

Jacob (Blue Sky operator):

Welcome to Catholic Ethics and the Challenge of COVID-19, a live webcast series presented by the Catholic Health Association and Georgetown University, in cooperation with the Pellegrino Center for Clinical Bioethics. Thank you for joining us. My name is Jacob and I will be the operator for today's presentation. Before we get started, I would like to acquaint you with a few features of this web event technology. At any time, you may adjust your audio using your computer volume settings. There will be a question and answer portion of the webinar. To submit a question, just click on the Q and A icon located at the bottom toolbar of the Zoom platform and enter your question.

Jacob (Blue Sky operator):

Please note that today's presentation is being recorded and both the recording and slides will be emailed to you. We are joined today by Nate Hibner, director ethics for the Catholic Health Association. At this time, I would like to turn the presentation over to Nate for opening remarks. The floor is yours, Nate.

Nate Hibner, Ph.D.:

Thank you very much, Jacob. And welcome to everyone. Thank you for joining us for part five. The special series presented by the Catholic Health Association and Georgetown University entitled Catholic Ethics and the Challenge of COVID-19. Before I introduce today's presenter, let us take a moment for prayer.

Nate Hibner, Ph.D.:

Jesus Christ, healer of all stay by our side, in this time of uncertainty and sorrow, be with those who have died from the virus. May they be at rest with you in your eternal peace. Be with the families of those who are sick or have died as they worry and grieve. Defend them from illness and despair, may they know your peace. Be with the doctors, nurses, researchers, and all medical professionals who seek to heal and help those affected, that do put themselves at risk in the process. May they know your protection and peace.

Nate Hibner, Ph.D.:

Whether we are home or abroad, surrounded by many people, suffering from this illness or only a few, Jesus Christ, stay with us as we endure and mourn resist and prepare, and the place of our anxiety give us your peace and stayed by our side and this time of uncertainty and sorrow.

Nate Hibner, Ph.D.:

We are very honored to be joined today by Professor James Giordano from Georgetown University, we will focus on the topic of public surveillance as it relates to COVID-19. Professor Giordano is a professor in the departments of neurology and biochemistry, chief of the neuroethics studies program, co director of the O'Neill Pellegrino program in science and global law and policy, and special projects advisor to the brain bank at Georgetown University Medical Center. He is also senior fellow of the project of biosecurity technology and ethics of the US Naval War College in Newport, Rhode Island and consulting bioethicist to the US defense medical ethics committee, currently addressing ethical issues in biosecurity, in biomedical responses to the COVID-19 crisis.

Nate Hibner, Ph.D.:

Professor Giordano's the author of more than 300 papers, seven books, 21 book chapters and 20 government white papers on brain science, national defense and ethics. His book Neurotechnology And National Security And Defense Practical Considerations, Neuro Ethical Concerns is widely regarded and used as a definitive work on the topic. In recognition of his achievements he was elected to the European Academy of science and arts and named an overseas fellow of the Royal Society Of Medicine in the United Kingdom. Welcome, Professor.

Nate Hibner, Ph.D.:

Today's event is 30 minutes. If you have any questions during the discussion, please go ahead and enter them in the Q and A module and we'll answer them at the end of the presentation. And so with that, I will turn it over to Professor Giordano to begin his presentation.

James Giordano, Ph.D.:

Thanks very much. And thanks to CHA for extending the invitation. Before we begin a brief disclaimer, and also in terms of some transparency. As you all may know, I am currently doing a bit of work with the department of defense United States government and have been for the past decade and a half. Nothing that we're about to tell you here necessarily represents the views, perspectives, or opinions of the United States government, Department Of Defense, the Defense Military Ethics Center, and/or the United States Naval War College. These represent my views based upon the most current information that I've been able to assess through a variety of the resources and collaborations that I currently manifest. And certainly I keep myself open for questions. The information that I provide you here, once again is current. As of this date, this is a changing situation. And as a consequence of such changes, we understand that this really needs to be a flexible understanding.

James Giordano, Ph.D.:

What we're talking about today is pandemic surveillance. And I won't bore you with specifics about the nature of the SARS-CoV-2 virus that is the source of the illness COVID-19. Enough to say that it had initial human host opportunities to transfer zoonotically from an animal species may have, or may have not gained an intermediate species from bat to perhaps an armored animal called a pangolin, then going over humans, that's still debatable, but certainly transmission from a bat species to human seems to be at least one of the primary vectors.

