MILKEN INSTITUTE

CONVERSATIONS WITH MIKE MILKEN

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Mike Milken: Today, we have the honor of having David Feinberg, the head of Google Health, and Esther Krofah who runs FasterCures join us. David, what has been Google's response at all levels to this COVID-19 pandemic?

David Feinberg: It's really great to be with you and Esther. I'm happy to bring you up to speed on what we're doing at Google and Alphabet in general, to try to do our part around COVID-19. I'm very proud of how the teams worked on this to make sure that we got authoritative information out, so when you came to Google search that you were seeing information that made sense to you from a local standpoint, from a regional standpoint, and from an international standpoint.

Google for the first time took over the web page for a medical condition. We've never done that before. We've only done that for natural disasters like floods and hurricanes – we call it an SOS page. So if you typed in anything in a search bar around COVID, coronavirus, you got to a landing page on Google that was completely curated, that we made sure that there was all authoritative information, that it made sense based on what

This interview has been lightly edited for clarity and readability.

region you were in. No advertisements so that we can make sure people were getting the same type of information. Similar on YouTube: making sure on YouTube that we raise the authoritative information. Because it's a community network there, we have the ability to remove what we would consider non-authoritative information and really get people the information they were looking for.

And we really saw two groups of people; we saw consumers or regular folks coming, but we saw also a lot of clinicians coming to YouTube and Google. How do you treat this? What are they doing in China? What's happening in Italy? So really thought about those two audiences and how we could best get them that important information in a really timely manner.

The next big thing that I'm proud of that we released where our community mobility reports. These are now used in 130 countries worldwide daily. This was really public health folks coming to us and asking them to solve a problem for them. And the problem was: Are people social distancing? Are people staying away from crowded areas? Are people staying at home? And these reports in a very privacy-first way allow public health authorities in an anonymized way to see, "are the policies around social distancing, actually taking a hold and are they actually working?" And you could actually then predict where folks were doing well and what would happen.

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Following that, and this was in partnership with Apple, we released exposure notifications. And this was again, public health experts asking us to help with contact tracing. So think about it, if you're positive and you just got your test today and your positive COVID, you would know that you've been in contact maybe with a few family members and maybe if you went to work with a couple of work people. But if you're on the bus or you were in a crowded area, there'd be no way to contact those other people that you may have exposed. So in this voluntary system – and it's works both on the Android phone and the Apple phone – people can volunteer to be part of it, such that if they came into exposure with somebody who is now COVID positive, they would get a notification that they've had in essence, 15 minutes of contact in under six feet distance with somebody who's now positive.

Again, we don't keep any of the medical information. You don't actually know the person you were exposed to. You just get a notification that you were exposed. We already have this now in four states, more coming on, and now 16 countries and different

regions, including Germany, Japan, Italy, Brazil, are using our tool. We think of it as an important piece of the overall tool. And then most recently and really excited about this, we released what we call search trends symptom data set, and that's basically how many people in certain geographies – think of a county – are searching for something like "I'm having trouble smelling or my toes hurt," or "I have a fever" or "I'm coughing." And if those levels of search change, can that information – again, in a privacy-protecting way – be used by researchers to better predict where the next COVID outbreak is coming. So what we've really tried to do in general is get information out there to the public, to researchers, to public health folks, so they can make better decisions about what's happening and what they need to change so that we can all get through this.

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So Esther had a big job. I called her up in February and told her that she is ground zero for the world. Her and her team at FasterCures on making sure we're monitoring what is going on treating COVID –vaccines, antibodies, antivirals et all. But not only that, we needed to give people a list of what was going on. And I told her initially that we should be prepared to update this list once a week. She then told me, thank you, we're going to update it every night with her team. So I told her that might be too much work, but she's managed to do that Esther, as the center of providing this information to the world, our interaction with foundations, such as Gates, NI and BARDA and the HHS and FDA and so on, why don't you take us through what has occurred over the six months quickly and where are we today and where are we going?

Esther Krofar: Well, thank you so much, Mike. Back in February, when we had that conversation, we put together a spreadsheet, a back-of-the-envelope spreadsheet, that has now turned into this incredible tool that's had billions of views. I mean, it's been actually quite humbling just to see the level of uptake across researchers and governments and so forth. In early February, March, there were maybe two or three dozen compounds that were actually being considered for COVID; either treatments and therapeutics or on the vaccine side. And right now we're tracking 315 different efforts for treatments, antivirals, antibodies, cell-based therapies, and 210 different vaccine efforts as well, 30 of which are in clinical testing, six in Phase Three clinical trials. But on the therapeutic front, what's really important to understand, we've made some really significant progress since March.

