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# Situational awareness of laboratories and their supply chains: reflexions on the laboratory landscape in the midst of a «once in a hundred-year» crisis

**The Swiss laboratory landscape is heterogeneous in that laboratories may be privately or state owned, they can be operated within a public health structure such as a clinic or a hospital or elsewhere, and often times they are operated within a hospital but by another company as that operating the hospital (Reuschling, Conrad, & Korte, 2020). In cases where the laboratory is affiliated with the academic sector, they can be part of a university or part of a university hospital. While the academic affiliated laboratories have, next to their diagnostic activities, also a strong research vocation (be it pertaining to laboratory methods or to microbiology), they are not the only ones partaking in research activities.**

On Friday the 13th of March 2020, seeing the sizeable crisis coming onto the Federal office for public health (FOPH), Spiez Laboratory, who was already involved in the COVID-19 response with its own diagnostics capabilities and protective material testing expertise, offered to support the crisis management efforts in the field of laboratory diagnostics. Starting on Monday the 16th, a small team at Spiez Laboratory surveyed all known laboratories performing SARS-CoV-2 diagnostics at the time. Aiming to establish a census of COVID-19 laboratories, gain an understanding of their current situation, and list their diagnostic setups and needs. As more and more laboratories implemented SARS-CoV-2 diagnostic pipelines, so they too were surveyed and added to the COVID-19 laboratory roster. The ad hoc survey would later on be improved and professionalized in collaboration with the branch societies FAMH (laboratories) and SVDI (industry), the FOPH and a consulting company working pro bono. An additional survey was created in order to gain insight into the current and the foreseeable delivery capacity of the main in-vitro diagnostic suppliers in Switzerland. Throughout 2020 and until autumn of 2021, both surveys would be repeated mostly in a weekly or bi-weekly manner depending on the fluidity of the pan-

demical and supply chain situation. With a better understanding of reagent stocks, analytical systems in use and status of personnel resources, but also of the specific supply chains, the federal government had the necessary data to root decision-making pertaining to the testing strategy in data and observation of the field.

The first four waves of the SARS-CoV-2 pandemic in Switzerland have shown some of the attributes of the laboratory landscape and have put light on capabilities and potential fields of action.

## **Burden of a pandemic**

A pandemic comes in waves. Waves are asynchronously geographically distributed, not only between countries but also within countries. This was also the case within Switzerland (Federal office for public health FOPH, 2022), therefore regions of the country and their laboratories have been strained differently at different times. Much alike other economic fields, laboratories are set-up to be as cost-efficient as possible. Since they were set up in this way during pre-pandemic «normal» operations and pandemic times are particularly challenging (exceeding many predictions), laboratory capacity reserves (especially in terms of personnel) did not match, and could not have matched, the pandemic surge for diagnostics. Switzerland benefits from one of the qualitatively best health systems worldwide, which is a strong advantage in the normal situation, but this

comes with high quality management and training requirements. In addition, modern day in-vitro diagnostics is a highly technical field requiring years of training. Fast personnel growth in crisis times is therefore difficult and the market for qualified personnel had already dried out early in the pandemic. Laboratory personnel have demonstrated very high levels of engagement and flexibility – working overtime throughout the first two years of the pandemic. Of note, while there were only two pandemic waves in 2020, testing activity experienced four incrementally higher growth spurts that did not come back to a pre-spurt low level (Federal office for public health FOPH, 2022), therefore, and unlike clinical care, not allowing any respite for laboratories since the pandemic started.

## **Resilience of the laboratory landscape**

Nonetheless, the laboratory landscape has demonstrated high resilience and an impressive capacity to increase testing capabilities (from a national maximum of about 10'000 tests per day in the first wave to over 100'000 tests per day in January 2022). Part of the resilience of the laboratory landscape can be attributed to the aforementioned flexibility and engagement of their staff and in part to the capacity of laboratories to collaborate and forward samples from overburdened laboratories to partner laboratories with capacity left (for example from less bur-

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dened neighboring regions). Certainly, a solution-oriented and innovative mindset within many laboratories has been essential.

