

FINISHED TRANSCRIPT

ITU AI FOR GOOD GLOBAL SUMMIT  
BREAKTHROUGH GROUPS ON SUSTAINABLE LIVING

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>> BARRY RESSLER: One of the areas that is very important, an area that's very important to us, is in the inactivation of virus and bacteria, and thermal resistant spores, and we have had a very long, successful period on earth. The reason I bring that up is that in the space environment, we are now facing mutated organisms, those where the DNA and nucleic acid has been affected by radiation and through shock waves where there's water content OH radicals, and being at a remote distance, we are now depending on artificial intelligence as we gather our data and dose response in an orbiting cube set.

Taking that into consideration, we are very sensitive to areas of earth where there isn't medical care, where there isn't hospitals available to physicians, and information that AI can report, whether it's just an evaluation of the content of water, whether it's the speciation for the evaluation of an outbreak -- may not be an epidemic at this time -- but can share information that may be of value to a protocol that could catch it early and inactivate it.

So we believe that AI will play a very important role. We are also involved in AI in education, but I was very pleased to hear that the education of humanity for medicine that was brought up earlier is extremely important, and we have seen issues of pharmaceuticals being used by elderly people without any understanding of what the interaction is of the multiplicity of those pharmaceuticals, to do that kind of analysis education is very critical but we're also working on STEM and STEAM education using robotics in various countries and we've been evaluating the responses of children in Switzerland, in Italy, Brazil and the United States and expanding the programme.

Artificial intelligence is a very critical part of our success in addressing many of the problems that I just mentioned. I'm very pleased to be invited, because I've heard expert comments on the state of artificial intelligence, challenges that we may not have anticipated, because we're basing our artificial intelligence on work we have done with dynamic modeling and simulation and doing with human effort an analysis that can be done by artificial intelligence and transferring that to an AI device, and also to have machinery that might be able to provide information when they encounter an issue that isn't a match for what is in the database or in the machine learning that we have achieved. And that is a very, very important indicator and it would happen a lot faster than if we were doing this on a laboratory basis if it was participation between human and the artificial intelligence.

>> MOHAMED ALKADY: Perfect, thank you. Doctor?

>> ABHA SAXENA: Hi, good afternoon, and thank you. So the question you asked was, what does AI in health care mean to you? And given the fact that I'm working with the World Health Organization, for me the extreme shortage of health care workers around the world means that I'm interested in the various ways artificial intelligence can be used to support public health and health systems, especially in developing countries and hard to reach areas.

As you heard from my introduction, my area of work is actually Global Health Ethics, but given that many of the sessions in this conference have already covered ethical issues quite comprehensively, what I would like to touch upon are two problems that are relevant to the WHO.

The first is the question of -- that I would like to pose to the group or to the AI industry, actually, is: How can the AI industry ensure that the algorithms and outputs are inclusive and take into account the data and variables from developing countries, especially the rural populations and hard to reach populations, so that the solutions provided by AI are relevant to them. And in the same vein, how can the AI industry ensure acceptability of this technology, not only by the illiterate population in hard to reach areas, for example, in Africa or Asia, but also by the health care physicians

who work in these areas?

This means that a lot more work is required on the ground to ensure that these technologies are introduced in a culturally acceptable manner, and the traditional role of health care workers is not either undermined nor -- perhaps this is not an AI word -- but this is work AI industry needs to do before AI can be accepted.

My second problem that I'm interested in is in the area of new drug and vaccine development. As some of you or most of you may know that drug development vaccine development is a very slow and expensive process and often it's quite messy. It's required to do clinical trials in human beings over long periods of time, various phases of clinical trials are required. Sometimes people die, and then sometimes it doesn't go through.

I feel that AI has the potential to cut both the cost and the time. There are many emerging diseases with epidemic potential and WHO already identified at least a dozen such diseases where neither the vaccines exist nor therapeutics exist, and these are diseases that because of globalization and because of changing epidemiologies are likely to become prevalent very soon.

For example, we saw the Zika virus outbreak which nobody had anticipated, and developing drugs and vaccines for this will take time, and we don't have the time.

What I want to know is: How can AI help us not only to dramatically identify new molecules but also to increase the vaccine and drug development time? There are others but I've just identified two questions.

>> MOHAMED ALKADY: The list is endless and I'm happy that we have a pretty diverse panel so moving forward the next few questions I'm going to ask I definitely want participation from each one of you and I'll moderate as we go through them. But one thing that's very interesting to me and definitely sitting through the conference so far is, AI seems to be something we talk about in this very arbitrary fashion. What I mean by that is that we see a robot doing something. What is that? That's AI. But that's not really an answer, right?

So to me, AI can't just solve everything. It has a place and position for what it does. So where do AI and humans work together? And that's -- I'm asking this in a broad question. Everybody will have different angles at it, but when we say AI coming into the picture, how do those two areas merge? Because I think ultimately to a point you made, Jay, which is the combination of the two is very powerful.

