) Antarctic expeditioners. The responses received can be summarised as:

- Argentina: Currently, access to testing is not guaranteed. Testing availability will be reconsidered in due course.
- Australia: To be determined once a Tasmanian Government procedure has been developed. Current community COVID-19 testing capability is substantial with a 2 to 24 hour turn-around time.
- Chile: COVID-19 PCR testing is available in Punta Arenas. The analysis is done in local laboratories with a short turn-around time.
- New Zealand: The testing regime is part of the conversations currently underway with Governmental agencies.
- South Africa: The testing of asymptomatic people remains discouraged, as there is a

postulated argument about not having enough tests for those that may really be infected.

Question 4: Regarding PCR testing - do you mean PCR testing in gateway cities making an arrangement/agreement with a laboratory there?
Response 4: Yes. Wherever your final gateway to Antarctica might be located, that's exactly the place where people need to be placed into quarantine and need to be tested if we are going to stop introduction of the virus into Antarctica. So it is crucial to understand the Governmental limitations imposed (such as availability of testing for asymptomatic persons), to seek information on the infrastructure available for certified testing at each gateway. Moreover, if needed, contract a facility for testing of deploying Antarctic expeditioners or ensure timely contact with the local laboratories and make sure they are available and have the capacity and material for the testing volume you want to run over the course of the Antarctic season. Each gateway Government may respond differently and there is a need to understand local limitations.

Question 5: What about the Immunoglobulin (Ig) tests?
Response 5: Ig tests, also known as antibody tests, are valuable depending on the question you want to answer. As the peak of IgM (think of IgM as the first Ig produced by the body) is reached around the seventh to tenth day of the person already having the virus, patients have been infectious for quite some time until you will detect them as positive with an Ig or antibody test. If you test using only this method, a person infected with the virus could have been exposed to many other people before detection. In addition, the sensitivity of this kind of test seems to be lower than for PCR tests- there is a possibility of "cross-reaction" with the CoV-1 Virus, (simplified) meaning: it sometimes could be that the test detects the old virus. This will make this difficult to make decisions based on an Ig test result only.

Notes for the non-medical among us: After suffering from an infection, it is common for a person to develop an antibody response against a particular pathogen. Early after infection (usually after the first week), a class of antibodies known as immunoglobulin M (IgM) develops, although these are not typically long-lasting. Later, after the first 2-4 weeks following infection, immunoglobulin G (IgG), a more durable antibody, is produced. Detection of microbe-specific IgM and IgG in circulating blood (a 'serologic' test) serves as a traditional method to determine whether a person has been infected with that pathogen, either recently (IgM) or more distantly (IgG).

Comment 6: It will be very difficult to have a whole hotel (at a gateway) for exclusive use of Antarctic participants.
Response 6: Agreed, it is a big logistical challenge which requires local leadership, may require exclusive contracts between the hotel and the National Antarctic Program (which may prove costly) and will require commitment and understanding from hotel staff and transiting National Antarctic Program expeditioners.

Comment 7: Any testing protocols should ideally be the same for all the Antarctic gateways to avoid different standards at the gateways and amongst the various National Antarctic Programs deploying people south.
Response 7: The Joint Expert Group on Human Biology and Medicine (JEGHBM) agrees with this comment and is working towards recommendations on testing protocols to be advised to COMNAP and especially to Antarctic gateway National Antarctic Programs. COMNAP will advise National Antarctic Programs as to the progress made on this work.

Comment 8: In a case where a person requires medical attention to a level not possible at the Antarctic stations [or on a vessel], it is going to be very difficult to quickly transport the person to a medical facility appropriately equipped for the response required.
Response 8: Agreed, this is always a challenge in Antarctica in cases of medivac of patient that cannot be provided with advanced medical care in Antarctica for the particular circumstances the patient presents with and it will continue to be a challenge that requires advanced planning for the 2020/21 season. Consideration should be given to the specific scenario COVID-19 presents in the context of likely reduced Antarctic operations and given that the global COVID-19 landscape is constantly changing. COMNAP is planning on a Medevac focussed ZOOM discussion with Rescue Coordination Centres in order to advance plan for this scenario.

