

# SARS-CoV-2 testing in Norway

The Norwegian Institute of Biomedical Science sent a survey to 19 microbiology laboratories that test for SARS-CoV-2 in Norway. The survey was designed with help from BLS students as a part of their bachelor assignment and sent through Questback on 5 Mai 2020. The purpose of the survey was to get facts about methods, biosafety and capacity of SARS-CoV-2-testing in Norway. The survey was summarized on 2 June 2020, and 13 of the 19 laboratories participated in the study. As of 25 June 2020, Norway has performed 321,471 tests and reported 8,793 confirmed cases and 249 deaths due to SARS-CoV-2.

The survey was divided into six chapters:

- Collection and specimen handling
- Biosafety and infection control
- Extraction of SARS-CoV-2 RNA
- PCR detection of SARS-CoV-2
- Other methods (Rapid molecular testing and Serologic assays)
- Capacity of testing - Challenges and solutions

## Collection and specimen handling

All collection of specimens is conducted through healthcare providers, mainly doctors and nurses, but also BLS's and other health workers. Usually a combination of nasopharyngeal and oropharyngeal swab is used in collection, but other specimen, like bronchial flush and sputum has been used in different circumstances.

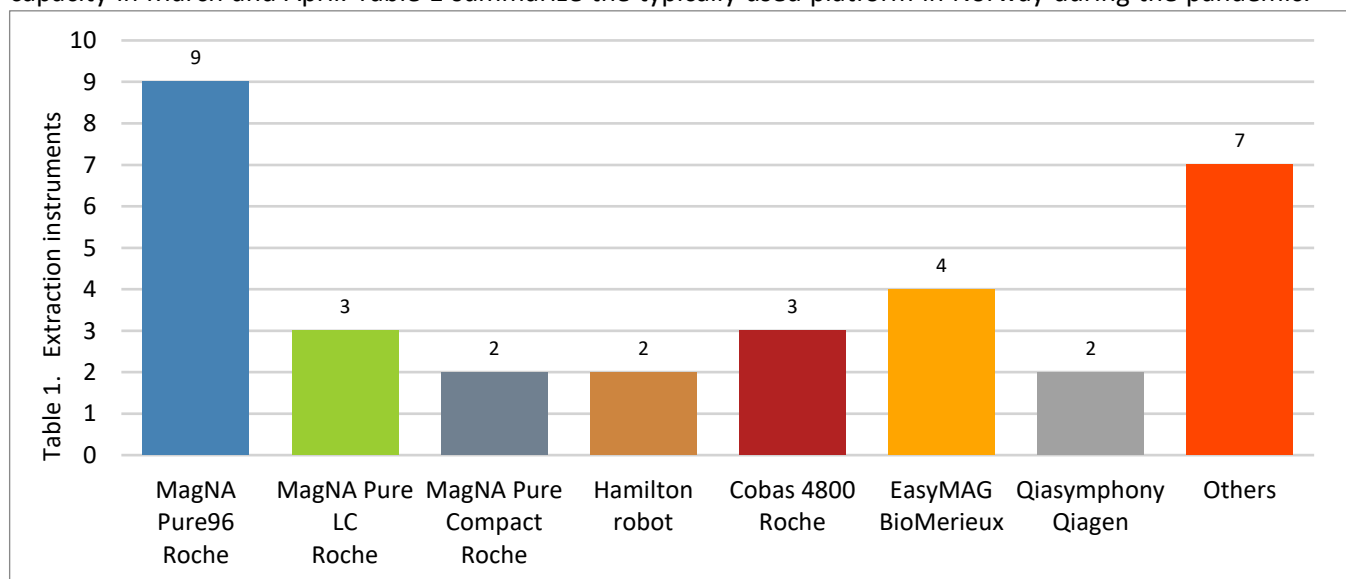
Due to lack of viral transport media, like Copan UTM or ESwab, 6 of the 13 responding Norwegian laboratories have started their own production of liquid based transport media.

## Biosafety and infection control

The risk of being infected by handling specimen is consider differently among the laboratories. Naturally, there's a lot more safety involved in preparing the specimen, than receiving and unpacking it. When preparing the sample before extraction of RNA the BLS's uses gloves (13 of 13), fume hood (11 of 13), protective coat (10 of 13), protective glasses/visor (4 of 13) and/or facemasks (4 of 13).

## Extraction of SARS-CoV-2 RNA

Lack of kits and reagents to automated extraction of virus RNA was a considerable challenge to the testing capacity in March and April. Table 1 summarize the typically used platform in Norway during the pandemic.