So how do humans and AIs work together? And in the context of just health care. What are some of the things you see there, what would AI be doing, what would the human be doing? One of my favorite videos we saw was the robot that would ask for coffee and doesn't

know what coffee is. One day we could argue a robot will be putting the coffee in but it's an interesting discussion especially in health where I don't think anybody will disagree a touch of a human is very valuable in health care.

So how do we combine those two? I don't know if anybody wants to take it first. Jump in. Doesn't have to go down in order. I'd love for you guys to comment along and I'll help moderate through that.

>> CHRISTIANE WOOPEN: I think there are three starting points. One is the data, so having all the data and interpreting them and pointing to some correlations on the long run, having surveys and so on, and having some hypotheses coming out of them but you need the humans who know about the surrounding or the prerequisites, the surrounding contextual conditions, the living conditions and so on to interpret them finally.

Because there are so many examples where data interpretation just by machines lead to very weird policies, because you don't have the background. Second is just in doing something, doing surgery together with robots, or other systems, having tailored medical applications and so on. And the third one is application of something, of decision support systems, of integrating data and doing good diagnosis, merging it with the current evidence from scientific literature in large databases no individual can really know and read.

But then referring to it and integrating it really in evidence-based medicine what means integrating experience and individual experience and intuition of humans, as well, not only seeing data but seeing the concrete individual in front of you and giving advice for his living.

>> MOHAMED ALKADY: More like assist intelligence more than artificial intelligence.

>> JAY KOMARNENI: Just to continue on that theme, I think there's different ways to look at intelligence as a whole, right? There's the idea of augmented intelligence, so expanding the capability of a human or other agent using machine intelligence. There's the idea of pure AI, which is having an AI answer a question better than a human potentially, for example, with radiology images and then there's the idea that I kind of mentioned earlier which is this idea of integrated intelligence. How do you use humans and machines together in a system that weights their intelligence appropriately for a given problem?

There's a couple pieces I'd like to kind of discuss with respect to how we think about that problem generally, and kind of the specific case of how we're kind of implementing some of it. I won't go into as much here. So the first is that one of the biggest problems in AI today is the lack of labeled training data to accomplish certain goals, so basically, what we've done for the most part with AI to date is, hey, we've captured all of this data for

some purpose. That probably wasn't the purpose of building an AI and we're trying to back fit to come up with conclusions or interesting insights as opposed to thinking from first principles, how would we capture the data that is necessary to actually solve the problem that we're aiming to solve?

So I think it's actually building interfaces that capture, structure, encode labeled training data that allows us to actually solve the problems that we set out to solve. So I think that's part one.

I think part two is essentially around this idea of: How do you weight the knowledge of different agents in integrated intelligence? So if you have multiple physicians pontificating on a case for example and then you have multiple machine agents pontificating on a case which could be a bot, it could be a distributed instance of a piece of software, it could be any number of things, how do you then decide which of those has knowledge that is relevant to that problem?

And so this is actually a broader idea in essentially kind of I guess distributed consensus theory around the theory of an epistocracy. How do you weight different agents' perspectives accordingly? We've seen for the foreseeable future human in the loop artificial intelligence is an absolute must. Your earlier point about decision support is the right one, because for the very foreseeable future, these systems are not going to be at a high enough fidelity and robustness for the sheer edge cases that can emerge for the complexity of cases as they actually manifest in real life and the third one and the final one I'll mention right now is the idea creating ontologies which can allow the seamless communication between different types of agents in such an integrated intelligence.

So one example is basically how ontologies are used for different languages around the world, so if you're building a system which could potentially work in some language, you want it to potentially be able to work in all languages for all different types of humans.

Now, the second that would you actually need to do is to deal with people who have technical expertise versus people who only understand plain language. So that's another application of ontologies.

So imagine you're building a system with labeled training data understood by clinicians but is not understood by community health workers. That is another problem ontologies can help solve in terms of capturing the right data and information. And the third problem that can be solved with ontologies is human and machine communication. As you probably heard from the Plenary discussions, one of the biggest problems today is AI is not human interpretable and auditable in the way it needs to be. In the same way as I pointed out earlier, the labeled training data we're capturing is

often not captured with the express intent of being machine processible.

We can actually solve those problems with ontologies and those are three examples of ways we can enable human and machine collaboration.

>> MOHAMED ALKADY: Those are interesting things and they bring up to mind a few comments and there are a few other comments as well. There's almost a, if we were all here as humans presented with a, somebody with their arm cut off, right, we would conclude certain things quickly, whereas an AI would need input, to your point, and input in a way that makes sense, that's labeled properly for it to give a proper answer, which I find interesting and also fascinating at the same time.