We all saw and heard and in April and May the outcomes of a master protocol trial through NIH that gave us the answer around remdesivir. Mike and I were involved with actually getting some folks access to it on a compassionate basis. We had anecdotal information that remdesivir could be effective and saw the outcome of that through a platform trial to show that it really could help in terms of faster recovery for patients. Not too long after that, we saw dexamethasone as another potential therapeutic that can help reduce mortality. That came out of the recovery study in the UK. And so now we have an antiviral, dexamethasone, a corticoid steroid. Just recently we saw FDA provide emergency use authorization for convalescent plasma, which has gone into over 60,000 patients through our Mayo Clinic initiative. And there are many more that are underway in terms of study.

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What's really promising right now, where there's a lot of focus, as monoclonal antibodies with the potential for it to be used both as a prophylaxis, potentially for frontline workers like health care workers, but also as a therapeutic for patients who are in the hospital. And that's being studied right now through an NIH network. So, that's promising.

We're also seeing repurposed cancer medicines being investigated for COVID as well; studies that are underway, Mike, through the Prostate Cancer Foundation that you're very familiar with, addressing TMPRSS2, which is one of the two ways that the virus really attaches itself to the cell. So looking at repurpose, potentially prostate cancer medicine that could be effective there. So that's what we're seeing on the therapeutic front; a number of master protocols beyond what I talked about that are studying a lot of different types of medications that could affect things like the cytokine storm.

And then of course, where we see a lot of attention right now is on vaccines and the race to develop a COVID-19 vaccine, with six of them in Phase Three clinical trials. Expectation that we might have a vaccine through emergency-use authorization. So again, that could provide really definitive evidence and hope in terms of being able to provide access to millions of people to prevent COVID-19. So that's what we're seeing right now in terms of the landscape, Mike.

So Esther, if someone wanted to see what the more than 500 different protocols were, where do they go?

Esther Krofar: If you visit the Milken institute.org web page, you can find our COVID-19 Treatment and Vaccine Tracker, and you can download it in a useful way. It's all publicly available information. We continue to update that daily. We have started that back in March and we have continued to do so. And it's been incredibly helpful because we're keeping the data very fresh.

Let's go to you David, and talk for a few minutes about the potential collateral effects of COVID-19. We have children who didn't get to go to their high-school graduation, didn't get to go to their college graduation. We have seen, out of 15 million small businesses, 41% of every business owner led by an African American shut down within two to three months. And so over three million small businesses were shut down. What is the effect going to be on young children, adults, and others when this is over? And David, I know one of the things you've been concerned about and we have in our Center for Public Health, are the mental health issues that we're going to deal with in the next few years.

David Feinberg: I think we've already actually seen some of those effects. We saw early on studies in China that 20% to 25% of the kids there were suffering from depression and anxiety. That then moved into the U.S. where adult rates are now 50% of folks are experiencing symptoms of depression or anxiety. Eight times increased calls to the suicide prevention hotline. We started to see a lot of people coming to Google asking questions about depression, anxiety. We actually launched an anxiety screener to complement what we already had done around PTSD and depression. And of course a COVID screener that allows people to self-identify their level of depression or anxiety, and then get them into action. But when you think about the multiple effects, not only is it on my depressed when depression increases, and the economy goes bad, we know that diseases of despair increase – that's suicide, depression, alcoholism, drug abuse.

We also know that when you have kids out of school, I think it's only 30% of the kids in the LA Unified School District have even logged on once. So when you have kids out of school, not only are there going to be bigger gaps in education, but often times school or the coach or the afterschool program is the adult who identifies that a child may be exposed to adverse child events like substance abuse or physical abuse or sexual abuse. And they pull those kids out into safety. That's now not happening, right? So these kids are at home. They're at homes where houses are under increased stress. We know those houses are going to have increased rates of substance abuse themselves and alcoholism, and it's really, really setting up those kids that we don't know or see or hear about because they're not on Zoom, that are having more trouble. So really important for us to make sure that we figure out how to allow us as a society to protect this most vulnerable group.

So that's why we keep pushing mental health on YouTube. We know that our creators have a great way to get information out there and have helped them be able to more comfortably talk about mental health, to decrease the stigma. Anxiety alone, typically people wait seven to nine years before they tell anyone, including their family, their primary care doctor, their psychiatrist, that they're suffering from obsessions and compulsions or OCD. Seven to nine years before you share that with anyone. We want to decrease that time period so people feel comfortable talking about it. We think that the mental health effects of this are going to be astronomical.