James Giordano, Ph.D.:

Let me make something very, very clear to each and all of you in the audience. As you know, I do a lot of work in the biosecurity and bio warfare realms with regard to not only the science and technology, but ethical issues that arise from those heinous engagements. And to all the understanding that we have and all of the information that is provided for me through a variety of resources, both high side and low side, inclusive of those things that are classified and not give you a guilty knowledge, there's nothing to suggest that the SARS-CoV-2 virus, the COVID-19 is a manmade pathogen. It is not. It's a naturally occurring zoonotic disorder that apparently has spread once again from an animal species to humans, for a variety of different reasons.

James Giordano, Ph.D.:

We know there were some early viral ISO forms, but what becomes important to understand is the patterns of infections. We know that individuals between 24 and 48 hours of their infection have what's called presymptomatic spread. This represents the first phase of viral shedding, and they continue to

virally shed two to 28 days after their symptoms begin. And the latest information about SARS-CoV-2 suggests that the virus unlike other coronaviruses may be somewhat unique and then may be able to lie in latency, dormancy, if you will, in certain tissues of the gut, perhaps of the nervous system and elsewhere throughout the body, and then reappear. Either reappear in its current form or in an ISO form, a modified form that may not necessarily represent a full on mutation, but in some way, an adaptation to the ecology in which that virus is now engaged with those living host cells.

James Giordano, Ph.D.:

Well, we also understand is that there are a higher number of infections than previously recognized. The proverbial "patient zero" has been punitively identified as being infected as early as September of 2019. That would suggest that infection may have occurred in either later summer or early fall. And as a consequence, the spread of the infection throughout the fall and early winter was far more profound, which would suggest that the hetero types of this virus, in other words, the different forms of this virus are perhaps multiple. And we know that to be true. If we just take a look at how the virus presents, it presents on the constellation of signs and symptoms. Yes, mostly respiratory, but also GI, fully somatic. Many individuals are asymptomatic. And there now seems to be both a neurological manifestation and that inflammatory vascular manifestation that occurs primarily in children. But it's the spread factors that are so, so important in trying to quote proverbially, flatten the curve, if you will.

James Giordano, Ph.D.:

Understanding the nature of new infections that lead to quote incidents and those individuals who are infected and may have dormant infections, even though their symptoms may be minimal not present at all, which then contribute to prevalence, that'd be highly, highly important to not only utilizing human resources to stop the spread, but also to develop adequate treatments and testing and vaccines, to be able to determine who is most vulnerable, who may not be vulnerable and who may have mixed vulnerabilities. The key variables that are so important to the spread factors are the aerosolized spread. In other words, the droplets of very, very small, small size that can then be spread from individuals as they talk, as they breathe, and certainly as they cough. These aerosolized spreads are smaller than actual droplets that would then come out of the individual if they're coughing or sneezing, which would then get onto various surfaces as you know, the durability of the viruses on various surfaces, such as metal, plastic, various forms of cardboard and paper are differential.

James Giordano, Ph.D.:

But now we're really more concerned about interactive spread. How does one individual through their social engagement, engage human to human contact in a variety of different means that then propagates the spread of this virus and therefore engages further spread of pandemic effects? Well, we know that human social engagement is critical. Travel, work, physical proximate socialization. And this is important because we're recognizing now is that the original idea of maintaining a physical or social distance of about two meters, if you will, about six to seven feet may not be sufficient. The aerosolized ability, in other words, that very, very small particulate matter of this virus that may be exhaled in breath or as a consequence of speaking very, very loudly may now require a social distancing of up to two and a half to three meters. And we know that if people are moving quickly, for example, if they're exercising, running, jogging, skating, riding a bicycle, and their inspirations and exhalations are more forceful, they can create what's called a slip stream vector or slip stream vortex behind them that would necessitate anybody who's directly behind them being as far away as perhaps 16 to 20 feet with the lateral separations of perhaps 10 feet.

James Giordano, Ph.D.:

So clearly types of human to human contact, both direct and indirect becomes very important to understand as well as surface contact, where individuals who are infected and who may have been infected, but still may be virally, shedding, or engaging various surfaces that then may propagate the spread to others. This is very important when we begin to consider some of the epidemiological effects of peaks and their curves. We know that the first peak has not yet occurred, although regional and/or local peaks certainly have. An overall peak, if you will, with a national peak here in the United States. And an overall global peak is anticipated to occur somewhere between the end of May and the end of June. And that may be particularly so as we're now beginning to see manifests, spread into the American Heartland and also manifest spread to developing and undeveloped countries.