Because when we talk about how an AI can be auditable, I would argue to say, how do we audit humans today? And it's a very arbitrary way of doing it, right? We have other humans audit humans, right? This is the system essentially, a set of laws we all agree on. And then it raises another question of course of standard, did that mean in order for AI to actually become something that everybody participates in that we all have to have a common standard? I'm not looking for ( ? ) those are interesting observations that come up in discussions and definitely I think today the question of AI raises a lot more questions over time.

>> JAY KOMARNENI: Just a real quick reaction, and I'll pass it to the other panelists. That's the epistocracy. You need to measure things that are true. The way we do that in Human Dx is when we're comparing clinicians' intelligence, we have them solve a reference set of training cases which we know are correct based on what actually happened to the patient, and by using that as an index to essentially create their clinical quotient in the system we can then begin to index who knows what about what. I think you pointed out that's a tremendously important part of this.

>> ABHA SAXENA: Reacting to something you said that was different people making the -- different groups of people making the diagnosis and then collecting that -- using the collective information, in medicine, a lot of the diagnosis is based on context as well, and so you could actually if the people who have contributed to your AI were based in New York or in Australia or somewhere else, and this AI was used either in Africa or let's say in Indonesia, the output may be completely different just because the context is so different.

I think when we develop systems for diagnosing, for diagnosing diseases and conditions one would need to keep that in mind to say: Where was it developed? Where is it going to be used?

I also think that because medicine is such an imperfect science, so even when a physician makes a diagnosis in relation, sees a patient, makes a diagnosis, it's not A plus B is equal to C. There's

A and B and C, and we're putting A, B, and C together. The chances that this person has X is this, and Y, and then because he has a family history I will not choose X, I will choose Y so it's a very complex algorithm that physicians use and that's why I think that AI alone may not be -- is not likely to be sufficient to provide the diagnosis or to provide health care. There would need to be human interface at least in the future.

I also want to say two other things in relation to AI and human and machine interface. The things that are currently important in the care system are care and compassion, the physician trust at the patient end. These are important values. There are other values, as well, but to me, they just jump out, and a machine itself or AI itself, it probably, in the far future, we would be able to have -- integrate those sort of values, as well, but for the time being, I think we're looking -- we cannot trade off those values in the health care system.

>> The question about human and artificial intelligence interaction --

>> MOHAMED ALKADY: Can you guys hear?

>> BARRY RESSLER: Is that better? We create algorithms that are really the baseline for how the artificial intelligence for a particular application or an application specific issue will function. We have hopes that over time, as problems are identified with the artificial intelligence, that we may see some recommended, suggested, or obvious changes to the algorithm, which we may find operating independent of artificial intelligence or with artificial intelligence. But I see the human and AI interaction of being very, very dominant. I don't see that changing at all. And I also see we would be evaluating the performance of AI as it gets into extreme circumstances and not the baseline.

Another area that I didn't mention before is anti-microbial resistance, which is a very significant problem globally, and different in different parts of the world. I believe we could apply various algorithms or AI concepts that would be helpful as we are doing in parallel in a laboratory with humans, so I think this is important.

The other point I wanted to mention was robotic surgery. It's been around now for a long time. I see a wide range of performance, but the surgeon dominant opinion is that they would like to have an interrelationship with the patient and almost a touch and feel as more advantageous than robotics. Of course, that's been challenged by a number of lawsuits which I think have been moving aside now as things get better and I think that has to do with training.

But it's very possible that that training could have artificial intelligence to work with the surgeon that might improve that practice. So we see artificial intelligence as a very significant part of health care.

>> MOHAMED ALKADY: So one thing I like Jay you mentioned about artificial intelligence is the difference of artificial intelligence. We group everything into AI but really there's segments of what AI is, right, from augmented to is it truly artificial?

And I'll ask one more question and then we'll start narrowing it down. One of the most interesting things to me is that especially when we talk about the context of developing worlds, while we see AI taking off and we're using it for -- I'll use the context of assisted intelligence in my personal opinion, only because I think we're using AI to do tasks that are repetitive or take time for a human or should be, we use AI to answer the question, what's 1 plus 1 because we know it will always give us 2 where a human might make an error. Things like looking at pathology scans, radiology so at least with a high degree of confidence. What about the other end of that? We see people using low cost tools if we flip that completely around. We've seen people come up with ways to separate blood to be able to do that in the field just using a carton and a string.

Is there a play for AI everywhere? Kind of where do you draw the line? Where does this low cost come? And I'm bringing this in context when you start thinking about how do we deploy it everywhere. Even if we think about developed countries, you can't deploy it everywhere, because cost will be a problem. It's a very open ended question in the sense I want a conversation around really, we tend to, as humanity we tend to put our hopes on something and I'm wondering how does that apply when we start talking about it going global. Very open ended question.

>> CHRISTIANE WOOPEN: What I always wonder about these things is we talk about an impact on millions of people, the whole world will change, everything will be different in some years and at least in some decades but in the end, the one single human being counts, and his or her quality of life even in health care, so artificial intelligence at least on the databases but you already mentioned that there are several possibilities to apply it, is about probabilities and now I see, well, if I give you this drug, if I prescribe this drug, there's a possibility that you'll live two years longer, let's say 60%.