### Dialogue is central

Hospitals are complex structures housing many different trades and expertise. Avoiding cultural and expertise divides between clinical departments and between them and laboratories is a challenge. During the pandemic, this sometimes lead to unrealistic expectations and challenges in prioritization of resources and strategies within hospitals. Regular dialogue between fields of expertise and trades within hospitals remains central.

Keeping the dialogue open and going between laboratories and the cantonal and federal governments is also essential in order to design realistic testing strategies and avoid as much as possible system collapse through overburden. In this sense, professional societies are not only a useful networking tool and information platform in the normal situation, they have a concrete operational role to play in times of crises too. Professional societies understand their members and their field best, they can condensate the information and translate it in such a way that the message arrives properly prioritized and in a usable form to the government. They can punctually survey their members in order to fill specific

knowledge gaps and inform the legislators and strategists within the government. They can also help the government by formulating concrete recommendations (see for example (FAMH, 2021) (Swiss Society for Microbiology, 2021)) and in transmitting information from the government back to their members all the while giving context to the governments' decisions for their members (see for example (Schweizerischer Verband der Diagnostikindustrie, 2020)). These and other actions have been taken by professional societies such as the FAMH, SVDI and SGM throughout the pandemic.

### Heterogeneity as a strength

While the heterogeneity of the field may appear upon first glance as a challenge, for instance when implementing new pricing or changing the testing strategy, it comes also as a strength of the system.

When, in late 2021, laboratories mostly serving medical practices were submerged by requests for serological testing for COVID certificates, hospital-based laboratories were almost completely free of such requests. When certain laboratories were submerged by a local increase of testing demand, they could transfer some of their samples to collaborating laboratories in regions nearby. Some laboratories have a rather localized diagnostic activity,

within a hospital or within a city; other laboratories have catchment areas that stretch out over the political boundaries of the cantons and in a few cases stretch out almost to the entire Swiss territory. Some of these larger laboratories have a network of multiple laboratories with SARS-CoV-2 testing capability at each location, others have focalized on a few core laboratories with very high SARS-CoV-2 analytical capacity and streamlined industrialized processes, sending samples from local collection points to their focal core laboratories multiple times per day. Swiss laboratories use different analytical pipelines from a range of suppliers, so that should one supplier experience difficulties in its supply chain, not all laboratories will experience the delay in supply delivery. Many larger laboratories implement multiple pipelines from different suppliers within their laboratory, not only increasing their resilience but also increasing their flexibility in terms of number of samples per run and therefore in terms of supply management and usage. Implementing different PCR-tests with different targets throughout a countries' laboratory landscape may also come as a safety feature in terms of detection when new viral variants arise (Lienhard, et al., 2021) (Metzger, et al., 2021).

### Conclusion

Few days after the first Swiss SARS-CoV-2 patient was identified in the last days of February 2020, the federal government set up a system to gain situational awareness of laboratories and their supply chains. Even though this system required from both laboratories and in-vitro diagnostics suppliers some additional administrative workload in the midst of the highest of workloads during this pandemic, the added benefit of the information given has been essential. Without these data and information, the government would not have had a situational awareness of the diagnostics field, which would have amounted to flying blind in respect to the testing strategy. Even though the testing strategy may seem at times not perfectly in tune with the needs of laboratories, this is due to the fact that not

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only the possibilities and needs of the diagnostic field flows into the decision-making process, but also many other parameters have a weighty influence on the strategy.

A situational awareness system based on surveys feeds the government with the necessary data, but data alone does not suffice. Interpreting the data requires tacit knowledge that is best delivered by the people at the forefront themselves. This essential role of helping to contextualize the information gathered was and still is provided by the professional societies. Laboratories offer an essential service to public health by making the pandemic visible. Without proper diagnostics, there is no definitive identification of cases. Not

well known of the public, the laboratories can be qualified as essential «travailleurs de l'ombre» of the public health system.

