THE BROOKINGS INSTITUTION

# TELEHEALTH AND MOBILE COMMUNICATIONS:

# THE NEW FRONTIER IN MODERN EMERGENCY PREPAREDNESS

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P R O C E E D I N G S

MR. WEST: (in progress) -- right away. Often times the quickest vehicles for emergency relief are electronic in nature. New technologies allow people to call for help, locate emergency personnel, distribute personnel to areas that need them, and get medical supplies where they can do the most good.

But at the same time, we know that state, federal and international innovation has not developed as rapidly as it should. Sometimes it is hard to get the public resources necessary to implement new technology and there remain issues in terms of communications and interoperability that sometimes limit the effectiveness of our current systems.

Today we have three distinguished experts who will help us understand emergency preparedness and ways we can improve our capacity for action. To my immediate right is Doctor Alexander Vo, he is the Executive Director of the AT&T Center for Telehealth Research and Policy at the University of Texas Medical Branch at Galveston. He's an expert on telemedicine, telehealth and technology supported medicine, and he is co-author of a paper entitled Telemedicine Disaster Response and Recovery, Lessons Learned from Hurricane Ike.

We also are pleased to have Mr. Joe Becker with us. Joe is Senior Vice President for Disaster Services at the American Red Cross. He leads disaster services for the Red Cross and provides a helping hand during times of disasters and emergency. He has been the Red Cross point person during four of the last five major hurricanes.

We were talking earlier about hurricanes and floods and natural disasters can happen at any point in time, and he said, on average, two-sevenths of them take place on the weekend, so you can't really plan your life very far in advance in his world.

On my far right is Marion Orr, who's a Director of the A. Alfred Taubman Center for Public Policy at Brown University. Marion is an expert on urban politics and co-author with me of a paper entitled Race, Gender and Communications in Natural Disasters. He's a former colleague of mine from Brown University, and also a former Research Fellow at Brookings.

The format that we're going to follow this morning is I'm going to ask each panelist to make a brief opening statement regarding his view about emergency preparedness in terms of where we are and what we need to do. And I will start with Alexander Vo.

MR. VO: Thank you very much for this opportunity. Can you all hear me okay? I tend to speak very softly, so if you can't hear me, please yell. I think the best way for me to describe what it is that we bring to the table is to talk a little bit about my institution and the impact that Ike had and the solutions that we found in order to mitigate and recovery from Ike.

As you know, Ike is probably the third largest destructive hurricane to hit the Continental United States. It pretty much devastated the entire city of Galveston, displaced numerous, millions of people all throughout the Houston area, and it crippled our clinical enterprise, which is UTMB is considered the largest and oldest medical school, health sciences school in the state of Texas, with 110 facilities, you know, serving research needs, clinical needs, and academic needs, and every single one of these facilities outside of the Galveston National Laboratory were just completed that July was a hit.

And our clinical enterprise essentially was wiped out for several months. Our level one trauma ER, considered one of the best in the world, did not reopen until

this past August, so you can see the devastation. We ended up laying off over 3,000 faculty members, to include 250 MD's, which is unheard of in any hospital setting.

However, after Ike, immediately after Ike, our telemedicine program started to serve patients 48 hours after Ike hit and was back online, pretty much to near capacity within 14 days. And those are very key things that occurred and are due to a couple of things, one is our pre-planning scenarios that involve fault tolerant networks and redundancy networks that we created to back-up hubs located about 108 miles away in Huntsville, Texas.

Another thing that helped us recover so quickly is the use of wireless communication technology. We reconfigured our networks so we can use the cell phone to provide non-routine medical care through some of our displaced telemedicine patients. And that's important because while – notices as the community evacuate, part of that community that evacuated included primary care physicians and their families, and when they returned, they returned to flooded out clinics and no electricity, et cetera. And so some of these patients stayed where they were, where they evacuated to, as well as some of our providers. So how do you reconnect those providers to their patients so that you can provide them with routine, non-emergent medical care so that these patients don't have to flood the emergency clinics and mobile clinics that are set up after the storm by folks like the Red Cross. And using the cell phone was a very, very good way of doing that.

In addition, our correctional facilities also had redundancy networks that we provide telemedicine to, and we use those to provide telemedicine to other patients who are located elsewhere in the state of Texas.

So a couple lessons learned, you've got to have redundancy network, you've got to have partnerships with commercial providers in order to set up well planned

disaster preparations, and you've got to utilize and leverage wireless technology, otherwise, you know, you mainly use land lines, it's going to be wiped out. So essentially those are the biggest lessons that we learned after Ike.

MR. WEST: Okay. Joe Becker, you are on the front lines of disasters when they happen at the American Red Cross, tell us a little bit about your experience.

MR. BECKER: When you think about technology and disasters, I would just want to start us off by making two general statements, and maybe we can dig into those a little bit. First is, over the decades, how our country has responded to disasters has typically been a pretty closed system. You have police, you have fire, you have emergency medical folks, then in a large disaster, you bring in others like National Guard, but the systems that are used are those organizations systems, close systems. And what we've become in the last years in disaster response is it's a very open system.

How do we have America become engaged in disaster response? Neighbors helping neighbors, people volunteering, it's something that's pretty amazingly American, the extent to which people volunteer during disasters, or what that's caused, or what we've benefited from are that the systems people use in their daily lives become the disaster systems or become part of the disaster technology solutions.

So I'll use our recent example in Haiti, you know, when we're trying to communicate with people and talk about here's where help is, here's how you can be served, we typically use normal ways that you would imagine here in the United States, we learn very quickly. Ninety-six – 90 percent, seven percent of Haitian families had cell phones, and by getting the carriers to agree to make receiving a text for free, I know my organization, we've sent between 30 and 35 million texts, here's where help is, here's what you should be doing to take care of your family, it's using the normal systems that people have.

And I think a lot of the social media tie-ins are dramatically changing how we do business. I'll give you an example. We have had a technology in place for probably eight or nine years to connect families after a disaster. Go to Redcross.org, you can log in, say I'm in a shelter or I'm fine or I'm looking for Joe Becker, where you are, and we, again, used that similar platform in Haiti to connect about 25 – 30,000 people, that was dwarfed by Facebook, it was dwarfed by Facebook in terms of what did people turn to connect themselves, or where's the nearest shelter, if I can't find that on a map, if I can't find that on Google Maps, then we're not communicating to people in the ways that they usually do.

But during Ike, we put all of our service locations on Google so that people could be pushed out if they had access to the internet and learned where they were. The point that I'm making is, it's not about the proprietary systems, the big IT spends, the big IT investments that we tend to make in government and sometimes in the non-profits, it's how do we leverage the technology people use in their daily lives to become part of the response.