But that does not say something about you personally. And your quality of life and your preferences, if you prefer this drug to another drug or this drug and so on. So these very basic things will stay and they will have to be solved and quality of life, and that's what I wanted to add to objective approaches and to the truth, to really have access to what is true, truth from a philosophical perspective is a quite ambivalent and ambiguous notion. Quality of life is a subjective notion. How I want to live has -- and what I appreciate as a wonderful life can be something completely different to what someone else counts as a valuable life.



So we have to take this individual view into account, and to integrate them in the AI systems from the beginning, like someone proposed to integrate the human rights as values in AI systems. And that's why I think that patient reported outcomes, citizen participation, participatory approaches to even already to develop AI applications is very important, because their perspective can differ completely to the professional perspective, and the technical perspective, and so on.

>> MOHAMED ALKADY: I'm a bit of a romantic so anything where it's simple and easy that to me is huge. This is where AI changes the experience, right? When it knows something about you that delights you, right? When you do something, you're like I feel good, that's what we try to achieve anyway. Yeah, sorry, Jay?

>> JAY KOMARNENI: Yeah, absolutely. First I want to agree with the other panelists on a couple fronts. So the importance of context, I think I 100% agree with that, and that's part of the reason, at least in our own application, why we really want people from all over the world contributing to such a system and why we already have people from 70-plus countries. That being said, I think the power of AI in an integrated intelligence of humans and machines is collapsing the solutions base.

So basically, if we look at the primary drivers or parameters which determine the nature of given problems and how to diagnose them or treat them or manage them, the first two which are the most relevant are actually not even where you're based. They're kind of your gender and your age and then of course factors like your obesity or your body mass index, things like where you're located, all of those parameters do matter.

The power of using AI with humans is allowing humans to narrow the solutions base faster and to potentially think about what could or couldn't be right and then the value of humans to AI on the other hand is understanding when there may be situations which are ambiguous and aren't clear-cut and don't have objective truth, and in those situations, allowing humans to basically close the loop with such a system to say, hey, this may or may not be the right answer.

And I do agree with the general point that truth is a very tricky epistemological question, that being said I do think there are things which are more true than other things and truth is an approximation that moves towards some extremely high likelihood probability.

>> MOHAMED ALKADY: That's a different conference if we're going to talk about truth.

>> JAY KOMARNENI: But I do think it's relevant.

>> MOHAMED ALKADY: Totally yes.

>> JAY KOMARNENI: Because I think we want to use such systems, software systems, data, AI, to help us come to better approximations

of reality. And we can agree that we're probably sitting in this room right now, obviously get existential about it but the point is there are things that seem to be more true than other things.

Now, the last piece I'll mention is actually kind of my take on your question, which is in the future, we're going to have a world where everything is connected and programmable, right? First it will be things like the Internet of Things, but in the future beyond that, literally we will have programmable matter, right? We will actually be able to manifest things in physical reality as we choose based on data, information and artificial intelligence.

That being said, we shouldn't wait for that day to actually begin using AI to make impacts and by using it to improve human health and well being, where we can even today. So one of the big limitations as I mentioned earlier was: We don't have the data to solve many of the problems in cultural context, in situations where it's difficult to get such data which is a point we discussed at length yesterday. The biggest problem is actually getting the data for those given communities in context. So one idea I'll quickly leave you with I think, which I think is quite --

>> MOHAMED ALKADY: I hope you're not leaving after the idea.

>> JAY KOMARNENI: No, I'm not. But one idea I think that's really helpful is: How do we get data in context with unreliable Internet access where you can actually get people online and you need them to write to such system where you have to solve a couple major problems. One of those is you need to be able to allow people to coordinate without internet access, mesh networking which allows bluetooth and other protocols to allow data exchange between individuals in those contexts and I think another one related to that is actually being able to capture or to actually compute in a distributed way where you don't have Internet access and that's an area that's emerging right now called edge computing.

So I think both of those are potentially interesting areas.

>> MOHAMED ALKADY: Can we give everybody in the world an iPhone? For the record, my body is here, but I'm not present. No. So I want to begin focusing the panel a little bit and actually one more comment. Then I want to start focusing the panel a bit. I'm hearing a recurring theme so I'll mention those and open up for Q & A and we'll refine it and wrap it up but one last comment on that conversation?

>> ABHA SAXENA: I just wanted to say, you asked about AI and I think it's extremely important that AI will be used in more and more parts of the world, but we have to understand that the way that we have seen AI being successful in medicine so far is because in situations where we have electronic medical records, where we have the -- everyone has access to Smartphones, perhaps people have the Internet of Things already working in their homes and therefore there is a seamless sort of circuit being formed. What I would like

to see actually being successful is AI being used in situations where we don't have that sort of connectivity and that sort of Internet access, at least on a more regular basis. So it may not be there.