James Giordano, Ph.D.:

We do expect, as with so many coronaviruses and other forms of viruses there to be what's called in a tunnel rebound. In other words, these viruses do tend to decrease their curve capability, their infectious capability in warmer weather, not necessarily as a consequence of the virus itself, but more of the interpersonal dynamics and individuals being out in the air with larger distances between them. Bring them back inside in the fall. When things start to chill out, bring them into a controlled aerated environments. Next thing you know, we see a rebound effect and that's anticipated here as well. However, some of the ongoing work that I'm doing with my colleagues and Department Of Defense and with an organization called RANE, which is the Risk Assessment Network and Exchange is very importantly determining whether or not a second peak, a second wave may occur in November to December, 2020.

James Giordano, Ph.D.:

And we might call that COVID-20, the disease form itself might be somewhat different and even a possible third peak in April to July 20 of 21, which then forces us to engage and appreciate these mitigating factors. Certainly physical distancing is one of them. And unless you're living under a rock, which I'm sure none of you are, you know that there have been calls to limit physical distancing after this period of time due to the socioeconomic instabilities that they've incurred. And there are now relaxations of physical distancing, social distancing, the social engagement occurring regionally and locally throughout the country.

James Giordano, Ph.D.:

We know too, that we're working very hard to develop forms of antiviral treatments, antibody treatments, and there have been experiments, both explicit and implicit toward developing herd immunity with some implications there for individuals and social responsibility to get back out there and the socioeconomic environment, but engage more aptly and keeping some social distance so that there's relatively controlled social reinfection that may then lead to herd immunity. As we know from Sweden, that social experiment initially implicit, and then secondarily more explicated really, hasn't worked so well. And we see in those situations where individuals do come back together, we then see respikes in the number of new cases that are occurring sometimes as early as two to three days after re-infection.

James Giordano, Ph.D.:

Of course there's always work towards the vaccine, but even if we develop treatments, whether antivirals or antibodies, even if we're trying to develop herd immunity and we develop some form of

vaccine or vaccines, it will be very, very important to determine who is categorized as being safe or vulnerable. And this essentially reflects the horns of a dilemma. On one side, public safety and health, and on the other socioeconomic stability. Working with my colleague, Dr. Dan Gerstein from the Rand Organization, we developed a CNN opinion piece a few weeks ago that said that critical to trying to file down the horns of this dilemma is the need for effective, efficient, affordable, and accessible testing, both testing for the presence of the virus, utilizing a reverse transcription method, the nose swab, if you will, who has the virus, as well as blood tests, serological tests to determine who had the virus, or may still have some form of the virus, but may have antibodies against that virus. And those antibodies may be helpful to produce convalescent plasma, to then be able to allow others to develop some form of relative immunity.

James Giordano, Ph.D.:

Well, this testing must then be categorized. If they're going to be a metric, we have to do something with the metric. And we've suggested the identification of certain categories of individuals who are either actively infected, infected, and recovered, non-active or perhaps immune and those who may still not have been infected and therefore may be most vulnerable. And this would then determine how we might be able to allocate resources such as treatments and vaccines, as well as personal protective equipment and other resources to sequester the vulnerable. But to do this also requires monitoring of who's infected, who was infected, and who's not infected. As you know, there are ongoing enterprises of contact tracing, but there've also been proposals for infection identification, for reporting and tracking of those who will, and perhaps have gotten treatments and vaccines when they occur and then validating those categories of COVID infections so that these individuals could more responsibly return to social and economic and occupational engagement.

James Giordano, Ph.D.:

This requires surveillance. This is if you will an attempt at some type of a protective panopticon. And if I can refresh some of your philosophy, if you think back to Bentham and think a little more forward into the 20th century, some of the work of the philosophy of your show [inaudible 00:15:42] the panopticon was basically an open arrangement whereby you're continually viewed, where a very small number of people or a person can view many, many people throughout all of their daily activities. The idea there is that transparency then provides this level of security. But of course, like so many things that type of transparency is also both beneficial to some extent and burdensome, if not risky and threatening to others. What type of surveillance and will be required, self reporting is one, but that requires a particular level of social obligation and individual responsibility.