And I would say that – the second point I would make is it's also changing who we would define as a volunteer. Information is service in a disaster, and information is service before a disaster. I'll just give one example.

I don't know how many of you regularly use Wikipedia, but there's an army of people who get paid nothing, who sit up at 3:00 in the morning with a cup of coffee editing articles on Wikipedia, entering items on Wikipedia, that's a volunteer work force interested in providing information within the country.

So the issue for us becomes, how do you leverage that to teach America how to be prepared to respond to a disaster? How do you leverage those people and leverage the social media so that you can have high school students telling their families

what they need to do to be ready for the next disaster that responds? So when you pull it all together, I'm not saying get rid of the big proprietary systems, but they should have a feed to social media, they should have a feed to Facebook, to Twitter, to the ways people want to communicate, and it empowers people to become part of the disaster solution in ways that weren't possible a very short period of time ago.

You know, here in D.C., we had a – remember the Snowmageddon, I don't know if you all saw on YouTube, but the big snowball fight right up the street from here, organized on Facebook, and to me, the power of harmony that, right after a disaster, is nothing but opportunity for the response community if we can pull that in, and if we can say, look, we need people to help feed people, this is where you'll want to come, we need people to help shelter people, this is where you'll want to go. And I think we can tie that together in some pretty powerful ways that we just need to imagine.

MR. WEST: Okay. Marion, you have written about communications in natural disasters, tell us about your perspective here.

MR. ORR: Thank you, thank you, Darrell, and thank you for inviting me. It's great to be back to Brookings after many years. In thinking about this subject matter, a couple of things I want to point to, one, I want to say that I'm going to share some results from a public opinion survey looking at how people perceive threats to hurricanes in particular. I grew up in a place where hurricanes were very, very prevalent, I grew up in Savannah, Georgia, and we're right there on the water, and I can remember growing up evacuating our home to prepare for the hurricane.

A few years ago, Hurricane Floyd came to my hometown of Savannah, and it stayed out on the coast for a long time, and it wasn't clear where it would hit, but the Mayor of the city decided to evacuate the city of Savannah, and Interstate 16, which runs from east to west was set down, you could only go west.

My relatives and friends all had to think about whether or not they should evacuate. Well, it turned out that Hurricane Floyd decided to bypass Savannah and head up the coast to North Carolina in particular, hence, the Mayor finds himself having called for this evacuation, and the hurricane went in a different direction.

But how do individuals perceive whether or not they are vulnerable to a natural disaster? And secondly, what sort of communication and information resources do they use to discern whether or not they should evacuate? So I want to say something real quickly about this question of perceptions of vulnerability, whether or not you feel vulnerable to a natural disaster like, in this case, a hurricane. And researchers have found several things, one, they found that social vulnerability has an impact on whether or not a person perceives whether or not he or she will face some sort of hazard.

Here, factors such as age, race, gender and family tends to effect risk assessment and impressions of disaster threat. Economic vulnerability, here you're considering financial aspects of peoples lives, those who are poor, those who lack personal transportation to evacuate, those who rent as opposed to owning their home tend to be more vulnerable and sometimes react more slowly to official evacuation orders.

So in addition to social vulnerability, age, race, gender, financial, there's also geographic vulnerability. Simply those who are in physical proximity to disaster outcomes are more likely to feel vulnerable. Those living, for example, in low lying coastal areas face hurricane risk more than those residing inland and this may elevate their perceptions of threats and may have some impact on whether or not they obey evacuation orders. In addition, communication and information are also key to disaster reactions. The idea is that information is crucial in how people perceive threat and

whether they decide to evacuate. And importantly, depending on one's experience, some sources of information have greater impact than others.

A few years ago, Darrell and I conducted a public opinion survey in Rhode Island to get a sense about peoples' perceptions of vulnerability and to get a sense of the kind of communication and resource information they use when thinking about threats to natural disasters.

For example, in the survey, we ask questions, if a major hurricane hit Rhode Island, how vulnerable would your residence be. Here we're trying to get perceptions of peoples' vulnerability.

And then we also ask if a major hurricane hit Rhode Island, and your home was in danger of serious flooding, how likely would you be to evacuate your residence for another location. Here you're trying to tap the likelihood of evacuation.

Here's what we found, we found that perceptions of vulnerability assumed to be linked to proximity, as we expect it, are those that live closer to the Rhode Island coast, are more likely to feel that their residence was vulnerable to some natural disaster like a hurricane. We also found that women and minorities are more likely to feel as if their residence was vulnerable from a major hurricane.

Now, we did not find in our survey support for the economic vulnerability model, that is, family income, having private transportation to evacuate, leaving your own home did not have impact in the Rhode Island case on perceptions of vulnerability. We actually think this may be a Rhode Island Pacific kind of think, because people living on the coast of Rhode Island tend to have more resources than others.

But what factors determine whether a person decides to evacuate? This becomes a very, very important decision. Just very recently, you may have read early in this month, we had some serious flooding in the state, in fact, the most flooding we ever

had in the history of the state, and I talked to some people, including some of my students, who decided not to evacuate, and one of them ended up having to be rescued by the National Guard. In fact, he's on the local television video being put into a boat, he and his girlfriend, and being rescued out of their apartment. They decided not to evacuate. So what factors determine whether a person decides to evacuate? Well, we found in our Rhode Island survey, and it's a survey of some 800 registered voters in Rhode Island, that gender and race were not significant in determining whether or not a person decides to evacuate.

Having children, if you had children, you were more likely to respond to our survey that you were likely to evacuate in case of a natural disaster. I'm assuming that people with kids probably think about not only their lives, but the lives of their youngsters when making this decision.

Living near the coast, if you live in proximity to the coast, you are more likely to report that you would evacuate. You are also more likely to evacuate if you listened to and heard the demands of government officials. Government officials telling people to evacuate was, in fact, the strongest factor in determining whether or not a responsive answer, yes, I would evacuate. So information coming from the government becomes very important in the decision people make about evacuation.

And finally, we also found that age matters. It turns out that young people in our survey were more likely to answer that they would evacuate than older people. Here I think the results suggest that younger people may not be as rooted, and hence, they are able to and willing to get up and leave quicker than someone who's been around for many years, who have probably been through the routine like my – like the folks down in Savannah who have seen a hurricane come and perhaps passed away. But it turns out that it's young people who are more likely to evacuate.

Finally, these differences I think suggest that officials have to understand, public officials need to understand how race, how gender, how life circumstances, and how communication effects impressions of disasters.

Disasters are not a situation where a cookie cutter approach with everyone being treated identically is going to be effective. So the point I want to score here is that public officials need to be attune to how people perceive vulnerability, and secondly, how they receive communication and information resources in terms of determining whether or not to obey an evacuation demand.