And to see how we can actually use AI in these situations because otherwise we're leaving half of the world behind. Inequities will rise hugely and the haves will have more, and the have-nots will have less, much less so I feel like we really need to make that effort to get the 50% or 60% of humanity along with the scientific technological advances that we're making and that's what I would like to see.

>> MOHAMED ALKADY: I agree with that. I'll pick a couple themes that the data is missing or we don't have Internet anywhere because those have been brought up multiple times. Although it would be interesting to end the conference on that note, hey we don't have enough data, therefore no AI. It's interesting, I think we have enough data and somebody brought that up earlier and I know Barry mentioned this a lot too. There is data. The question is who has the data and can you get to the data and how much does it cost you?

So the three kind of themes I'm hearing and I'm kind of going to talk about one is definitely education, AI and education. So and actually I'm going to pose these and ask people to Q & A on those topics and come back to how we'll shape it. So education and AI and how those go together.

The other one and I know you touched on this a lot, evidence-based care, more protocol based, I think those are very valid points, how does that get incorporated? Then as far as usage of data goes, rather than just saying data, I think you brought up earlier outbreaks. Can we gather enough data to see outbreaks?

I would go one step further and say: If we can, is there something we need to detect certain things in those outbreaks whether they're infections or what not through image recognition so those are kind of the common themes I see we're kind of talking about, short of any -- of data or governance or anything like that.

So I don't know if you guys have any questions around that. I'd love to kind of get some questions and talk about those a little bit and we'll go from there.

>> JAY KOMARNENI: Can I just clarify one comment you made? I don't think any of the panelists are saying it's not useful or important to use the data that we have access to. It's just to say that a lot of it we do have access to may not be sufficient for certain contexts. And really the solution to that is generalizing the training interface so it doesn't have to be a Smartphone. It can be a feature phone. It can be something that people all over the world have.

>> MOHAMED ALKADY: Definitely.

>> BARRY RESSLER: I'd like to make a comment about the outbreak

and AI can play a role and maybe it will not but the important part of that is to be able to do an evaluation which is often speculation, and if there's a mutation to whatever is the cause or the source you want to get to that before there's an epidemic and the ability to evaluate that remotely provided the establishment of the AI or some usability to monitor what is happening in the environment, that to me is a very important factor, because intercepting what is happening before the epidemic and before it ever becomes a pandemic is very, very critical and it's doable, and the data on how to do the evaluation exists. It exists because it's been used and there's a significant amount of data related to viral and back material activation, its repair cycles, it's metabolic position after you think you've inactivated it.

What I'm talking about is not treating humans. It's preventing humans from being infected.

>> MOHAMED ALKADY: Mutations of how a virus might change over time or bacteria. We'll go to questions and then we'll come back. Yes, sir?

[ Off microphone ]

Use the mic. And if you could state your name before hand.

[ Captioner has no audio ]

>> Hi, Steve Diamond. I'm with the International Space Medicine Consortium. I'm a physician and I think there are two levels that we have to look at in medicine. And one is a public health level, which I think has a really big bang for the buck, and where we sometimes in medicine at least in the first-world countries, we don't take that as much to heart as we do as medical care, where we focus on a person who's already sick.

And the thing that brings both of those together and it's one of the things that I notice in practice, is that the medical chart is fragmented, it's filled with junk, and that even though you have an electronic medical record, when I go see my physician, they're sitting there looking at their chart. So my feeling is that if we can create a greater granularity of history, using the old Pareto principle where 20% gets 80% I think with AI we would perhaps be able to develop a platform of understanding at least the milieu that a person is living in through public health, is there a propensity towards diabetes, for malnutrition, et cetera and then there's the second stage with AI looking at a particular chart, perhaps, and being able to bring in and aggregate the proper information from radiology, pathology, perhaps the clinical laboratory.

I do have to say one thing: As an older physician, it used to be we had a history and we would make a diagnosis, and then we would use the technology to prove that. I find that there's an overuse of technology as a pathologist, where people just shotgun tremendous amounts of information. So to me, again, I think you have to be very careful what information you're using but I think the clinical

chart, the history, is going to give you the biggest bang for the buck going forward.

>> MOHAMED ALKADY: Thank you. Questions, that's what I'm looking for. Go ahead.

[ Off microphone ]

>> -- an entity and yet, in fact, in medicine, I will tell you as a clinician, 80% of patients who walk into a doctor's office, what they have -- take care of it. 20% of the time, you may have some problems where you really need to have people that are looking at it. I think if you want to go back, when I started 40 years ago, one of the common diseases was treated with a surgical procedure, a peptic ulcer, which we now know is a bacterial disease that is treated with an over the counter antibiotic, so there's an opportunity for AI to work in very specific areas to help us understand the complexity of why you get diabetes or why hypertension affects one group of people, or -- but I look at the third world and say: People are dying of malaria, they're dying diarrheal disease. You don't need AI to figure that out. You need to figure out how we get health care to people in the third world. I think we need to understand a lot of other things but I think when we talk about AI, we need to talk about specifically, what are we using it for? How is it being used? Is it being used in health care as a treatment option? Is it being used for understanding the etiology of the disease? Is it understanding the complexity of what drug-drug interaction occurs?

