# Pandemic situation at Clinical Microbiology laboratories in Sweden

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In order to find out how Swedish Clinical Microbiology (Clin Micro) laboratories have handled the COVID-19 pandemic we contacted SLIM (Svenskt laboratorienätverk inom mikrobiologi). SLIM consists of members from all Regions represented by the Clin Micro laboratories with a remit from the respective Region. SLIM is owned jointly by the Regions and Folkhälso-myndigheten (Fohm, see www.folkhalsomyndigheten.se/slim/). SLIM representatives from the large Clin Micro labs at the seven university hospitals (Umeå, Uppsala, Stockholm, Örebro, Linköping, Göteborg and Lund) were interviewed concerning their experiences from the COVID-19 pandemic and our conclusions are summarized here.

All larger Region hospital Clin Micro laboratories adopted to the pandemic situation very fast, they were up and running with in-house established methods for RT-PCR analyzes of SARS-CoV2 already in February, 2020. Sequencing of virus isolates was initially slow but quickly established when Fohm decided to sequence 10% of the positive samples. However, certain laboratories had already established sequencing of virus isolates early during the pandemic.

A pronounced problem at all Clin Micro labs during the pandemic was problems with sample logistics due to the large number of samples and lack of communicating IT systems. The sample handling, which is on a level that has never been seen before in Clin Micro labs, was solved within the labs and improvements have been done in the IT systems, even if it is not working perfectly and improvements can still be made.

Other problems identified was to scale up the number of analyzes and to make it automized on commercial platforms. None of the laboratories were set-up for the scale of testing at the start of the pandemic but today all the major Clin Micro labs can handle large amounts of samples for molecular analyses. This transition was quickly established and the major limitation was recruitment and education of personnel and purchasing of equipment. There were also needs for bioinformatic support and further education of personnel in this area. One challenge in the future will be to run the established systems after the pandemic on at least 10% of maximum levels so that the platform equipment, assays, and personnel are up to date.

All Clin Micro labs lacked supplies, chemicals and equipment during early pandemic and they all needed and received help from other labs (commercial companies, governmental agencies, SciLifeLab/National Pandemic Center, other clinical microbiology labs).

There was a lack of a good, functional pandemic plan in most Clin Micro labs and there is a need to improve this for the future.

Some labs stated that they have difficulties to use money for method development since the activity is on the border of regular clinical lab work and academic science and grants are normally marked to use for either one.

Personnel with research background have been essential during the entire pandemic situation to quickly establish new methods and will be essential for the future to follow the front line in development of new methods and to keep the generated knowledge within the laboratories. It has been shown that active research in the lab environment is an advantage to keep personnel up to date and to create a stimulating working environment. It is also clear that efficient work in Clin Micro labs is very knowledge-dependent, it takes a long time to generate the specialized knowledge that is needed to do a good job and most of all to be able to quickly react during pandemic situations.

How can the Pandemic Laboratory Preparedness program (PLP) and SciLifeLab ([www.scilifelab.se/pandemic-response/pandemic-laboratory-preparedness/](https://www.scilifelab.se/pandemic-response/pandemic-laboratory-preparedness/)) support the major Clin Micro labs during the current and future pandemics?

1. *PLP and SciLifeLab can contribute with technology development and education of personnel.* SciLifeLab is Sweden’s largest infrastructure in life sciences covering the whole repertoire of technologies. The technological knowledge, via direct interaction and and courses, in this organization can be transferred to personnel in the Clin Microlabs. This can drive technology development at the international frontline and at the same time generate a stimulating environment and a possibility to keep key personnel and the knowledge generated during the pandemic. At the same time SciLifeLab personnel will get educated in Clinical Microbiology.
2. *PLP and SciLifeLab can support technology development projects related to pandemic research in Clin Micro labs.* Research and development of analysis methods is needed before and during pandemics and this can be supported. This can be done financially within the PLP program and by giving access to the SciLifeLab infrastructure and research network. Areas of interest are diagnostics and analyses of infectious diseases, analyses of immune responses during infections and vaccination and studies of resistance development in viruses, bacteria and other infectious agents.
3. *PLP and SciLifeLab can support bioinformatic analyses and data handling in Clin Micro labs.* Large amounts of data are the outcome of modern analytical methods in life science and SciLifeLab have the experience and expertise in this important area.