DROMLAN’s efforts to prevent the spread of SARS-CoV-2 virus within the Dronning Maud Land, Antarctica

**Precautionary measures taken and experiences gained by DROMLAN member states**

**Sweden:**

We had two teams travelling to Wasa, all following the DROMLAN protocol. Team 1 had no problems with SARS-CoV-2. However, Team 2 was slightly delayed from Cape Town due to bad weather and one participant tested positive for SARS-CoV-2 on day 16 of the quarantine (in group quarantine). This meant that the whole team went back from group to individual quarantine for another 7 days. The virus was probably contracted from the hotel staff in mid-December, at the very peak of the fourth wave in South Africa. Then followed the holiday season with the hotel fully booked and the next DROMLAN flight to Antarctica was scheduled to January 12. The team was therefore relocated to a new group quarantine in a less populated setting. After a discussion with the medically responsible doctors and an infectious disease specialist, the Director of our agency decided to cancel the second part of the expedition, and the participants of Team 2 went back.

The lessons learned from this incident are:

**The quarantine setting:**

The participants should be quarantined in a truly self-contained setting.

**The length of the quarantine:**

With 3-plus vaccinations for all participants in a team, it should be possible to have a shorter quarantine.

**Format of the quarantine:**

With a shorter quarantine period, it may be preferable to have only strict individual quarantine.

**Testing:**

The PCR testing with external staff is a risk factor. It should be enough with only one PCR test at the end of the quarantine.

**Finland:**

* basic principle was to lean to DROMLAN and COMNAP information and protocols to avoid in the first hand to bring SARS-CoV-2 to Antarctica but also make it safe as possible for our own team to fulfill tasks for season.
* All our expedition members were vaccinated with two shots (third was not available before season). We also had influenza vaccination for everyone, just to avoid risk that seasonal influence would spoil someones trip. There was PCR test max. 72 hours before leaving Finland as air operators demanded in November 2021.
* The First FINNARP team (7 pax) arrived Cape Town 17 th of November. We travelled in business class to lessen amount of contacts during our trip, Helsinki-Doha-Cape Town and two pax Helsinki Munich-Cape Town.
* We stayed one week in single rooms in quarantine (meals were brought to rooms) and after that there was PCR test. All negative. Then second week we continued but added possibility to move to walk on beach which was pretty empty and having meetings between team members in garden. When out of own room we wore FFP2 masks and had distance between each other. Mask were immediately available in case of need when we were out of rooms. After the second week quarantine there was another PCR test and the FMI team flew in a private jet to Novo Runway. We stayed there 6 days, first in runway facilities and then couple of days in ALCI guest house
* During our stay in Cape Town we got information of omicron, couple of days before we left. There was discussion between FINNARP team and FMI administration Corona group and the director of administration. As there was very little of information of omicron then the decision was made to postpone the rest of expedition till next season, so 6 scientist and one technician stayed in Finland and did not travel to Cape Town or Antarctica at all. They will join next FINNARP expedition.
* There was an issue with a cargo flight and SARS-CoV-2 cases in last week of year 2021. We were receiving cargo with an ALCI Basler and got the information about positive SARS-CoV-2 cases the same day. We prepared one small four person living module and field toilet available for the Basler team of four to accommodate if needed, but closed the possibility to access main building.  The crew did not stay at Aboa but flew to Neumayer (as the facilities there “were better”)
* At Aboa we decided to have a one-week quarantine as some of us had been in more close contact with Basler crew (medical support for flight assistant). Meals were picked up and ate separately and there was no inside work together but outside work with distancing continued. Nobody had any symptoms and we made antigen test after one week and continued as normal after negative tests (the problem of course is that if no symptoms the test is not really valid). We also kept strict distance to the team of the Swedish Polar Research Secretariat (SPRS) and no visits were allowed between stations during that time. There was also discussion about if second SPRS team would arrive to Basen, we would keep two-week distancing between stations.
* For the rest of cargo flights we paid even more attention during loading operation to wear FFP2 masks.
* We flew back via Novo Runway, stayed one night there. In Cape Town we had an antigen test when arrived and then there was PCR test before we left Cape Town on 17th of February

**Japan:**

DROMLAN Basler made refuels four times in November 2021 at Syowa Station runway and once in February 2022 at S17 runway. Since 31 station winter crews were not vaccinated, they have never contacted either crew of Basler or passengers during refuel.