MR. WEST: Okay. Thank you very much. I'd like to ask a follow-up question of each of our panelists and then we'll open the floor to questions and comments from you. Alexander, you made a very interesting point in your presentation that, of course, during disasters, land lines are often the first thing to get wiped out, and so we then are very dependent on wireless and cell phone communications. And you noted that it's important in the delivery of telehealth to have redundancy in the networks, but yet when we were talking before the panel, you said there are, what, something like 200 telehealth networks across the United States, and virtually none of them have redundant systems, meaning they don't have back-ups. Is this still the case and what should we do concerning it?

MR. VO: I think it is, and that's one of the reasons why we wrote the report, so that we can share sort of important knowledge. And we are really lucky because we – we're lucky in the sense that, depending on how you view it, we got hit by a storm, but we're really lucky in that we observed the lessons learned from Hurricane Katrina, and shortly thereafter, Rita. So we built in our fault tolerant network.

So even though some of our land lines are now a major hub down in Galveston was completely obliviated, we still had these fault tolerant network where one part of the

system is down and then the rest are still going on. And that's really based off of lessons learned from the banking industry, telecommunication industry, natural gas, electricity industry, wire and grid networks. Now, there's about 200 established telemedicine programs in the United States, very small ones to very large ones like UTMB, which actually is considered probably the largest operational telemedicine program in the United States and perhaps the world. We see about 60,000 patients -- a year real time, and just the last year alone, we saw about 80,000, so it's continually rising, so it's an incredible operation.

Although we're not the largest network in the world, I think Canada has the largest network with about 800 end points. We have about 392 end points.

Now, back to your question or point, it is – you've got to have this thought tolerant network in place, and a lot of these telemedicine programs do not even have a back-up data hub elsewhere outside of their institution. So if a natural disaster was to hit them, they're completely wiped out.

Everything on our system is electronic. We have gone to an EMR for the last ten years. So it's very important for us to maintain that system. Now, one of the lessons that we learned also from Ike is that even though our redundancy network hub is – our recovery hub was in Huntsville, Texas, it was like 108 miles away from Galveston, if you really look at the size of Ike, it covered the entire state of Texas, it got hit, too, but not as bad as Galveston, of course.

So there are some glitches that occur even though we had this redundancy plan. So what we're doing now is, moving towards multiple recovery hubs to include sites as far as Arlington, Dallas. So – and riding major highways so that you wipe out one of our smaller hubs. Our satellite clinics that depend on that are not affected as much, which was the case with Ike.

So it is important for existing health care organizations today, not just telemedicine programs, to have data redundancy, and in order to do that, you have to have good plans, you've got to have partnerships with local, state and federal organizations, as well as commercial providers.

MR. WEST: Okay. Joe, you were making the interesting point about how our – how we've moved from closed to open systems, the new role of social media, people relying on Facebook. I'm curious about the role of government in all of this. Like what do you think is the most important thing that local, state and federal government should be doing now?

MR. BECKER: I'll try to pull that together in a way that is a view from outside of government. We're not part of government, we're not funded by government, but we work very closely with government. And I'll tell you what I worry about a lot. You see a county or a city create a social media presence, yeah, we're on Facebook, yeah, we're – I'm twitting and people are following me. During a disaster, that's going to be viewed by the citizenry as a 911 mechanism.

When I have informed you that I need help via whatever method, not just picking up the phone and calling 911, there's an expectation there that police will rely, that fire will rely, or rather search and rescue will rely, and I worry that the back end systems aren't tied into the front end portal in a meaningful way for local government. And it all starts local.

Our key constituent during a disaster is that county emergency manager who's in charge of the disaster response. And the good news is, we can learn and be a dialogue with the effected people very quickly on an incredible scale. The bad news is that creates incredible expectations of a finite police force, of a finite medical response, of a finite fire response in those earliest hours. I can imagine when 911 was being created,

whenever that was, and you had the local fire folks saying, wait a minute, you mean to tell me anybody who calls will respond, can we create that capability? And how frightening that might have been in the beginning, yet how free that was. And, yes, I'd love to know where they are so we can get there as quick as we can, and what a great tool 911 has turned out to be. Now picture all of our social media applications as being 911 on steroids, and I worry that we have the back office in a county or in a city or that the systems are connected in a way that that can result in immediate response. I'm not sure they are.

MR. WEST: Marion, you were talking about how women and minorities feel more vulnerable to natural disasters, so let's make you the FEMA czar for a day. What would you do if you were running FEMA and thinking about kind of the differential impact on different parts of the population?

MR. ORR: I think part of what would be important is really making certain that you're getting accurate information through to citizens, residents rather, with the right sources. For example, women and minorities in particular tend not, especially minorities, tend not to trust government sources. They have a very cynical and skeptical view of government sources, partly through history and the like. And so the question becomes, how do you funnel information down through the community so that they can understand the seriousness of the natural disaster that might be on the way?

So, for example, the world community base organizations, churches and synagogues and the like can play in terms of getting information to people about hurricane preparedness and preparedness for natural disasters. The extent to which the government can connect to sources that people feel clickable with seem to me to be the way to go.

MR. WEST: Joe, it seems like faith based organizations have played a vital role in the response to a number of different natural disasters. Have you seen that, and how does the Red Cross coordinate or work with these types of organizations?

MR. BECKER: In fact, that's been one of the big game changes in the last decade, is the extent to which – I think what we had to do in our organization was go back and ask the question, where do people turn for help in non-disaster times, where do they go when there's a family crisis, typically the faith community is a key, or the key part of that help network for that family. So what we've been about is asking that same question, then during a disaster, how do we engage them in the communities response.

And we've reached out and we have thousands of local partnerships with faith based groups and other organizations that aren't necessarily disaster organizations, but they have that trust and that credibility in the community, and so if your church is willing to be a shelter, we'll train you, we'll give you the equipment, we'll work with you, we'll support you, we want that all worked out ahead of time.

And one of our great stumblings during Katrina, and I read our Katrina response, was the number of faith groups that we still didn't have that relationship with. And they'd open up the shelter and after two or three days, they were out of food, the volunteers hadn't gone to bed yet, they fatigued, and they didn't know how to get help. And we didn't know they were there, and the county emergency management apparatus didn't know they were there, and that was very frustrating for them. And so the issue for us is, how do we reach out to them long before the disaster? You know, when the first – when Gustav hit New Orleans after Katrina, came back and hit, the first kitchen we opened in New Orleans was run by the NAACP. That was by design. We had trained them, we had equipped them, they knew the community, and we said, would you become

part of this community's disaster response, you're not disaster folks, but you know the community, and those kinds of relationships are the force multipliers.

