Ten lessons for the life sciences from COVID-19

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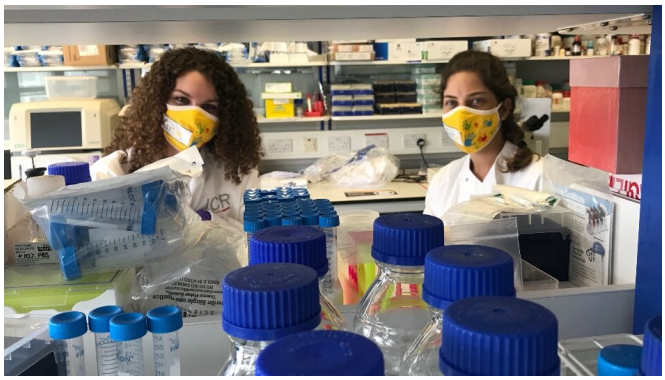

Credit: Institute of Cancer Research

The COVID-19 pandemic has seen virus-beating technologies progress at unprecedented speed. Scientists have raced to understand and treat the new coronavirus, teams have developed tests and built COVID-19 equipment, and deals have rapidly been brokered between partners.

In the past few weeks, for example, we've seen the results revealed of major trials of three separate vaccines. Each announcement came following 10 months of incredible effort, shortening a process that would usually take about 10 years.

How has this been possible? And once life returns to something like normal, what are the chances of a positive knock-on effect for future collaborative, cross-sector research and development across non-COVID technologies, including in cancer?

Ten key factors

I've identified 10 key lessons to learn from the rapid development of COVID-19 technologies, and assessed how likely it is that we might be to achieve similar progress on other technologies in the future.

1. Horizon scanning, rapid starts and quick pivoting

A recent piece by the BBC asked Professor Sarah Gilbert about the development of the Oxford vaccine. At the beginning of the coronavirus outbreak she was in the process of developing a vaccine for MERS—another coronavirus.

When SARS-CoV-2 emerged in China she quickly realised that the same approach could be used for this new virus and so, within days of Chinese scientists publishing the genetic structure of the new virus, she had developed a vaccine strategy.

The key here was seeing that the new virus might become a problem and rapidly adapting existing thinking to address it.

Likelihood of being able to move this quickly on future technologies? It should be possible but would require frequent horizon scanning, coupled with the ability to think freely and move quickly. 8/10.

2. Getting the attention of academics

To move quickly, it is essential to have the full engagement and buy-in of academic inventors and innovators. That has happened with COVID-19 and it is a vital success factor in cancer research too.

If we want to proceed quickly with a licensing or collaboration deal at the ICR we need to know that the academics involved are happy with it and are available to promptly answer any questions that might arise—particularly if the project will involve further work in their labs.

A challenge in the university sector is that academics are so busy, it can be difficult to get their attention quickly. But over lockdown, when many labs were closed, scientists were able to focus on getting deals completed—and even those

who were still in the lab tended to answer questions without delay, as COVID-19 was such an important issue.

Likelihood of getting the same amount of academic attention in future: 7/10. Academics are typically very interested in getting their technologies adopted, but it may sometimes be hard for them to prioritise commercialisation above other work.

3. Dropping everything

A third factor in the rapid development of COVID-19 technologies is that many people have dropped almost everything else to focus on the pandemic.

For example, earlier in the pandemic the MHRA was asked how it had been able to approve commencement of clinical trials on COVID-related technologies so quickly—and its answer was that it was putting just about everything else on the back burner.

This has been true for many deals involving COVID-19 technologies. Other work has been set aside to get COVID deals done.

Developing COVID-19 technologies has been like driving across London at rush hour—only with the roads cleared, the lights turned green and with a blue light escort, rather than the usual traffic-choked journey full of frustrations and delays.

Likelihood of being able to drop everything in the future: 3/10. Post- COVID, there are likely to be competing priorities that simply can't be dropped as easily.

4. Carrying out work in parallel and working at risk

Usually the development pipeline of a new medical technology is carefully sequenced, with positive results required from one stage before moving on to the next. In order to compress the timeline for the development of coronavirus technologies, this sequence was set aside and many steps were done in parallel.

This required much more work to be done at risk than usual. For example, pharmaceutical companies began preparing for vaccine manufacture, including all of the set-up costs this entailed, before efficacy testing was completed.

Under normal circumstances, funding for development may be tranched, requiring success at earlier stages to be shown before moving on. And even large companies may be reluctant to take the kind of financial risks that have been taken with COVID-19 to get so rapidly to a safe and efficacious vaccine.

Likelihood of being able to compress timelines in this way in future: 2/10. It will be rare that something is considered so urgent that stakeholders will be prepared to bear the financial risk that this entails.

5. Everyone moving quickly

There are always at least two parties involved in the negotiation of any deal—often more. But for COVID-related technologies, not only have universities been dropping everything to work on them, so has everyone else.

Normally, at least one of the parties involved will also be working on other things with higher priority, leading to potential delays. During the pandemic, technologies to fight the pandemic were top priority of everyone's list.