Six JARE expeditioners who have been vaccinated twice started MIQ strictly ruled by DSP just after arrival in Cape Town on 15 October 2021. On 30 October, the expeditioners flew from Cape Town to Novo runway by D01-IN intercontinental flight and moved further from Novo runway to Syowa Station on 4 November by DROMLAN Basler. These expeditioners were in isolation (accommodating in an isolated building) during their stay until 10 November, when they left the station for an inland traverse. Since the traverse team consists of those six vaccinated new expeditioners and three non-vaccinated winter expeditioners, two groups stayed in different snow vehicles and were accommodated separately until 18 November. There were no reports of suspicious symptoms from the traverse team and the station.

Eight JARE expeditioners left the S17 runway to Novo runway on 7 February 2022 by DROMLAN Basler and flew from Novo to Cape Town on 11 February 2022 by D10-OUT intercontinental flight. These expeditioners implemented all necessary DSP procedures during flights and their stay on the Novo runway.

Lessons learnt

Once the number of new cases goes down, people quickly feel uncomfortable keeping the rules. However, we should keep in our mind that easing sanitary procedures by our own decision is very dangerous. For example, no one can predict the surge of the Omicron wave when we finalise DSP. Our pre-departure MIQ was conducted before the outbreak of the Omicron variant, but it may be undergoing and may have a chance to bring it to the station. We might be just lucky that all tests of JARE expeditioners in Cape Town showed negative results.

In case of emergency during the feeder flight, DROMLAN Basler may land any possible runway of the station. When crews and passengers may have suffered infectious diseases, not all stations could provide isolated accommodation and treat properly such persons at the station.

**Norway:**

When NPI on December 28, 2021, received information that there was an Omicron outbreak in Dronning Maud Land and that there was a risk that some our personnel at Troll could have been infected we immediately tested and isolated all personnel that could have been exposed. In total 10 persons, or 25% of the on-station personnel at the time. It included scientists that had spent time in transit at Novo in late December, a transiting Finnish scientist, as well as personnel that had interacted the Kenn Borek aircrew from C-GKKB. As part of our SARS-CoV-2 prevention procedure we had already tested all persons that arrived from other stations and limited interaction between station personnel and visiting aircrews. The overnight stay by the air crew of Basler C-GKKB on December 27-28 had been at the airfield, separated from the rest of station.

After discussions with Tim Heitland from AWI and co-author of the COMNAP as well as DROMLAN covid prevention protocol as well as NPI management it was decided that a strict quarantine, completely isolated, of 3 days followed by another test should be sufficient. Since this happen during a very hectic part of the season a longer quarantine could not be justified. The cabin used by the aircrew for overnight stay was sealed off. After the 3-day quarantine everyone tested negative again and was released from their quarantine. The cabin used for overnight stay was thoroughly cleaned after 7 days. After this it was decided that there could be absolutely no interaction between NPI personnel and other programs for the rest of the season.

The effects for the Norwegian program was, besides the loss of 30 days of work, that one very important and long-term science project in early January which required Basler support was cancelled.

**India:**

Deployment of team in Antarctica for season 2021-22 was planned in compliance with the guidelines of COMNAP and DROMLAN. All the members were fully vaccinated prior to their induction however, the overwinter members at the stations remained unvaccinated until they returned India. A total of 69 persons traveled from Cape Town to Novo on shared DROMLAN flights in three batches on 09-Nov, 04-Dec and 11-Dec 2021 while the voyage team sailed from Cape Town on 4 Jan 2022. Prior to boarding the flight or vessel, each batch underwent mandatory institutional quarantine in Cape town and periodic RT-PCR testing were conducted.