You know, one of the advantages of the Red Cross is, we've got about 60,000 volunteers who will go anywhere in the country on a moment's notice and respond. Well, before I send somebody from Ohio, I'd rather reach out to the community in the effected area and make sure we're maximizing all the volunteers that are there and that are willing to step forward, and that's what we've been about, not asking them to become part of the Red Cross, asking them to become part of the community's disaster response, and we'll coordinate that.

MR. WEST: Okay. Why don't we open the floor to questions and comments from you? If you could just give us your name, if you're with a particular organization, if you can identify that organization. We have microphones coming up the aisle. There's a question right here.

DOCTOR SINGERMAN: Hi, thank you. Doctor Richard Singerman, Singerman Group. It seems like you hit on two really important points, and I'll try and mix them together. One, if you looked at the government's role, what you really talked about is essentially a quasi search capacity by leveraging these non-traditional resources, that's area one.

And area two, in terms of health care IT, as our country is going from seven or ten percent physician adoption to hopefully, you know, 50 to 100 percent in ten years, it begs the question of how vulnerable we're going to be and what it would really take to build a capacity to adapt to health care situations if all of a sudden a huge amount of our health care network is wiped out. So those are actually two different questions, but –

MR. VO: Well, first, you're right, there needs to be an acceptance across traditional way physicians are trained how to deliver health care, that has to take place,

as you know, and I assume you're a physician. So what we're finding is some resistance to that today in terms of adoption to telehealth, but as time progresses and they see the advantage of using telemedicine, and what we try to convey to folks is that it is not the solution for everything. There are severe limitations to using telemedicine. You cannot do certain things. There are times when you are going to have to go see and get hands laid on you. So it is not a discipline of medicine, it is a tool that is used to deliver health care.

And if you think of it in terms of that mechanism, then you can think of it in terms of solutions, even when there is wide adoption, and then there's a huge disaster that wipes out a significant portion of the help IT infrastructure.

If that's the case, then you would need to think about how to really back-up all your data, because, as you know, we're moving more into an age where all of the medical records, all the medical data is going to be digital. And so how do you store that, how do you transfer that, how do you maintain that and keep it confidential? All these things will need to be worked out in detail for each individualization, as well as for state and local and federal agencies, as well. So that's a very tough question to have a solution to. But at some point, all those things are going to need to be considered and entertained in detail.

MR. BECKER: To your point on surge, you know, when something horrible happens, everybody wants to help, we all just want to, in some tangible way, reach out and help. And I think one of the key rules of government early in the disaster is to articulate the priorities of what is needed, which we do fairly well, and articulate what is not needed, which we don't do well.

And so I'll use Haiti as an example. In the earliest, earliest days of Haiti, when you have one air strip, and I slept on that air strip, it's just – there's not much

capability there, the priorities were search and rescue, medical, and infrastructure to get communications and infrastructure in place, it wasn't shoes by the boat load, it wasn't what people felt, oh my gosh, they must need this thing that I have, so I will arrange it to get there, and what you ended up having was the port in the airport being tied up with things that might be needed three weeks from now, but aren't urgent right now.

And I think what we in the response community, and I'll use my own organization as an example, we have to get clearer about what is not needed and what actually becomes the disaster within the disaster if we're trying to figure out where to put what people dumped out of their closet when what we really need are these critical supply items that are getting in. I think that we have to help people understand how to help us surge, people who want to do that.

MR. VO: If I can add to that, case in point is using telemedicine itself in Haiti, there was a lot of organizations that contributed very sophisticated telemedicine equipment, lots of telemedicine equipment, boom, plopped them down in Port-au-Prince. It went unused, there was no logistical coordination to track this equipment, and it went missing. There was over 200 satellite phones that were handed out for physicians who were there on the ground. As you know, there was a surplus of doctors who showed up.

So, one, you didn't even need to have a reach back to the United States for specialists because they were there on the ground. Secondly, there was no training to use these devices, and the immediate need were more in terms of, when you're talking about technology, was the phone and web access. They didn't need all these boxes of video conferencing, medical peripheral. Now that the providers have left and gone home to their respective countries, now is the time to use telemedicine. But back in the first three weeks, you didn't need it, because they were there, there were more immediate

concerns; there were more immediate logistical and coordination issues that had to be addressed.

MR. WEST: Right there is a question.

MR. MCDONALD: Mike McDonald, Global Health Initiatives. First of all, I agree with you that government has a very strong role to play in mission critical gaps. One of the concerns I have about what's been talked about so far this morning is that it's all downward vertical exchanges and it's hierarchical controlled systems.

So in the last ten years, DOD command and control research has gone to a fifth generation system versus these fourth generation eccentric systems that allows for more smart forms. So the – one dimension of this is, yes, we have to improve the downward vertical exchanges in these command systems. But I don't hear you talking yet about what do we do to use intelligent social networks to enable self-triggering of teams from the community itself to address the problem if we're bottlenecked? And in Haiti, in the early days, one of the things we did was, use crowd sourcing to enable people to get to Haitians in trouble by having them use their cell phones to call a short coat. So there are mechanisms to use, upward vertical exchanges of information from the public and to enable them to actually act themselves into these mission critical gaps. Do you have any comments on that?

SPEAKER: I can start. What you're describing scares a country emergency manager to death at times, yet it's the greatest strength and the greatest opportunity of what we have going forward. You know, when a disaster hits, each county has a room like we're in, and in that room are the police, the fire, the medic, the hospital, the power company, the school system, the Red Cross, we're all in there, and as issues are identified or needs are identified, that's the group that can solve it, that's the group that knows where – either they can do it or they know who can, and the idea of

empowering citizenry to on their own mobilize and respond creates duplication gone wild in an emergency manager's eyes, when, in fact, it could be the quickest, cheapest, most effective way to feed somebody, rescue somebody, respond, it's how do we – I was with a bunch of military folks last week, and I was trying to argue the position that we're going to have to tolerate messiness in a way that we're not used to, we're going to have to tolerate what they would view as chaos in a way to launch the response more quickly and more effectively. And I don't think I or my organization has our head all the way around how to empower that and how to tie that into what's happening in the operation center, where somebody else is also crafting the same solution to address the same problem, and I think that's our challenge.

You know, who are the first responders in a disaster? It's not police, it's not fire, it's not the Red Cross, it's the family, it's the next door neighbor, it's the bystander, and what we all care deeply about is, do they know what to do, and are they willing to do it.

And the role that social media can play in this to create that framework is incredible. We just don't have our heads around the possibilities yet, I would suggest.

MR. WEST: If I could ask a follow-up on that, because I know, you know, we heard in Haiti there was increased reliance on social media, and crowd sourcing is certainly kind of a big topic in a number of different areas. How do you actually implement that type of solution? Like, you know, with all the information coming in, how do first responders or second responders actually synthesize that information and put it in a form that actually is actionable?