And it's all done in the context as somebody says of it's each individual person depending on their cultural background, where they are, there are a whole host of other entities or complexities so I get somewhat frustrated when people use the term AI in health care, and then sort of say, yeah, okay --

>> MOHAMED ALKADY: That's how AI is used in every context. So here we're applying it to three things that I mentioned right before the questions and I appreciate you guys giving feedback, and that's great but we are looking -- it's more questions. I don't know if you have a question at the end of that. Otherwise everybody can come --

>> I think my question is: Should we be using it in the developed world right now? Or should we be spending more of our time in the underdeveloped world?

>> JAY KOMARNENI: I have one reaction and comment to those statements. So the reality is, health care inequities, disparities, problems are multifactorial and there are so many and so many that are large scale so there's a billion people on the planet according to the WHO's data who lack access to basic health care, where we need smarter and more enabled and equipped community health workers and other front line workers who actually know what to do. We also know that in the developed world, medical rates, 15 to 20% depending on some of the data you look at and we know that it's way higher

than that in the developing world. And then the third point I'll make is this has a real economic cost if we think about the SDGs, there's 100 million people who are put into poverty every year as a function of the health care costs so they may be incurring costs they don't necessarily need based on cultural context, based on what is specifically wrong with them so I think your point is well taken that AI doesn't solve all problems. That doesn't mean that it's not extremely useful for solving some of the most critical problems.

To your earlier point about electronic medical records and the value of the clinical charts, I 100% agree with you. I think the biggest problem with EMRs is the data is unstructured, it's unverified, it doesn't capture the clinician's thought process. It actually is primarily for billing and legal purposes as opposed to being used for clinical care and it doesn't distill the signal from the noise so I think you're spot on in that a system needs to be created that better stills itself from the noise.

>> MOHAMED ALKADY: We'll open a can of worms if we open that discussion. I know that discussion all too well. I want to focus on getting it back to the proposals and going through that because otherwise we'll be here -- we can have drinks and sit if everyone wants but we'll go two more questions and then we'll go over there.

>> There we go. I'm Dave ( ? ), a resident at the University working with a startup to predict the ideal -- oh, there's feedback. It's fine. To predict ideal treatments for patients with major depression so the question I'm going to ask is: What about mental health? So a lot of what we've heard about and I've even gone to look on the Human Diagnosis Project website while we were talking, a lot of it is focused on diseases that are more traditionally easier to diagnose and have more well defined treatments like a pneumonia or things like that.

-- the projects you've been looking at with respect to mental health with all the messiness that that entails in terms of diagnosis and treatment and et cetera, et cetera.

>> MOHAMED ALKADY: We'll take one except, then we have to get to the proposals.

>> ABHA SAXENA: In relation to mental health, I can say that there are actually a lot more AI projects going on, with very interesting results. So for example, somebody has found that over a period of years, not over years but over a period of time, using the information available from -- you can actually diagnose when a person is going through periods of depression or not, and actually also from Facebook data, I think they have developed an algorithm not only to be able to predict that somebody is going into depression, for example, but also a method to alert his peers to say: Hey, guys, you want to look after this person, or something like that.

So I think there's a lot more going on in the area of mental

health than we know. I'm not a mental health expert but I know a little more about it.

>> MOHAMED ALKADY: I'll comment this is very separate. You actually can't record the data for many, many reasons, like speaking to your lawyer, but there are projects around analyzing brain sequences and using light therapy, so there's actually a lot of AI being applied, because even as humans, we don't understand it, so that's where machines come in.

>> BARRY RESSLER: I have a comment there. We're at an early stage and because of working, forgive me for bringing up space so I'll call it remote or confined environments, sleep deprivation, depression and not being willing to talk to your peers because they're really not colleagues. Everyone is in different countries doing different work and competing with each other and we have tested the potential of human persona robotics using AI and being able to communicate to do that because it becomes very personal and confidential. We've also explored whether or not we can use that concept in remote areas --

>> MOHAMED ALKADY: I'm sorry, we're running out of time.

>> BARRY RESSLER: That was a very excellent point.

>> CHRISTIANE WOOPEN: It's important to add there's a lot around for mental health disorders in risk prediction and risk profiling and alerting and it's wonderful if you can treat and prevent early, but there's also the risk of -- so alerting a peer group or even the person itself, you have a suicidal risk from Facebook, so it might be about probabilities, but for the individual, it could be very harmful and discriminatory. We have to think about these ethical issues, as well. This conference is about ethics.

There's unfortunately not one single speaker on the Plenary Sessions.