Comment 9: In South Africa, if anyone enters the country with infection, they and anyone that accompanied them are placed under 14 days quarantine-this includes the entire flight crew from the particular aircraft. So, if a flight carrying Antarctic expeditioners south (or north) had a person who tested positive for COVID-19 (including someone medevac'd from an Antarctic facility) all personnel on-board would be quarantined which could means flights to/from Antarctica would then be delayed for 14-days.

Comment 10: In case of one infected patient, there is the probability that more people will be infected in a few days.
Response 10: Agreed, and an important point. Where one person has symptoms and is infected and when that infection has gone undetected, already, many more people at the facility/station will be carrying the virus. Good hygiene practices, and isolation as soon as possible, are important response tools.

Comment 11: It will be very difficult to get high flow oxygen [in Antarctica]. We may perhaps use a BiPAP machine with oxygen concentrator.
Response 11: (In order to illustrate the thought behind this comment, here is some background, remembering that any decisions in regards to treatment for COVID-19 patients must be made by the treating doctor(s)/care-giver(s) on site.) A COVID-19 infection can lead to problems with the oxygenation of the patient's blood (for several reasons). What the doctor can do to help the patient with their oxygenation is administer additional oxygen. This should be adapted to the patient's demands and treatment protocols. So, if there is a need to administer high flow oxygen in Antarctica (that could be as much as 40l/min or even more, just to give you a number and is a non-invasive technique -> no mechanical respiration support), your oxygen supplies on station will be depleted in a very short time. Mechanical ventilation devices (if available on station) with Positive Airway Pressure (PAP part of Bi-level PAP machine), use less oxygen or concentrate oxygen so that less oxygen needs to be stored at Antarctic stations. However, the amount of oxygen needed is only one consideration in the treatment of a COVID-19 patient. Likely, the biggest constraint for the Antarctic situation is the availability/presence of trained individuals to deliver level of care required.

Question 12: In regards to quarantine/isolation of people in hotels at gateways or at final points of departure to Antarctica, do the food delivery options need to consider prevention of contamination of the delivered supplies?
Response 12: Yes, development and implementation of a protocol to ensure delivered supplies are not contaminated needs to be in place at these facilities. Hotel staff should apply good hygiene rules, and wear masks and gloves even during contactless delivery. Trays, if used, should be

sanitized. Much is currently being learned from quarantine situations at countries around the world and it is likely that common basic standards can be shared with hotels used by National Antarctic Program expeditioners at Antarctic gateway hotels. Expeditioners should be made aware of these common basic standards, as there will be no easy way to police the standards.

Question 13: How many replications are you getting with the Bosch PCR test?
Response 13: We have written to Bosch and are waiting for the answer to this question.

Notes for the non-medical among us: For diagnosing SARS-CoV-2, a PCR test starts with a swab, which looks like a long Q-tip/cotton bud on a stick that draws mucus from the back of a patient's nasal cavity where it meets the throat. This swab goes in a vial that is then sent to a lab facility for the PCR test. There, technicians use reagents to extract any viral RNA on the swab. The RNA is converted to a complementary sequence of DNA, which can be replicated many times over to make it easy to detect. To accomplish this replication and detection, technicians or automated machines, add additional reagents. There is then a cycle of activity, which, basically, turns the two strands of DNA into four, then eight, and so on. After about 40 cycles there are roughly 100 billion copies of the target DNA - making it easier to detect.

Comment 14: For our [USA] crew who had to travel to Summit Station, Greenland, we had them quarantine in a pre-identified hotel so that rooms had kitchenettes with food so that they did not have to get trays of food delivered at each meal, therefore reducing exposure to contaminated surfaces related to food delivery.
Response 14: Noted, facilities at gateways with cooking facilities in rooms would eliminate the need for daily meal deliveries.

Comment 15: We [USA] decided to use 21 days for quarantine of our expeditioners. A research study from Johns Hopkins University estimated that out of 10000 individuals quarantined for 14 days, 101 might still show symptoms outside of that period. So, 14 days is good, 21 days provides almost total confidence even if testing is performed.
Response 15: Guidance based on peer-reviewed research showing evidence for timeframes for quarantine should be shared/considered through the JEGHBM.