Likelihood of all parties being able to prioritise a future transaction: 3/10. When things return to something like normal, there will be other priorities again. Our analysis of one recent transaction found that 20% of the 'dwell time' – time spent waiting for someone else to do something—was with us, with 30% at a funding partner and the rest at our industrial partner: we all have many competing priorities.

6. Streamlined decision making with direct access to senior management

Sitting alongside moving quickly is being able to make decisions quickly. Universities are not generally renowned for the speed of their decision-making and larger companies may also have to

pass decisions through several layers of management.

But in tackling the challenges posed by COVID-19, cross-functional and even cross-organisational teams have been rapidly put together, breaking down existing silos and with direct access to the highest levels of management. Many organizations adopted a gold-silver-bronze command structure, holding meetings regularly, often daily. As a consequence, decisions were made far more quickly than is usually the case.

Likelihood of rapid decision making in future—6/10. I fear some technologies will once again be subject to the tiered decision making and committee schedules that were common before the pandemic, but I am optimistic that the new connections that have been made within and between companies can be harnessed to speed up future projects, and that access to senior management can still be obtained for the most important of those.

7. Financial terms

For normal licensing deals, universities and their funding partners expect a fair financial return on sales of products using their technologies—which means negotiating royalty rates and milestone payments as well as hand-back, liabilities and other terms.

We have an obligation to our scientists and funders to get the best deal we can rather than the fastest deal, meaning time is spent negotiating.

But many COVID-19 technologies have been licensed on a royalty-free basis, provided they were used in the not-for-profit development of treatments and diagnostics. This removed the need to negotiate financial terms.

Indeed, many of the other terms were also much simplified and only negotiated if a party found them absolutely unacceptable. Sometimes, non-negotiable 'shrink wrap' licenses were provided with very benign terms, further streamlining the process.

Likelihood of being able to do a minimum negotiation deal in future: 2/10. While shrink-wrap licenses and easy-access IP are becoming more popular, there will still be the need to negotiate terms on many of the technologies we license for further development.

8. Going digital

While much management time has been focused on organizations' response to the pandemic, people themselves have had more time, as a result of not traveling and not commuting. It has been easier to coordinate diaries for Zoom calls than for face-to-face meetings.

This has allowed negotiations and discussions on the development of technologies to proceed more rapidly than if everyone had had to find several days clear in their diary for face-to-face discussions, sometimes on a different continent.

It's not been easy at times, but we have all had to embrace digital technology and it has made some elements of working life more efficient.

It is unlikely that people will go back to working in the office in the same way in the future—people are now more willing to conduct meetings and negotiations and communicate major decisions over Zoom (or your video-conferencing service of choice).

Likelihood of doing deals in this way in future: 9/10. We know it can work!

9. Serendipity

Sometimes creating and developing a new technology can take a bit of luck. We might say it was lucky that Professor Gilbert was already working on a vaccine for a different coronavirus when the pandemic struck, and there have certainly been reports that the 90% efficacy observed in one group of people vaccinated with the Oxford /AstraZeneca vaccine occurred through a mistake in the dosing regimen.

There is some element of luck in almost every new development. The conversation in the café that leads to a new connection, or the change to a process that shows far better than expected results.

The trick is to try to capitalize on these chance encounters and bits of good fortune, and recognize when something that some might consider a mistake is actually a breakthrough. Our desire to take advantage of serendipity was a key consideration in the design of the ICR's new Centre for Cancer Drug Discovery, where multidisciplinary teams will be encouraged to interact and bring different perspectives to bear on major scientific challenges.

Likelihood of getting a lucky break in future—8/10. As I said there is an element of luck in almost every new discovery.

10. The grandest of challenges

Defeating a global pandemic is the grandest of all grand challenges. The world is watching and delays will not be tolerated. There has been an unprecedented scientific focus on a common goal.

Chances of this happening in future: 1/10. Challenges like this area rare; but should we hope for this type of attention on other problems? Could climate change suddenly become another emergency that requires this level of focus? Or global food production, beating forest fires or defeating cancer?

The future

So, I make it an average of just under 5/10 across my scores. That on the face of it might not seem that hopeful. It does feel like once we've moved on from the immediate shock of the pandemic—when the vaccine has become widely available—many of the old challenges will return.

Even less optimistically, we also know that many non-COVID technologies have been delayed during the pandemic, and this includes the development of cancer treatments. Indeed patient care has also been adversely affected, as ICR-led research has shown.

But on a more positive note, the speed at which deals have been struck and technologies developed for a novel disease is a powerful demonstration of what can be achieved, by partners all working towards a common goal.

While we may not be able to go at quite the same speed as we have during the pandemic, there are various lessons here that we do look well equipped to learn. And there may also be other benefits. The way we have embraced remote working, may also, I hope, make working culture more diverse, enabling a greater contribution from a wider range of people and a greater range of new ideas to be brought to the table.

And, in all of the conversations about COVID-19, it should be remembered that the research underlying the technologies that have been licensed so rapidly has in many cases been going on for years.

We have a wealth of knowledge and expertise that can be brought to bear on the greatest scientific challenges. I think that, along with all that we have learned from working through the pandemic, bodes well for a brighter future.

Provided by Institute of Cancer Research