MR. BECKER: That's the point I was trying to make earlier. With a front end portal is the easiest piece of this. The back end systems to take all this – is this anecdote that I just saw the tweet, is that representative of damage in that area or not?

And when I was referring to closed systems, we have a government apparatus that reacts to official information. If it's verified by police or fire or a medic, then we say it's real. When it comes in from the public, then I have to go verify it, and we have to move so far past that.

You know, don't tell me, if I'm taking a picture of my house on fire from my cell phone and shooting it to you, that's pretty darn official as far as I'm concerned, you don't need verification of that. Yet when you look at the systems that we've built, particularly at the local and at the federal level, not so much at the state, it's all based on who verified what and who reacted how, and it needs to become much more decentralized, and that's daunting. We don't have the back office, the back end systems to support the information that's already coming now.

SPEAKER: While I agree with you, and I think that needs to be done, you do need to consider, though, a couple issues, one is prioritization of resources, because at some point, even though the citizens are responding and helping each other, there comes a time when they don't have the actual tools to put out a fire or to open up, you know, the jaws of life to save somebody, they're going to need an official response.

So, yes, you're going to need that, and it's great to involve the citizens in a horizontal type of medium, but at the same time, you have to prioritize the resources that you're going to dedicate to saving one life versus ten lives.

And then with the spread and decentralization of all this information, what you're going to have is an influx of information, just overwhelmingly. So how do you coordinate, how do you filter those information? So those are two issues I think that needs to be addressed. And I don't have the answer to that, of course, but, you know, it's certainly something to consider.

MR. WEST: Okay. Right there.

MS. BERNARDO: Theresa Bernardo, Pan American Health Organization. Following on that same thread in the social media, we saw some great innovation happening in Haiti in terms of finding people that were trapped, but also volunteers working on the weekend to map where the camps were, where the people were, where the health facilities were, all sorts of attempts to match needs and offers.

And one of my questions is, how do we capture that and grow that and scale that up for use in the future? It's almost ironic that these groups work with so little money that they can't capture funder's attention. And for a small investment, I think we'd see huge rewards, but we need to invest in the innovators there.

MR. BECKER: I think we would agree with your statement.

MR. WEST: Other questions?

MR. BECKER: I'll use my organization as an example, how we have used social media. We started, I'll get this wrong, but probably four or five years ago, just being in the conversation, what are people saying. And so every morning for years, I get an update of all the blogs and all the social media sites, this is what people are saying, and it gave us a great opportunity, because if they would give us information during a disaster that we didn't have, you know, somebody over here has need and nobody thought that was in the effected area or whatever, so the first step was just being present and giving people the way to talk to us and watching their surprise when we answer, you know, which was pretty incredible. We're present constant online.

Then we move from that to using social media to raise money. And we started that during Ike and Gustav, the text to help, and we certainly saw that on scale in Haiti. Ten million Americans, I'm sorry, I got it backwards, three million Americans gave $10 each by text. And when we dug into who they were, they were non-traditional donors

because it was so easy. It really scaled in Haiti in terms of how much people gave by text.

Then we moved it from fundraising to delivering service. So in Haiti, when we were setting up inoculation clinics, we learned very quickly that that was the best way to communicate.

You know, in each of the camps, we did several things, first we'd find the mayor, and the mayor was not an elected position, it was the young adult male typically who was the opinion influencer in the camp, and we would tell that person we're going to be here tomorrow distributing supplies or whatever, when we send them all texts this afternoon, here's what you can influence in terms of, yes, this is great information, have them all be ready for us to come and we'll be ready to do this, it went to service delivery.

Then what I believe you were describing, working with the State Department, for people to actually be able to text and say I need help and here's where I am, that was another service breakthrough.

And then that's all the official; the unofficial is what you were referring to, which is the good hearted people at 3:00 in the morning, I refer to them as the Wikipedia folks, you know, it's the same people who just want to help and just want to make sure that the people have the right information.

To me, for my organization, that redefines who our volunteers are, not necessarily the person in the shelter providing care or on the feeding line or driving through neighborhoods, it's people who can map information, it's people who can connect dots, and you never have to leave home, we just have to make their work possible and know how to tie it to everything else. That's hard, but what an opportunity that is.

MR. WEST: There's a question in the very back.

MR. LERNER: Thank you. Norm Lerner, Organization of American States. I have a question that can be asked two ways. What is the, in your opinion, the technological driving force that either encourages or restricts applications of eHealth? Alternatively, you can say or ask, what is the expectation and relationship of different applications with the constant improvement of technology in mobiles going 2G, 3G, maybe eventually 4G? And then what is the distinction within that for urban versus rural applications?

MR. VO: Let me try to remember all your questions and answer them succinctly. There's a couple of issues naturally that either drive or restrict the adoption of telehealth technologies, and that is, one is efficiency of work. So if you're using electronic means to deliver health care, you can be much more efficient in the way you deliver health care, particularly through the electronic medical record. You can really – and in sharing that amongst providers and specialists. So you reduce the redundancy that takes – for instance, if you go to your primary care provider and he or she recommends you to a cardiologist, that cardiologist will probably repeat similar tests that was already done last week by the primary care provider, so using telehealth really reduces that redundancy and then could eventually drive down the cost for that.

The other restrictor right now, and actually that's a facility, the restrictor for adoption of telehealth really is the reimbursement rates that we – that a lot of providers face. They really right now can't get reimbursed for using telehealth to deliver health care.

Now, I think the state of Virginia just two weeks ago passed a law mandating the third party pairs to reimburse one for one for telemedicine, and that's great, but there's a lot that needs to be done throughout the whole United States.

A lot of states have their own rules on how you're reimbursed for it and how you actually conduct telemedicine. For instance, the Texas Medical Board is now passing rules on what is required for a telemedicine encounter to take place, and some of it is actually quite restrictive. So you have regulatory rules and you have economic obstacles for the adoption. And I apologize; I lost your other two questions. If you can repeat that, that would be great.

MR. LERNER: Sorry about that. The other side of the coin associated – is there a limitation, and how is that relaxed with respect to the applications of telemedicine that are available and are expected to become available as technology improves over time?

MR. VO: Okay. The innovation around applications and hardware and software for telemedicine is constantly evolving. Just three years ago, we were doing, you know, regular VTC, now we're all transitioning to high definition, which actually provides greater utility for some of our providers. Now they really see deep inside the ear, nose and throat, and those are images that can be captured and stored in electronic medical records.

MR. WEST: I don't think I want that stuff in my medical record, just for the record.