Question 16: Should we do sentinel testing in Antarctica?
Response 16: The JEGHBM will contribute advice on whether we should do sentinel testing in Antarctica.

Notes for the non-medical among us: "Sentinel testing" refers to the practice of testing asymptomatic members of a community or population on a regular, random basis. It is often part of a country's strategy in order to ascertain community spread since COVID-19 has a relatively high asymptomatic infection rate, which, if left undiscovered, means the virus can be spread within a population undetected.

Comment 17: Antibody tests still needs to be carefully validated, but real-time PCR is very sensitive in that window period.

Question 18: Will COMNAP certify the gateway city laboratories that do COVID-19 testing on Antarctic expeditioners or can a certificate be provided to persons who have been tested?
Response 18: COMNAP is not in a position to certify national laboratories. Several National Antarctic Programs have proposed discussion in regards to a COMNAP certificate for expeditioners to indicate when they had last been tested and what those results were. We need advice from our medical community as to whether this would be feasible, able to be policed and ethical given privacy considerations. The JEGHBM will contribute advice on this.

Question 19: Will National Antarctic Programs have PCR testing equipment at Antarctic stations for the 2020/21 season? And, if yes, can COMNAP collect that information and provide a list of the stations with the equipment available in case of need to share?
Response 19: While it is understandable that some National Antarctic Programs are considering setting up testing equipment at their Antarctic station(s), from a medical perspective there needs to be consideration in regards to the high-level of stringent protocols that need to be in place at any testing facility that intends to accept swabs from suspected cases from other facilities/stations. If handled incorrectly, such samples could infect those handling the samples, those testing the samples and thereby become a vector from one normally isolated Antarctic station population to another. Other station-to-station vectors would include the person(s) transporting the test samples from the suspected COVID patient to the testing station and its population. If after thorough consideration, National Antarctic Programs did choose to support testing equipment and capabilities at their Antarctic facilities, that equipment information could be added to the medical data fields already in the COMNAP facility database if a National Antarctic Program asked to have it listed in the database.

Comment 20: Germany [AWI] will have a PCR testing at Neumayer III Station for the future.

Question 21: What is the magnitude of the problem with false negative (PCR tests)?
Response 21: Aprimeo, the company that produces AWI's mobile PCR machine, supplied this response at the request of Tim Heitland:

Table 5 – Clinical Sensitivity [1] and Specificity [2] (95 % Confidence Interval)
SARS-CoV-2
[1] 100 % (91.6 – 100.0 %)*
[2] 100 % (66.4 – 100.0 %)

*Two out of 51 specimens were tested as "valid negative". Upon dilution with eNAT™ medium (COPAN Italia S.P.A.) repetition of these specimens gave "valid positive" results which were considered. Without retesting sensitivity was 95.2 % (83.4 – 99.4 %).

Comment 22: Uruguay [IAU] has the capability to have real-time PCR tests at Artigas Station (King George Island).

Question 23: Can we roll out PCR testing to all?
Response 23: Testing is important as one tool in the toolbox for COVID-19 management of Antarctic personnel at gateways and in Antarctica. It will be a question of availability at all the Antarctic gateways. In Antarctica, for symptomatic patients only, regional testing facilities might be possible, however, such testing facilities in Antarctica must be considered in the context of providing vectors of transmission between stations that might otherwise be avoided (see Question and Response 19 above). Further discussion is needed on this.

Question 24: Is it correct to assume that no quarantine would be required at the gateway country when expeditioners return from Antarctica?
Response 24: While Antarctica remains COVID-19 free there is no possibility of a returning Antarctic expeditioner (currently winter-over) transmitting the virus to someone else-since they have no exposure to the virus. Quarantine at the gateways for returning expeditioners is subject to the restrictions and regulations in the particular gateway country/city/region. These gateway restrictions/regulations are evolving and will continue to evolve based on the global situation later in the year. The situation may also depend on whether returning expeditioners have arrived by ship after a significant isolation period on ship while at sea or by air.