While some systems were established ad hoc for the pandemic, such as the laboratory and supply chain situational awareness surveys, they may be superfluous in normal times, and therefore may have to be reinvented/implemented again from zero when the next crisis comes. Alternatively keeping such a system, albeit a much lighter version of it, may also prove to be helpful in the normal situation.

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# COVID-19-Pandemie in der Schweiz – die wichtigsten Erkenntnisse im Praxislabor und der Praxisfachpersonen

**Wenn Hausärzte und MPA in der Zeit der Pandemie etwas gelernt haben, ist es flexibel zu bleiben und aufmerksam alle Informationen aufzunehmen, die den Alltag einer Arztpraxis immer wieder auf den Kopf stellen können.**

Wir MPA sind GeneralistInnen und unser Einsatz in der Arztpraxis ist vielseitig. Das Praxislabor ist der Ort, wo die Patientinnen und Patienten auch mal ihre Sorgen platzieren und es lässt Gespräche entstehen und manchmal auch Diskussionen. Wir sind die ersten Ansprechpersonen für die Patientinnen und Patienten und haben stets ein offenes Ohr für Fragen, Anliegen und persönliche Katastrophen. Wir nehmen Bagatellen genauso ernst wie Krisen- und Notfallsituationen – eine Berufseigenschaft einer jeden MPA.

Was sind die Erkenntnisse der Pandemie im Bereich des Praxislabors? Für jene Praxen, welche nach dem ersten Hype teilweise zu dezentralen Test-Zentren wurden, weil symptomatische Patienten, bevor sie in die Arztpraxis können, zuerst getestet werden müssen, offenbarte sich ein grosser organisatori-

scher Mehraufwand. Diese Organisation lag meist bei den MPA, unter der Berücksichtigung der BAG- Richtlinien – was eine hohe Medien- und Informationskompetenz verlangt. Die MPA und die Hausarztpraxen wurden zu wichtigen Auskunftstellen für die breite Bevölkerung während einer Zeit der allgemeinen Verunsicherung. Zu Beginn der Pandemie, als noch wenige Daten und kein Impfstoff vorhanden waren, war das gegenseitige Verständnis, die Solidarität, wie auch die Empathie gegenüber den Schwächsten gross. Die Anerkennung war spürbar und es erfüllte einen fast ein wenig mit Stolz, sich für die Sache einsetzen zu können und Teil der Krisenbewältigung zu sein. Mit der Aussicht auf eine Impfung schien es uns schliesslich gewiss, dass diese Krise bald ein Ende finden würde und Normalität wieder einkehren wird. Wir wurden eines Besseren belehrt und wir befinden uns nach wie vor in der Krisensituation.

Zu den Entnahmen von Abstrichen für das Testen sind dann noch die Organisation der Impftermine und -anlässen dazugekommen. Dabei gilt es nicht zu vergessen, dass das Impfen auch geschult werden muss. Der SVA hat zwischen Dezember 20 bis Mai 21 mehrere Hundert MPA online in Theorie der neuen Impfstoffe, Handhabung und Ausführung ausgebildet. Damit sind sie gewappnet und bereit dafür, die entsprechenden Prozesse in der Praxis einzuführen und für Impfungen bereit zu stehen. Ebenfalls nicht zu vergessen sind die IT-Prozesse rund um die Anmeldung und das Ausstellen der Zertifikate sowie weitere Arbeiten, welche immer neben dem üblichen Tagesgeschäft zu bewältigen sind. Die Erkenntnis in diesem Bereich gestaltet sich ambivalent: Einerseits liessen sich die neuen Prozesse und die zusätzlichen Aufgaben in die meisten Praxislabors gut eingliedern, andererseits stiess das Personal und die Infrastruktur auch an neue Grenzen. Die Pra-

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