MR. VO: It could be used a baseline and compared for later on, a post-op type of scenario. So the innovation is sky rocketing, you know, and the equipment cost for that is reduced over the years, because you have a lot of competitors, you have a lot of people evolving their applications to meet the needs of the clinician, so it's great. The limitation, however, comes from the reality that some folks use telemedicine as the end all, be all for their health care delivery, and that's dangerous, because there are severe limitations, as I mentioned, for telemedicine, you can only do certain things with

telemedicine. And even though you can evolve your technology to do a lot of things with telemedicine, at some point you're going to have to provide health care via an in-person environment.

And, you know, right now there are some programs that are experimenting with robotic surgery, which is a great innovation, actually could be much more – in some instances, I see that as better than an actual doctor cutting into you, because you can program the – to cut precisely certain things, but at some point, during certain surgeries, for instance, neurosurgery or CT surgery, where you're going to need the judgments of the provider to play a role, and that's where telemedicine stops and real medicine, well, telemedicine is real medicine, but, you know, years of clinical experience and training come into play.

MR. WEST: Marion, I have a question for you about state and local government, because we know that a lot of the responsibility for responding to natural disasters does fall on the local level, but yet now we're seeing state and local government in the United States having huge fiscal problems, and, in fact, those fiscal problems are going to get worse, not better, over the next couple of years. So I'm just curious what you're seeing in terms of the capacity of state and local government, is it getting better, is it getting worse? What are we seeing in terms of their ability to handle these types of issues?

MR. ORR: Well, I think since Hurricane Katrina, there's been this real push at the state and local levels to give more information to people about preparedness, for example, making certain that they know where the evacuation routes exist, where the nearest shelter is located.

All these kinds of information outlets cost funds, and you're right, with states right now facing tremendous fiscal constraints, these kinds of things have to be looked at in terms of whether or not they can fund them.

So the whole effort that we saw after Katrina, where you had a real heightened effort by especially state governments to encourage people to be prepared, to encourage folk to know where their evacuation routes exist and where their local shelters exist, you would imagine that, given these fiscal constraints, that states will be constrained in terms of their capacity to encourage people to do these kinds of things. So my guess would be that the economic downturn and the tremendous challenges that many states are facing must hamper preparedness efforts.

MR. WEST: Okay.

MR. VO: Is it appropriate for me to ask one of the other panelists a question?

MR. WEST: Yes, you can, as long as you don't mind them asking you a question.

MR. VO: No, not at all. Thank you very much for sharing your study on the Rhode Island study and the type of folk who are most likely going to evacuate during a disaster. I was just wondering, maybe Rhode Island may not be the appropriate state to assess this given their economic background. What do you think is – do you think one of the factors that could contribute to them likely to evacuate, as well, would be whether they actually had resources to evacuate?

MR. ORR: Yeah, sure. In fact, one of the things that I will point out is that folk who live, and I think I mentioned this, in proximity to the coast tend to feel more vulnerable about a hazard and they're more likely to sort of say they would obey evacuation orders. It so happened in terms of Rhode Island, the folk who are living there

against the bay and along the Atlantic Coast, these tend to be high middle income folks. So while they may very well feel vulnerable because of their location, they also have the resources to be able to make the evacuation, whether it's private transportation, whether it's the capacity to live with someone else in another location. So as I indicated, I think the Rhode Island one may not be the perfect model because of the kinds of people and the kinds of infrastructure that exists along the coast.

MR. VO: How about folks like in the Panhandle of Florida or Alabama or Mississippi, how do you imagine that would play a role in those areas?

MR. ORR: Well, again, I would suspect that the extent to which you have issues of gender, race and financial vulnerability certainly would – you would have to look at those kinds of things. That's what researchers have tried to do; they tried to look at financial vulnerability, social vulnerability, and this whole question of geographic vulnerability. So if you're living along the Panhandle of Alabama and around Florida, certainly you are in an area where you're vulnerable simply because of your location to these kind of natural disasters.

MR. VO: All right.

MR. WEST: Okay. There's a question back there.

MR. FINKEN: My name is Ed Finken; I'm a pediatric orthopedic surgeon from Children's Hospital. I'm also part of a larger national organization that's trying to create sustainable change in relief work in developing countries. And I've been stymied and a bit discouraged because of the lack of relationships and sharing resources that exists.

Also, I was down in Haiti four days after the earthquake and worked for two weeks there and was part of the bedlam. But also, there's a report that said that there are about 6,000 NGO's present in Haiti before the earthquake, and you look at the

lack of infrastructure both in terms of government and health care. How can we harness the tools of what you're talking about with integration of medicine, telecommunications to help create a reticulum in network so that we don't have to continually reinvent the wheel after earthquakes and natural disasters? Thank you.

MR. VO: That's a very important point. And you're right; there was a lot of NGO groups who already established a footprint in Haiti before the earthquake even hit. For instance, the UN is such an organization. And what we saw, though, was when the earthquake hit, and this is something we discussed before the talk here, is that when the earthquake hit, a lot of these organizations infrastructure were compromised.

The UN, for instance, lost their leadership, and their whole entire disaster planning, supply, warehouse collapsed. So you have a lot of these groups, they suffered the disaster themselves. They were then mobilized to recover within their organization. So it was very difficult at that time for them to share information and react to the community while they had to tend to their own needs, as we saw with the UN and I'm sure a lot of other NGO's.

And I think that begs the question or leads to what my own organization went through, in that we really depended on the fact that we had a back-up plan, a redundancy plan for infrastructure, so that when our major hub in Galveston was completely wiped out, which it was, how did we recover from that, where was all our resources, information, and our equipment, back-up equipment? So we had planned that out before the disaster. And I think that's something that other organizations have to think about, too, that they need to locate their recovery hubs, whatever you call them, somewhere else far away from the disaster site, far away from their headquarters site, so that they can have ready access to, one, recovery and distribute whatever services that they are there to do.

MR. BROWN: Thank you. My name is Dave Brown; I work for the National Council for International Visitors, in a volunteer capacity. Following the earthquake in Haiti, I actually volunteered at the Haitian Embassy and helped build the web site over a couple of days and implement some systems.

We tried to coordinate with Southern Command. A friend of mine works – is liaison with NATO for the Navy and didn't have much luck, and they had spoken with him afterwards about the communication process, and I think that might have been the top down approach. He said that we didn't exist beforehand, they didn't know that they should be speaking with us, and I just wondered, in the use of social networking and the groups that are coming together in the fifth generation this gentleman spoke with before, would there be any – make any sense for the government to kind of convene all the parties and look at the system, such as the 200 different telemedicine systems and networks out there and help standardize systems, procedures, protocol, so when things happen, they can come together much more easily? And that would be to any of the panelists, I guess.