James Giordano, Ph.D.:

But what about systematic reporting? In other words, those individuals who have been tested should the testing facilities then produce that information to then contribute metrics, to say, we've tested A, B, and C, X, Y, and Zed. And this is how those tests came out. Should there be some combinatory approach where individuals themselves are then received and notified of the results of their testing, but they have some incumbent responsibility to report the results of that testing appropriately and/or should we utilize some form of personal communication tagging? In other words, iPhone apps or immunity passports, or chips and/or perhaps even electronic medical record access in key situations that may be important to allow individuals to return to social, occupational and even governmental and political workspaces and engagement spaces in a way that is going to be safe, protective, not only of individuals, but protective of the Polis protective of the process, protective of the corporation of the politics, any role the above?

James Giordano, Ph.D.:

This is not science fictional. This is science factual. The way we do this is utilize a host of what we call node edge dynamics. So that just assessing an individual's reporting, their communication, whether they're immune, what category they are, can, and very often should be linked to a whole host of other factors, both directly and indirectly. This is something that our group has developed and the larger construct is referred to as a [Funmueller 00:34:07] nodogram, where each one of these nodes represent realms of data. And these data are then integrated by virtue of their connectivity. So we can take a look at an individual's genes, their biomarkers, to determine what phenotype they are infected, noninfected, immune. This then can also be used to identify who those individuals are through their communications and contacts tracing their contacts and their behaviors through their social dynamics and ecology can assist us in electronic surveillance, contact tracing, and immunity overall oversight.

James Giordano, Ph.D.:

Well, this proposal would allow us to gain acquisition across domains, levels, geographical locales, across time and across groups. And in essence, what we then could do is to use point data. In other words, where are you in this particular pyramid? We can not only aggregate you in terms of certain aspects of time, but also we may be able to look back into your "metadata" and perhaps appropriately. So to be able to gain certain information, that would be very useful to not only bolstering your immunity and relative resilience, but also contribute to a proverbial greater good. The more we know about you, the more we know about why you have become infected, why you may be resilient, why you may be asymptomatic or remain vulnerable. The more we may be able to develop adequate treatments that have the benevolent end of being able to gain great benefit for the population at large against this COVID pandemic.

James Giordano, Ph.D.:

And we can certainly compare your data to cohort data, to population data, and we'd be able to use those population data more normatively. But as soon as we begin to talk about comparisons and normativity normalization, and then creating abnormals, as well as norms, we open a proverbial Pandora's box. Oh, the goodies are in that box because we recognize that the driving force is the benevolence of suppressing the problem and the burden of this pandemic and all of its effects, biologically, psychologically, socially, economically. We also recognize that the burdens go beyond this. Defining norms and abnorms defining who is infected, who is not, may also be instrumental and influential to certain forms of public individual professional, occupational, and legal regard and treatment. It may very well be that we utilize these sort of black box, big data methods to be able to develop patterns and then create patterns that are not only descriptive, but are in many ways predictive.

James Giordano, Ph.D.:

And this brings us into a second dilemata. On one side, the need for prevention, protection to ensure public safety and public health. And yet those very same mechanisms create tensions, if not conflict and or apparent impunities with privacy, personal liberties, rights and potentially punitive implications. In so doing there are a number of caveats that we call second order caveats as well. Clearly this huge amount of data being held in repositories must be assessable and therefore accessible for some form of use. We would hope that those uses are benevolent, but if it's tagged, identifiable, then the data and the individuals to whom those data belong are targetable. Moreover, as you saw earlier with no nodogram, these data are stacked and in those stacking vectors and in those nexus, those stackable points are

hackable points. What's hackable as manipulable, and what's controllable is corruptible for a variety of ways.

James Giordano, Ph.D.:

So the questions really are, what do we do with the information and capability we have? We know we need more. We know we need to track and trace and surveil. What do we do about the information we don't. Given what we can do? What should we do? And then once we know what we should do, can we really do that? Well, one way towards this is to develop what's called a 6-C approach. We need to address the capacities and limitations of the technologies at hand, various cultures and circumstances of its potential use, the consequences that these technologies will incur, or the consequences of not using these technologies, examine the benefits, burdens and harms of commission and omission. What is the character of the patient, the family, the society that could be affected by using these data and information for what we assume would be benevolent ends, but of course, like so many other things, may be bastardizable and corruptible.