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And then you add onto that the sequelae of actually having COVID. We're learning more about the cardiovascular effects, the neurologic effects, so that's a whole another wave of people. You may survive COVID, but you will have medical issues. And then there's the whole group of people that need routine care, mammographies, colonoscopies. They need their diabetes check. They need regular physical exams; kids who needs immunizations, that we've all been afraid to go into the doctor during this time period. So there's this entire gap of routine care that people are afraid and not coming in for routine care. So we really need to bring up the healthcare system back online so that people get routine care. And so we've really tried to focus on making sure we get people back into care. Which clinics are open? How you get there? What's available from telemedicine to make sure that the sequelae from COVID is not as large as it could be?

We have seen opening patent libraries by biotech and pharma so people can manufacture products without royalties during this period of time, whether they're manufacturing them in India or Pakistan or someplace else in the world. We've seen the sharing and the partnering of numerous companies, so when you look at antivirals, antibodies or even vaccines, you will see that a few biotech or pharma firms combined their efforts to bring these to market. And so Esther, talk a little bit about the collaboration. I know Gates said assigned a person to interact with us, NIH had assigned a person. Let's talk a little bit about the collaboration, which I think both you and I would agree, and I'm sure David would, is unprecedented in the history of medical research.

Esther Krofar: We've seen a tremendous amount of collaboration with regard to COVID. I'm sure as you have participated in conversations with many people who are involved in

various efforts, a lot of it is borne out of the necessity of the times that we're in. We're in a global pandemic. Everyone's lives have been significantly disrupted. Companies operations have been significantly disrupted. And everyone is looking to what can we do? What part can we play? And how can we roll up our sleeves in order to solve for this pandemic in real time? We have seen the NIH, of course, respond in a significant way with a partnership that Dr. Francis Collins established through ACTIV (Accelerating COVID-19 Therapeutic Interventions and Vaccines). It's a public private partnership that brings together 17 to 18 large biopharmaceutical companies that are working with various agencies and U.S. government – the NIH, the FDA, BARDA are all part of this effort – focused on accelerating therapeutics, as well as vaccines.

These companies have made their libraries available. They're leveraging the NIH Clinical Trials Network in order for us to get to an answer as quickly as possible. Some of the most promising therapies that we are tracking very closely – monoclonal antibodies – are being tested through this public-private partnership.

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But we've also seen the Gates Foundation a step up in a significant way. The Gates Therapeutic Accelerator is an example of that, and they are partnering with Mastercard, the Wellcome Trust and a number of other individual philanthropists in order to review in real time compounds that companies have also put forward that can be repurposed to address COVID, with a focus particularly on low- to middle-income countries, which I think is quite significant because we really need to solve for this pandemic everywhere, including in under-resourced or less resourced parts of the world with therapies that can really get to the vast amounts of the population.

We've been quite involved with also helping Gates partner on their clinical trial efforts with the government, with the VA, with NIH and so forth. We've also seen nongovernmental organizations like CEPI, the Coalition for Epidemic Preparedness Innovation, also step up in a significant way. They're partnering with individual philanthropists. They're partnering with sovereigns, with governments who are supporting their efforts, partnering with the U.S. government, with companies that have compounds, vaccine candidates that could be accelerated through clinical development to helping them produce enough of their vaccine that can go through clinical trials, as well as funding advanced manufacturing. They're also part of a global effort with the

WHO to secure enough advanced commitment of vaccine supplies for low- to middle-income countries.

We're also seeing tremendous amount of collaboration in NCATS, the National Center for Advancing Translational Science that FasterCures was instrumental in establishing a number of years ago. They're working very closely with the academic medical research community in order to review compounds that they submit to NCATS to get assays in real time to understand how that compound has been used in other drugs, whether it has potential benefit for COVID, having all of that data provided to accelerate their efforts so they're not repeating that kind of analysis and efforts.

So, everywhere that we look, Mike, we see governments step up. We see the private sector step up. We see philanthropy step up. And we see individuals, in fact, step up. And we have a lot of hope for what that means for us in the future. As we think about other disease conditions, we realized that we don't have to work in silos. We can come together around rare diseases. We can come together around oncology. We can come together around Alzheimer's in a pre-competitive way to share data, make libraries available, collaborate on medical research that can accelerate these efforts going forward.

We will have a solution here for the COVID-19 pandemic and the world has changed in collaboration and speed. The fact that a government is willing to put up money for manufacturing and production prior to knowing whether it works is kind of a new strategy on a massive scale.

David and Esther, I want to thank you for joining us today. All the best, and good health to you.