MR. BECKER: I'll take a general stab at that. I don't think – you can't just say we need to pull everybody together in a disaster. There are such discreet subsets of disaster. How do you do debris removal, how do you do search and rescue, how do you handle the medical mission, the feeding mission, the shelter mission, the supply mission? It goes on. And each one of those is its own system. It's its own eco system, and how do you pull those together, and how do you pull the players in beforehand?

And there's no shortage of efforts and umbrella organizations and trade groups that do that sort of thing. And you craft very thick documents and you arrive at a

well oiled machine, you think, and then the event hits, and the number of new players mushrooms, and the frustration is, they don't know how to tie into that system.

Moving onto the very highest level, the NGO's, through the United Nations, we said we need to be organized on international response, and maybe after the Tsunami it was recreated into the cluster system, so there's, you know, a medical cluster, and a feeding cluster, a logistics, and that's how we organize ourselves internationally.

But what about this little church that wants to respond and doesn't have a way to tie into this huge apparatus? That's where the frustration is. What about the ad hoc volunteers or the people back home trying to create things online, how do they tie into that?

And that's what we haven't broken through to create yet, is – I was talking about the open systems and the closed systems. We're so used to the systems being closed with a finite number of players and we haven't moved well to a recognition that America in particular has what it takes to respond to disasters.

You know, I know budgets are tight, I know my organization's budget is tight, if I look at the only resources as what we have in our organization, we'd miss the vast majority of how America can respond, it's how do we bring it all together. There's a role for social media in that, but I would suggest that's the easy part. You know, it's easy to create those front end portals for people to create and to do; it's hard to tie that to the existing closed systems and have it be meaningful. I used the example before, we have our system to connect people in disasters, and then there was the Facebook. So it's incumbent on us to do one of two things, either get out of the business, because there's another solution, and we work real hard on our driving costs out of the business, or maybe we have the right things so that all the systems are at least integrated and talking

with each other. But how do we change our systems to be open to new feeds during a disaster? I think those are going to be the answers.

But if you're that county emergency manager, I keep going back to who's the customer here who's trying to coordinate this whole thing, I mean the state is calling saying do you need help, the feds are calling the states saying do you need help, and you've got this poor him or her in the country trying to organize this whole thing, that's not the time to shake hands and get business cards and learn about each other, and unfortunately that happens too often. But the people who aren't in that planning meeting and in that planning process often feel shut out of the response and have a hard way tying into it.

MR. WEST: Joe, we talked a little bit about Haiti here today, but before the panel, we also were talking among ourselves about Chile and their response, which has been very different, obviously Chile has a different capacity, different economic resources than Haiti. But could you just talk a little bit about the contrast and how each of those countries handled their own particular disasters?

MR. BECKER: Sure, and I can imagine you all would understand the dynamic there. You know, when there's an international disaster, we typically don't send tens of thousands of American Red Cross people to respond. You know, if something bad happens here in the United States, you know, we'll use 30, 40, 50,000 response volunteers for a typical hurricane or something of that scale.

If it's international, what we're trying to do is augment what's in the country. So in our world, the Haitian Red Cross had thousands of volunteers, actually more than that, and our job was to send in small numbers of people to be force multipliers to engage the local community to respond, because Haiti didn't have that capability even to put order to it.

Chile was a very different situation, it was an experienced government, and not only relatively well resourced within Chile, but the surrounding countries capabilities to come forth and respond meant that there were very few requests of the international community to respond to that disaster; that's a good thing.

You know, and again, people call us all the time, I want to go to Chile, I want to go to Chile, that's the worse thing we can do is send well intentioned people to a disaster where they become part of the problem.

You know, they need to be fed, they need to be housed, they need to be cared for, what we're all about is, how do you empower the local community to respond, bring the resources in, and bring organizational mechanisms to that? We'll send small numbers of people, large sums of resources and money, and that tends to jump start the response quicker than plane loads of people looking for organization.

MR. VO: I think the critical factor there between Chile and Haiti is the government infrastructure already in place that you mentioned, I would second that.

MR. WEST: Okay.

MR. BECKER: I would also suggest for the long term recovery, I can't tell you how many conversations I've been in where, how do you sustain Haiti, and if we're going to pour resources into that country like we've been and continue to do so on the pace that we have, the worst thing the Red Cross can do is put water systems in place and build latrines and know that it's not going to be maintained by an effective government, and tens years from there, it's not going to be there, and we've seen that happen globally.

And so we're very invested in having a functioning local government that can take recovery investments and sustain them, otherwise, it's a bottomless pit of money. And I know we're real focused on that, and the primary role of the UN is also

helping to reconstitute the government and put in place what wasn't there beforehand, help the country to that, let me be clear.

MR. WEST: Okay. Over on the side.

MR. AHRENS: Nathanial Ahrens from the Carnegie Endowment. I think everyone would agree that social networks are extraordinarily useful in these types of situations. The physical community networks are critical. But I think it's also easy to confuse that with the actual technology application, they're more infrastructure. And there's going to be certainly a need, and I think coming out of the recent search and usage of these social networks, for good applications that utilize those, and I don't think it's surprising that larger elite organizations or governments are going to be a little slower than the small local networks in figuring out how to use those. But I think it's also probably overly generous to call social networking telehealth or health technology, they really are infrastructure.

So if we get back to sort of the – one of the core points or questions you posed, how health technology and telehealth can better equip first responders, are there things outside of Facebook that are especially useful, especially in light of an event like an earthquake, the recent one in Shanghai or a Haiti type event.

MR. VO: Well, as we saw, the use of wireless communication technology is going to be critical. We did not use social networking mechanisms to recover, we use wireless technology, and we use a web based portal that we created to transmit and store patient data information. And a couple key things that could arise from the use of wireless, you can do DG surveillance, you can do rescue missions, emergency response, and then what we did, as well, was routine medical care, so that you don't inundate the emergence responders with the flu or with sinusitis. You've got to have a mechanism to provide routine medical care to the citizens that are displaced and have no

access to their primary care providers, that's very important. And for us, we utilize the cell phone for that. So in that sense, hopefully that answers your question.

But then how do you also communicate all this mass amount of patient data, folk that you've seen? So using the internet is vital for creating a secure web portal to interface with our EMR that was backed up several hundred miles away.

So in that sense, we utilize the web and wireless communication to provide health care. I hope that answered your question.

MR. BECKER: Let me take it; beyond health care, just in the disaster environment, none of these are the answer. What we have to have is the menu of options so that we can use the right one. You know, it just so happened that we didn't get voice very quickly in Haiti, but we got data on cell very quickly. We can't promise that's going to happen next time. We can't promise that will be part of the solution in the earliest days next time. When we have a disaster, one of the groups that we still deploy every big disaster is ham radio operators, got to have them, and we usually end up using them in some way where there's no access to internet, no power, phone systems are down. I mean what I care deeply is that there's a menu of options that we deploy and that the people on the ground can pick and use what's actually working for them at the time.