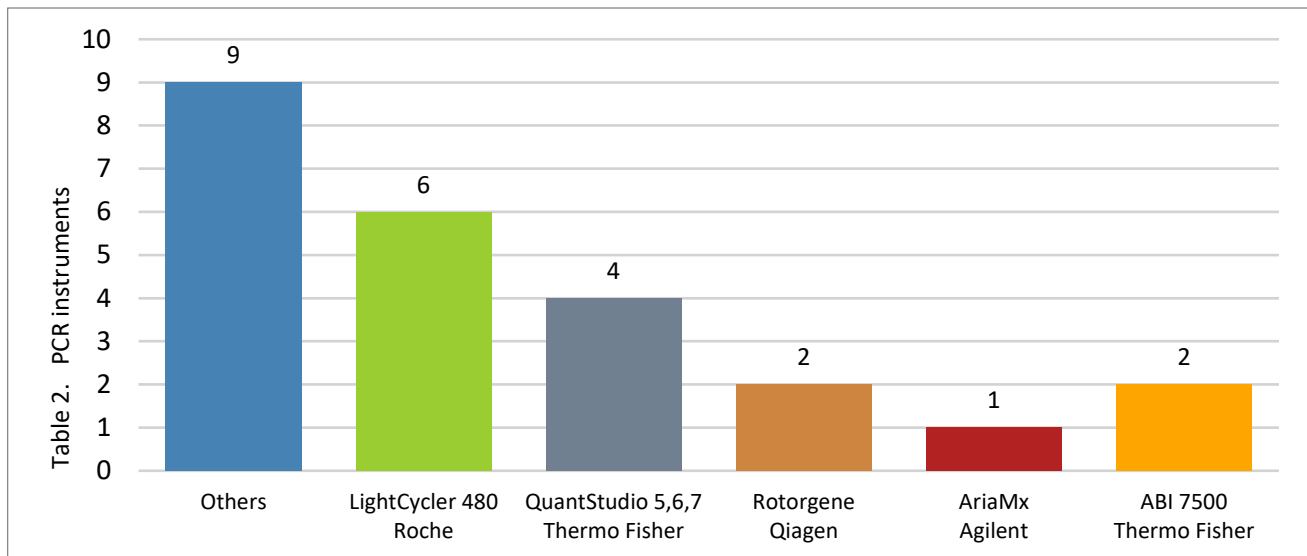


Some laboratories reported using other instruments like; EZ1 Advanced or Qiacube (Qiagen), Maxwell RSC (Promega), M200sp (Abbott), Nimbus (Seegene), KingFisher Flex (Thermofisher). The overall capacity of the main instrument is 91-120 samples in one run.

In order to solve the issue of limited access to reagents the Norwegian University of Science and Technology developed a technology for extraction of RNA based on magnetic nanoparticles that seems as sensitive as the commercial ones. The method has been applied in several laboratories in Norway to increase testing capacity.

### PCR detection of SARS-CoV-2

The majority (75 % of laboratories) uses in-house PCR tests in combination with commercial reagents for PCR detection of SARS-CoV-2. Table 2 shows PCR instruments used for detection of SARS-CoV-2 during the pandemic.



For nearly 40 percent of the laboratories, the response time from the sample is received until the answer is ready, is 5 hours. As many as 80 percent of the laboratories report test results within 12 hours after the sample is received in the laboratory.

### Other methods

60 percent of the laboratories in this survey have started using rapid molecular tests, such as SARS-CoV-2 on Genexpert (Cepheid) or Biofire Filmarray System (Biomerieux) in urgent situations. The instruments are placed in microbiology laboratories, emergency rooms and in other laboratories with 24/7 continuous operation. Only a small number of laboratories (3 of 13) have established antibody testing (May 2020) in routine use. Five laboratories will introduce antibody tests in the future, while three laboratories do not know.

### Capacity of testing - challenges and solutions

Five of the laboratories has a testing capacity of >900 tests a day, while the rest has a capacity of 600 test or less.

Lack of reagents and equipment for testing is reported as the main challenge in Norway regarding testing capacity. Collaboration between universities and hospital laboratories in finding new methods and solutions has improved the situation. In order to expand the capacity most of the laboratories has also prolonged their opening hours. As a result, lack of personnel has also been reported as an issue. 7 out of 13 labs thinks it will take 2 - 6 months to increase testing capacity due to the need to validate new equipment and to train personnel.