James Giordano, Ph.D.:

And if in fact, we're going to ask people to consent to this level of surveillance, will we provide continuity of clinical care for any form of manifestations that might come out of these testings in the future and what that information means and ongoing research, not only biomedically, but socially, psychologically, politically, legally to determine what the longterm or intermediate terms of the effects might be. Our core premise is simple. Based upon the work we've done. We really do not feel that civic institutions at large are fully ready for this overall level of instrumentalization of data surveillance, to be able to do this in a way that is both pragmatically sound, prudent, and at the same time protective, what we need before we go forward is something that we've proposed to be called a medical information nondiscrimination act, or MINA.

James Giordano, Ph.D.:

And here we give a great nod of homage to a colleague who a number of years ago wrote something about a neurological information on discrimination act. Her name is Stephanie [Costiok 00:23:19], and it's one of the best statements ever written in a paper. What it suggests here is that if we're going to move forward and do so, not only in a way that is technically sound, but also that is morally apt, we need to make sure that the ethical legal safeguards are in place. That the information that we're requesting of people and getting consent for will in fact, be protected by policy and legislation. But more than that, we need programmatic biocyber-security to make sure those stackable systems are not hackable so that they're not corrupted. And we need ongoing surveillance of the surveillance and to do this will require some level of transparency and dialogue.

James Giordano, Ph.D.:

I don't know what the answers are. I can only tell you that these are the questions. The question on one side clearly is what can we do. And what we can do in some cases is provocative, as we know from the developments of various forms of surveillance and self-reporting, there's now being rendered by Google and Apple and international applications that may be more varied. And the question of whether or not these things should be centralized and manifest withheld by the government for control or decentralized, and therefore held and controlled by some corporation, raise secondary tertiary and quaternary questions of both ethical importance and legal concern.

James Giordano, Ph.D.:

I ask you to pay attention to what's happening. I ask you to recognize that the benefits are certainly apparent, but those benefits also incur like so many other things burdens and potential harms as well. And so the question is given what we can do, what should we do? And when we decide what we should do, can we, and do we have the resources to do that at a scale that is going to be both protective of the public health and equally purposive and protective of our privacies and liberties?

James Giordano, Ph.D.:

I provide for you here some of the ongoing work that my group has done over the past few years in this area. And if you need to get in touch with me, certainly I'd entertain each and all of your questions, not only now, but in the future, you can reach me at my email at Georgetown and that's james.giordano@georgetown.edu. And with that, what I'd like to do is start my video so that we can now see each other. And I'd like to open up the floor, the floor for questions, if I may.

Nate Hibner, Ph.D.:

Well, thank you very much, professor. That was very enlightening. That's certainly a lot of questions that you raised at the end are ones that I'm sure we're going to be facing for quite a long time going forward. I wish to, again, invite anybody who has questions to please ask them in the Q and A module at the bottom of your screen. But to get started, I wanted to kind of make sure that I am understanding a little bit of a connection between what you just presented today and the questions that have already arisen in big data and the idea of collecting of people's personal data information in your collective, so that we're able to identify trends, be able to prevent illness, be able to identify social determinants of illness, especially when it is in line with the health care system, for example. And you mentioned this idea of a medical nondiscrimination act, and I want to ask you about if I have this accurate, if the idea of the questions posed around surveillance in a pandemic are similar to the questions posed in the discussion of the use of big data in the collection and utilization of that information.

Nate Hibner, Ph.D.:

And then secondary to that do we already have some legal guardrails that might be examples besides the genetic information nondiscrimination act, I'm thinking of the California bill around data protection and the consumer protection. I'm thinking of the European General Information Protection Act. So I leave you with those. So am I accurate to my connection? And do we have some already examples for potential guardrails going forward?

James Giordano, Ph.D.:

The easiest answer is yes to both. Your first question as regards to big data. Certainly we see big data as a force multiplier for not only biomedical research or for its clinical translation as well. And we mean by force multipliers, it actually increases the capability of those existing sciences. And what they're striving to do. Data are the engine by which we're able to make comparisons and relevancies across a range from the cellular all the way to the socioeconomic. It clearly that becomes a factor. The issue here is we're utilizing not only big data as data, but big data collection and assimilation engines to develop patterns that we feel are important for the description and prediction of this pandemic and the prevention and protection of the public against its effects. But the question then becomes, what do we do with those data? How secure are those data?

James Giordano, Ph.D.:

Will those data be used for various purposes in the future? Not only prospectively, but perhaps retrospectively as well, as we learn more in the future. What does that incur, which then leads us to your second question. And we are looking to, for example, more statewide and regional legislatures and policies that may have some import, as well as those that have been used internationally develop the type of legislature, the type of guidelines would be useful so as to provide national protection and international protections that are aligned, hence the MINA idea aligning with not only what's happening in California and to some extent Oregon and Minnesota, but also with what our colleagues in the European Union are doing. Excellent questions.