If we put all of our eggs in social media, that's fine for people not in the effected area, but I can't promise you anybody in the effected area is going to have access to it. And so it's got to be the range, it's got to be the menu of options. That's the philosophy that we would suggest for the general disaster world. I don't know if I would want to speak for the medical side specifically on that.

MR. WEST: Okay. We have a question here.

MR. DAHLHEIMER: Don Dahlheimer from the Armed Services Blood Program Office. I have three areas, first, if there is a – are there assessments being done regarding the vulnerabilities of communities towards disaster in the U.S.? I mean based on what happened in New Orleans as compared to what happened in Rhode Island. I would think that perhaps there could be a pre-assessment for different communities as to their level of vulnerabilities. I don't know, Mr. Orr. But there's another area that – you indicated, sir, that Facebook provided a level of communication for Haiti, and was that within Haiti or within the U.S.? Because I didn't necessarily understand if you were able to communicate to the community within Haiti with regards to Facebook.

And then the last kind of comment and question is regarding the capabilities of cell phone communications in telemedicine with the limitation of character space, as well as the possibility of power. You know, did everybody stay charged up? I mean, you know, they were lined up on a cell phone –

MR. BECKER: Actually I can tell you, one of the lasting images I have of commerce in Haiti was kids with the hood of a car up, clamps on the battery, an inverter and a big strip of plugs, charging people to charge their cell phones, because that was the way people were communicating. I'm sorry, I jumped in, go ahead.

MR. WEST: That's a strong visual image there.

MR. ORR: You make a good point in terms of what it is the government could be doing, for example, they could very well be making these sort of vulnerability assessments. What we tried to get at in our survey were simply peoples' perceptions of vulnerability. But I think you're raising the question of whether or not government should be doing something to make their own assessment, the extent to which people are vulnerable. And clearly, you know, issues of proximity plays a role, issues of whether or not transportation, product transportation is available is certainly some of the kinds of

things that you would think that local and state government could do to assess efforts around vulnerability.

But we simply got at the respondent's own perceptions of whether or not they felt that their residents were, indeed, vulnerable. I imagine, for example, with the recent flooding in Rhode Island, that state officials were quite aware the folk who lived near the Pawtuxet River, for example, which, you know, crush that some historic number were, in fact, vulnerable for flooding, and hence, early efforts to get those folk out of their apartments, out of their homes took place.

MR. BECKER: I would suggest that the first half of the assessment has been done pretty well in a lot of communities, but the back end needs to be done.

MR. WEST: The back end being?

MR. BECKER: What percent of people can evacuate on their own, what percent of people are there? You know, and our experiences in a disaster, somewhere between 90 and 93 percent of people take care of themselves during a disaster. They check into a motel, they go stay with mom. I have to believe if something terrible happened here tonight, you wouldn't be in our shelter. There's a real good chance you would be taking care of yourself, or on somebody's couch, taking care of yourself.

The issue is, who are those ten percent, that seven percent, and what are their needs? And I'll use New Orleans as an example. So they're dug in. Is transportation the issue, is economics the issue? How do we get them to sign up in advance for a ride to the shelter if they don't have a car? And New Orleans has gone pretty far down the road on that. And our chapter is pulling together churches, you have church buses. Can't you be part of the solution and drive people to shelter during a disaster?

Identifying the numbers and the communities is the easy part, the back end is, so what are we doing to do to help them, how are we going to mobilize this community to care for them and get them out of harms way is the tougher part.

MR. WEST: Okay. I think we have time for one last question, right there on the aisle.

MR. MAZELLES: Thank you. Chip Mazelles with Wyatt Madison and Associates, we're an investment banking firm. Doctor Vo, do you make a distinction between telemedicine and telehealth, number one, and then is there a country that's using telemedicine that we could use as a model?

MR. VO: Telemedicine, or telehealth is a more general basic terminology. Telemedicine actually is defined as the use of telecommunication technologies to transmit medical data over broad distances, I mean that's the actual literal translation, I have to memorize that. But telehealth goes beyond that, to include distance education, eHealth type stuff. So you can think of telehealth as the umbrella definition and telemedicine as the actual medical services definition or sub-definition, that's how they play a role.

I think the country that is leading the way in telemedicine is the United States, to be honest with you. India has a pretty robust telemedicine program that's – they claim to be, but their infrastructure, if you examine them in more detail is very lacking. They have very poor infrastructure and poor telemedicine. And they constantly come to us for advice and procedures. Canada has a robust telemedicine program, particularly the OTN, Ontario Telehealth Network, which is actually considered the largest network in the world by 800 – a little bit over 800 points. But in terms of the practice of telemedicine, I think you're going to find it here in the United States.

You have a lot of folks from Australia, the Philippines, the National – Agency, which actually is an arm of their NIH coming to us at UTMB for consultation on how to set up protocols and stuff like that.

The important thing about telemedicine that you have to consider is, or keep in mind, is that there's a lot of companies that are willing, and they do have great innovative tools, bright, shiny objects that can flash at you. And you have a lot of telemedicine programs that are funded through grants and endowments to start to look at pilot, you know, programs for a specific disease system or overall telemedicine telehub management.

What ends up happening is, after the grant funding is up or dried up, you have a lot of equipment that are then put into storage or closet space and go unused. The important thing about telemedicine to consider for all health care organizations, regardless if it's here in the United States or elsewhere, is sustainability. How do you utilize telemedicine beyond the grant funding years that helps you with regard to putting the initial capital investment and buying new equipment and stuff like that?

We actually at UTMB, in the early mid to late '90's, were 95 percent grant funded for telemedicine, just like any other program in the United States. We're now down to five percent grant funded.

So you've got to flip the table, you have to develop a mechanism in which you can sustain yourself beyond the grant funding years, and that's through a number of ways such as how you restructure your scheduling blocks, be more efficient, how you utilize your physician's time so that they can see multiple sites, multiple patients, and really optimize the services that you have, how you structure your reimbursements and payment schedule, and then how do you structure your protocols and standardization so that it can be replicated at multiple sites, you don't have to reinvent the wheel.

But then there's, you know, but then there's external factors, too, that we can't control, such as CMS reimbursement rates and stuff like that. But you have to consider those things in terms of when anybody, you know, think about structuring a telemedicine program. Does that answer your question?

MR. WEST: Okay. I'd like to thank all our panelists, Alexander Vo, Joe Becker, and Marion Orr, we appreciate your sharing your insights with us. Thank you very much.

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I, Carleton J. Anderson, III do hereby certify that the forgoing electronic file when originally transmitted was reduced to text at my direction; that said transcript is a true record of the proceedings therein referenced; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were taken; and, furthermore, that I am neither a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

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