>> MOHAMED ALKADY: I didn't know that. So let's --

[ Laughter ]

So let's, we unfortunately we're running out of time because we've got -- .

[ Off microphone ]

>> What about the aspect of keeping healthy people healthy for a longer time? That's something we've not talked about today at all. It's just a point that we need to have that, too.

>> MOHAMED ALKADY: We did mention that but yeah go ahead.

>> JAY KOMARNENI: I think that's a fantastic statement. I think the way we look at it is that's absolutely crucial, as well but when we're looking at the hierarchy of needs, the people who are not well off and need to be helped are ones that essentially we're trying to more urgently serve than ones who are already well and keeping them well.

I think they're both incredibly important. I just think one is one that generally tend to focus on.

>> MOHAMED ALKADY: Real quick.

>> ABHA SAXENA: From the WHO perspective I think that's a great idea because we do talk about promotion and prevention and I think the reason we didn't talk about it is because it's a relatively -- solutions and many of them are being used. For example apps that you see in all the Smartphones are using the AI to help you get better and to keep track and everything.

The only issue that I have in this is: How does one regulate these AI technologies? We don't have a good answer for that, so where is the population getting its information from? And if all the health information or a large amount of the health information it is getting is from these apps and from AI and Smartphones, then there needs to be some sort of rating system. This is rated 3, it's great, fantastic. Or this is WHO certified or somebody else certified.

I think the reason we didn't talk about it is because it's I think -- I think a lot exists already.

>> MOHAMED ALKADY: At some point I think we as humans also have to take some responsibility. If you're healthy, do the things you need to do to keep healthy. It ties into one of the proposals is how do we apply AI to education? And not necessarily keeping people healthy but if we can elaborate on that, some of our thoughts there and we'll go through the others and we will wrap it up at that point.

So from an education perspective, and I know there's two folds of an education and we brought up one from an evidence-based perspective and teaching health --

>> CHRISTIANE WOOPEN: My point is not mainly about education, it's about evidence-based care and medicine and learning about what is happening in real life.

>> MOHAMED ALKADY: That's one perspective. Would it be safer to say it's more about the work flows of what we're talking about?

>> CHRISTIANE WOOPEN: And the outcome of care.

>> MOHAMED ALKADY: So more clinical evidence-based, decision support that's a better way.

So more of AI for decision support. And then go ahead, yes.

>> CHRISTIANE WOOPEN: And institutional aspects of delivering health care at all, patient reported outcomes, citizen participation.

>> MOHAMED ALKADY: How would you see AI applying to that? How does AI apply to that? How does AI enable that?

>> CHRISTIANE WOOPEN: Mainly about gathering, integrating data and interpreting them and bringing them back to the system.

>> MOHAMED ALKADY: So using AI for clinical decision support, just to kind of put it in -- .

And then from an other perspective we talked about AIs teaching humans which I think that's pretty interesting.

>> JAY KOMARNENI: Yeah, so the common theme you probably heard



is: Use humans to train AI to do certain things, so our view is: How can you use AI to train humans? The nature of our project is one in which essentially thousands of physicians are sharing and teaching cases but as they're sharing and teaching cases the system itself is getting smarter at helping both them as well as independent to answers or conclusions about given clinical cases so the idea that we kind of had in terms of the way that AI could make a tangible impact in the next 12 to 18 months and could actually impact potentially a large portion of the world is create a set of essentially 100 let's say training cases that can essentially be used by health workers on a set of cases to triage, diagnose and treat the most common problems that have the highest clinical uncertainty, that can be dealt with ( ? ) and what's exciting about that is that can then be used by anyone around the world to actually improve their skills and AI really plays two roles in that proposal.

One is helping evaluate what people have learned and how they have learned, as well as making recommendations to them with respect to what additional cases -- they need to take in, in the same way you might get product recommendations from Amazon or content recommendations from Netflix, imagine you could actually train personalized learning -- that expands health care workforce capacity around the world. That's kind of what we think.

>> BARRY RESSLER: I've seen -- teaching -- for surgery and I think what we're saying is AI could play a role in not just having the VR experience but also whether it's verifying that what it was trying to teach has been known by the people --

>> JAY KOMARNENI: I think ARVR is very far away for a large percentage of the world. What we're trying to think about is solutions that could work on a mobile phone that isn't Internet connected. That could be used to train people --

>> MOHAMED ALKADY: So we talked a lot about data and disease management, infections. How could we apply AI to that. We talked about during the process being able to see if there's mutations of a disease that's going to come out of AI but let's take it to a higher level. How can we use AI in the form of detecting outbreaks or figuring out how outbreaks are going to occur? You guys have any thoughts on --

>> BARRY RESSLER: Looking at the causal effects, that's what I talked about before that you want to intercept and offset that but how AI would be able to identify the outbreak was imminent where it's already -- it could be for the environment and -- but if you want to do it before you're evaluating a patient, but you know there are symptoms and it's getting started, that's perhaps a target for AI, but the point I made was mainly to offset what the source was going to be.