Nate Hibner, Ph.D.:

We're getting a question and you kind of just brought it up right there at the end about perhaps the need as this is a global pandemic for a global sharing of information. What kind of collaborations that might exist internationally. And would that even be a feasible act? Somebody's kind of questioning?

James Giordano, Ph.D.:

Well, I think it is. I think that certainly the more communicative, the more transparent and the more cooperative, the more we can work as a unified body against this "adversary," if you will, SARS-CoV-2, the COVID-19 disease and/or any other, but of course, as we would understand, along with that cooperation are also the human nature for competition. And that competition is not only socioeconomic, that competition is also political as well as having to deal with issues of national security, intelligence and defense. The finger pointing, for example, that's going on? You started it. No, you started it. Clearly is a defeatist nature with regard to then gaining some progress. So I think it becomes important to understand that yes, competition is going to be part of the game. It's part of the, if you will, current human condition.

James Giordano, Ph.D.:

But to engage some form of cooperation on a grand scale to can join our international colleagues towards these common goals, these common adversaries, if you will, will become ever more important as we face, not only this pandemic, but the very strong likelihood that we'll have others based upon our spreading ecologies and the more scientifically and technologically capable we become, the more that level of cooperation will become both an ethical as well as a technical necessity.

Nate Hibner, Ph.D.:

We have a lot of questions coming in, but I mean, this is one that I don't know, you'll be able to answer in the short amount of time we have left, but everybody is pointing out the difficulty of protecting individual privacy, avoiding any sort of bias against individuals, the sharing of information with health insurance companies, for example, and the overall distress that having this information might bear on not only the personal level, but a family and even a social level. Any more last minute comments about what you kind of had as the two horns about this debate and where we might be able to turn to going forward.

James Giordano, Ph.D.:

Well, these are excellent questions and essentially at this point, these are unanswerable questions because the questions are manifest. That is the nature of the question. If what we're doing in trying to accumulate as much data as we possibly can is use those data in a benevolent way that is protective, and also that is preventive for further burdens, risks and harms, we have to recognize that the acts

themselves might be something that we need protection from protection with and protection for, and as a consequence, building those things in that remain a pace with the processes of developing these forms of data acquisition, analytics, and use become very, very important. Doing it after the fact I think is problematic. So what it really speaks to is the ongoing need to engage that level of science and technology in both ethical, legal discourse, as well as broad based public discourse, to be able to determine what the needs are with the values disirata ought to are, and then be able to accommodate them appropriately a work in progress. Excellent question.

Nate Hibner, Ph.D.:

Of course. And finally, let's have you look into your crystal ball, for example, where, what is the next step? When do you see any of this actually manifesting? Do you see this coming during this pandemic, or do you think this is not something that we're going to be able to address until we're finally over the initial crisis?

James Giordano, Ph.D.:

Well, I think it's a combination of both. I certainly see these technologies coming to the fore, both Apple and Google have stepped up to the plate and have offered the possibility of personal tracking as well as overall surveillance. There have been other processes that are gained doing this as well, internationally, whether or not there'll be used cooperatively, whether it'll be used in a centralized and not centralized way is still certainly underway and has not yet been decided. But I think what's going to be very, very important is to not only utilize what we're doing now as a lens to look into what we're capable of doing, but also turning it back on ourselves as a mirror to see what we're not capable of doing, what we're not prepared to do and/or what really is escaping us in terms of our readiness and in so doing use that as the metric for going forward in a way that is both cautious, as well as concerned and to do that with respect to the capabilities of the science and its internationalization, to be able to then create those kinds of international discourses that are going to be necessary to keep that science well guided and well governed.

Nate Hibner, Ph.D.:

Well, I wish to thank you so much to Professor James Giordano, to being with us today, to discuss this very important topic and to share his broad reaching expertise on the subject as well. So I thank you very much, Professor.

James Giordano, Ph.D.:

Thank you, sir. And I now turn it over to Jacob who will conclude our webinar.

Jacob (Blue Sky operator):

Thank you. And with that on behalf of the Catholic Health Association and Georgetown University, I would like to thank you for participating in today's event. A recording will be sent in an email and will also be posted on CHA's website www.chausa.org/coronavirus, where you can also find recordings of previous sessions in this series. This concludes today's program. Thank you, and have a great day.