Influenza like illness/ SARS-CoV-2

In the third week of December 2021, a couple of persons developed symptoms of influenza like illness (ILI) with a recovery period of about two to three days. With continued resurgence of SARS-CoV-2 variants, the symptoms of flu were a matter of concern. Symptomatic persons were isolated and wearing masks were made mandatory. Despite appropriate measures, 28 persons at Maitri and 30 persons at Bharati manifested ILI symptoms during the course of about 2-weeks. No new cases were reported after 29 December 2021 and all the members recovered by 1 Jan 2022.

Rapid antigen tests were conducted on 13 persons at Maitri on 22 December 2021 who were expected to travel on board D07(OUT) on 23 December 2021 from Novo to Cape Town and the reports for all the members were negative. Despite testing NEGATIVE in “Rapid Antigen Test” conducted at Maitri, 12 out of 13 persons were tested POSITIVE at Cape Town in the RT-PCR test conducted on 24 December 2021. It indirectly confirmed that the cases at Maitri and Bharati were indeed SARS-CoV-2 instead of common flu or ILI.

Management of Situation

The manifestation and the severity of the infection were very much similar for vaccinated and unvaccinated persons. The illness was characterized by fever, coryza, sore throat and body pain and nobody developed features of Respiratory Distress Syndrome (ARDS). Symptomatic persons were prescribed Vitamin-C, Zinc tablets along with cough syrup and paracetamol when required. In addition, oxygen saturation for all symptomatic persons were regularly monitored. All the members fully recovered by 1 January 2022.

Suggestions

Implementation of globally known best practices the for prevention from SARS-CoV-2 appear to have helped India for 4 out of 5 batches inducted to Antarctica. However, the infection once arrived at Indian stations – Maitri and Bharati, quickly spread to the majority of population without making any noticeable difference in the symptoms or severity in the vaccinated and unvaccinated members. Notifying other nations of the infection through COMNAP and DROMLAN helped contain the spread to the members of other stations. In all likelihood, the Covid-19 cases at Indian stations were of highly infectious Omicron variant however, the source of infection could not be ascertained for the want of contact tracing. As the highest standard of the SARS-CoV-2 protocol could not fully keep Antarctica Covid-free, additional/alternate layers of safety should be explored.

**Germany:**

Germany followed the DROMLAN Sanitary Protocol with additional dedicated flights between Cape Town and Neumayer Station III operated by White Desert. In total three intercontinental flight were planned with a 14-day quarantine being mandatory for each expedition participant and flight crew beforehand and strict hygiene measures for White Desert personnel at the sites. During the second quarantine phase, the Omicron variant already dominated the infection situation in South Africa. This highly contagious variant led to infection within the second expedition team being in quarantine at Blaauwberg Beach Hotel, which caused the quarantine to be tightened (no group phase anymore) and extended by a minimum of 14 days. After the second group arrived at Neumayer Station III with a delay of 26 days, they had to stay outside the station for 72-hours and were only allowed to enter after tested negative. Due to the uncertainty of the infection, the third intercontinental flight was cancelled and the overwintering team was brought to Neumayer Station III via the research icebreaker RV Polarstern after a strict single quarantine (together with the scientists and the ship crew).

During the whole season, there was no contact with other national Antarctic programs, only the sharing of the DROMLAN feeder flights led to contact outside the own expedition. For leaving expedition participants, the shared infrastructure of DROMLAN was used under compliance of the DROMLAN Sanitary Protocol.

The station staff at Neumayer Station III were informed about the SARS-CoV-2 outbreak in Dronning Maud Land by the operator ALCI on the evening of 28 December 2021. As there was contact with the affected flight crew, the affected people were tested. At no time was there a positive case at Neumayer Station III. However, it should be noted, that personal protective equipment was always worn and distance was kept, as soon as there was contact with people outside the national expeditions. Every cargo handling operation was carried out without contact. During the entire season, flight crews were not allowed to interact with the station personnel apart from cargo and fueling operations under strict hygiene protocol. At least one mobile living module close to the skiway was dedicated for flight crews. If meals had to be taken, they were handed over without contact. After the flight crew had stayed in one of the modules, it was not possible to enter it for the following 14 days.

Further and more detailed information on efficiently and safely conducting expeditions in the Arctic and Antarctic during the SARS-CoV-2 pandemicis given in the IP 58 presented separately by Germany.