>> ABHA SAXENA: I think we are way far in the real world, so you could use it in the developed world, but in a lot of the places

around the globe where you don't have Internet connectivity, where you don't have the sort of electronic noise that helps you predict outbreaks faster.

So, for example, if you had information about the number of people who are -- who are falling sick and therefore not attending school, if you had data about the number of workers calling in sick or a whole lot of data like that, then you would be able to use AI to collect this sort of noise to predict that something is happening, the Google flu type of application but in the real world where we really need to predict outbreaks, in Africa, in Asia, in other countries where there is a lot more outbreaks happening, and -- because we don't have the means to collect the information that AI can -- feeds on so if there is -- there's electronic outputs, how do you do that?

>> MOHAMED ALKADY: I think we're seeing more and more and I know there's a few people who do this, low tech cell phones, quick Q & A questions. Again hear we're talking about AI interpreting data, so first the collection part of it. I totally agree with that and interpreting -- a common theme -- we're not catching. I think we're seeing more -- some things come up with that especially using cell phones and quick questions. There's a text message, respond back and --

[ Audio is unstable ]

>> CHRISTIANE WOOPEN: One idea on AI that can be established very soon and very easily because it's already done from everyone every day that's the search engine so if people have a symptom or at least the prerequisite is there is an access to Internet but if they have some symptom and they look after a disease and they Google it, to Google, you say and then you'll get a hit list, and this hit list is driven commercially and not quality driven. If Google would implement a quality adjusted algorithm with a hit list saying that the first hit is a link to a site which is quality approved, which has a quality certificate that the information you find there is quality assured, then a lot of problems would be avoided by people going in the first, clicking to the first hit, but that is linked to a blog where you're completely -- what is your symptom about, or you go to a commercially driven site where you get recommendations which do not fit to your situation.

So a quality-driven AI algorithm in search engines would be a dream.

>> BARRY RESSLER: It would be in the eye of the beholder, the person who is reading it. I would like to make one last comment to the audience though for the future. We haven't really gone into certain technology protocols like the use of biosensors which we've been working with related to wounds that's remote, and that can certainly be used to monitor and feed back thermal properties, depth, color, and do a diagnosis if again you had the Internet or

Smartphone, something that can communicate back.

But AI is an important factor in that. And I think that could be very valuable going forward.

>> MOHAMED ALKADY: We'll do final comments.

>> ABHA SAXENA: I think what you said is correct. Already we can pull in data from the non-smartphones, the Smartphones, handheld devices, to collect surveillance data. I think if we figure out a way of using data that's collected by researchers, because there's a lot of research going on in the rural areas, and I know that there's confidential data but if we can figure out how we can get -- so there is a lot of data, I agree.

But I think we can do much more, and we -- much more to collect data from the -- that's my point. So we could still use the data that exists to make some predictions, but not...

>> MOHAMED ALKADY: This is separate from the proposal, it's dual pronged to what some folks have been saying which is, one, we can use the data we have. Let's apply AI to it and combine the human element and at the same time let's figure out a way to change the interface of which we're getting input. Jay, I'm sorry, you wanted to add to that, I know.

>> JAY KOMARNENI: Yeah, so I think the challenge with a lot of the solutions that are being proposed in AI just generally at this conference just because of the early days of the fact that -- is there's really kind of two things being proposed. So one is kind of broad theoretical approach, and the other are narrow practical approaches. If we want to succeed in using AI to help all of human kind we'll need broad practical approaches and one of the reasons -- sorry.

>> MOHAMED ALKADY: Just agreeing sorry.

>> JAY KOMARNENI: Wonderful. So one of the reasons I think we're excited about the idea of using AI to expand the health care workforce capacity, there are a billion people who lack access to even basic care, so actually I think it's a way of making a meaningful -- on a problem that impacts most of the world and hits several of the Sustainable Development Goals. One as we mentioned was the first one of ending poverty. There's 100 million people put into poverty as a function of their health care costs. That's a WHO number. The third -- the second SDG it hits is health and well being. Medical error rates even in the developed world and top institutions are 10%, who knows what they could be in the developing world. It's already scary to think how high they could be.

The fourth -- the third kind of goal that it hits is number 4, which is quality education and life long learning. Now anyone could really train if we built such system to become a community health worker. It hits number 5 which is gender equality. A large fraction of community health workers are female. There's also obviously a huge amount that knowledge and health understanding disparity plays

in general in maternal and child health and everything else and this is something that could help address that and the last one is decent work and economic growth. By essentially enabling people to train to be more competent to actually be able to deal with complex situations more simply, we could actually help solve that, as well.

>> MOHAMED ALKADY: Unless there's final comments I think we need to come to a close and make our way back to the main room. Thank you to all the panelists. Thank you guys for being here. We appreciate it. And we'll see you over in the other room.

[ Applause ]

[ End of session ]

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