

National Clearinghouse Lecture Series

National Clearinghouse for Science, Technology and the Law at Stetson University
College of Law

PRESENTS: DR. JAMES YOUNG

"TERRORISTS, HURRICANES AND VIRUSES: WHAT'S NEXT?"

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TIME: Commencing at 12:00 p.m.

PLACE: Stetson University, College of Law, The Great Hall

MS. HENDERSON: Okay. Good afternoon. My name is Carol Henderson, and I'm director of the National Clearinghouse for Science, Technology and the Law here at Stetson. I'd like to welcome you here on behalf of the law school and the Clearinghouse. And I also would like to add a special welcome to our friends here from the Consulate General of Canada, both from the Miami and the Tampa offices, and to Jim's wonderful wife, Eileen, who is also here from Canada.

I'm very honored today to introduce our speaker, Dr. James Young. He is the special advisor to the Deputy Minister of Public Safety and Emergency Preparedness for the government of Canada. Jim is also, at present, the president of the American Academy of Forensic Sciences.

I've had the pleasure of working with Jim over the past few years, since I'm also an officer in the Academy. He has worn many hats over the years. In fact, when I first met him, he was both the Chief Coroner for Ontario and the Assistant Deputy Minister of Public Safety Division in charge of the crime laboratory as well as other divisions.

He recently received the highest order of Ontario, which recognized the highest level of individual excellence in achievement. Dr. Young is internationally renowned. In fact, I recently saw him on the road in both Taiwan and Hong Kong, giving presentations on emergency preparedness and disasters. He has managed the SARS crisis, worked on 9/11, the Swiss Air crash, and also in helping identify the victims of the tsunami. And he has lectured all over the world.

Most importantly though, I think Jim is a voice of calm and reason in this age of angst and hype when it comes to these types of disasters. I feel safer already that he's here with us in Florida, even though it is before hurricane season.

So, it is my great pleasure right now to present Dr. James Young and his timely lecture, "Terrorists, Hurricanes and Viruses: What's Next"?

(applause)

DR. YOUNG: Thank you very much, Carol. I think everyone can hear me. The mic seems to be working fine. It really is a pleasure to be here and the bonus for us was the tremendous weather. That was about zero at home, and I got caught the other day in Ottawa in an ice storm. So, this is -- this is a wonderful treat.

I just want to say a word as well about Carol's work at the university. She mentioned that she's with the Clearinghouse Project. For forensic science and for the law, this is a very, very important project this is an attempt to bring together research and writings on forensic science from all over the world, put them into a database and make them available to everyone at no cost.

And it's been through a grant through National Institute of Justice in the States and it's certainly something the American Academy of Forensic Science is about quality and forensic science, and about advancing forensic science. And certainly, the board members and the American Academy endorses this project and thinks it's -- that it's really important for the advancement of forensic science.

So, that makes it a particular treat for me today to be lecturing about the role of forensic science in emergencies, because it really ties into what we're trying to do with the American Academy. It's -- the title, I stole really from "Planes, Trains and Automobiles."

I thought this is the emergency; the world is really much the same right now. It's all of these things, terrorism, hurricanes and viruses. And what I would like to do is talk specifically on the way through about the growing role of forensic science in these issues. And obviously, I'll talk -- most of the things I'm going to talk about are experiences that I've had in recent years. So, I bring some knowledge of having been there and seen some of these things.

Well, if we're going to talk about emergencies and we're going to say what's the role of forensic science, I guess the first key question is will we face emergencies and are they likely to happen? And the answer to this was actually predicted by people in the emergency field some years ago, we began saying to governments, "We're living on borrowed time. We are going to get into problems. We are going to see an increase in emergencies." For all of the things you see there, and certainly, I'm going to use some examples from all of them and talk about forensic science.

When I talk about global warming, I think it's interesting, because people sometimes will look at global warming, and they'll look at the direct effects of the weather, but the indirect effects we see as well. We've seen unprecedented fires, forest fires in Canada and in the United States and California and other places because of unprecedented dryness in our forests.

We've seen flooding. Certainly, I personally have been involved in floods in Canada that have been 100-year floods and 500-year floods. And probably to some extent, fell under some people's radar screen. Some years ago, the warm summer in Europe, 16,000 people died of heat in France that year alone. So, this is the kind of issues that we do face. So, I'm going to talk about many of these things over the next hour.

So, the trends that we see, in fact, in emergencies, and we've certainly experienced this in Canada, and you'll see from the slides, that if we've -- if you experience them in the United States or we experience them in Canada, they are probably affecting multiple other countries all at the same time.

And they're more frequent, they are certainly bigger, they are international in scope. And whether it's SARS or whether it's the 9/11, I'll illustrate to you how 9/11 affected Ontario and Canada the day that happened as well. And I can promise you, as I'm sure everyone understands from watching Katrina and other events, that they are complex in nature.

Aging and critical infrastructure and interlinked infrastructure is an interesting problem, and one where you wouldn't think, at first, that forensics could play any role, but it actually can. I was involved, personally, in the ice storm in 1998 and managed that for Ontario, and then I managed our part of the blackout.

It -- both were as a result of connections and interconnections and large power grids. I thought it was hard enough in the winter. I -- when you got cold weather and then it gets colder and you're trying to save people's lives. And when the power blackout came, I thought, "Oh, this will be simple. At least it's good weather," but now you're worried about people dying in the heat, and you've got to get air-conditioning to seniors; you've got to make sure that food is -- is properly preserved and that people aren't getting ill from the effects of spoiled food, et cetera. So, they all bring their unique set of problems.

And the power blackout affected people in two countries and 50-million people were affected. And that was 10 percent of the total North American grid. And some could say, well, that's not it. Then the solution is taking people off the grid and just have localized -- more localized grids.

Well, the problem with electricity is you can't store it and -- you can't store it, so, what you make, you have to use. And if you have a bigger grid, then you're able to equal that out so that if there's a warm spell in Ontario and we need more air-conditioning, but it happens to be unseasonably cold in lower New York State at the same time, then the power that's made in New York can be sold to Ontario.

We can keep our air-conditioners, and we are not all suffering brownouts and blackouts, because if you make too much and you don't use it, that's just as bad as not having enough and overusing it. Either will cause a shorting out.

And what happened essentially in the power blackout was that the lesson out of it is you're only as good as your weakest link, because what really happened was that there

were some fluctuations in power, mainly because of trees that were overgrown on some power lines in Ohio.

The crews that were looking after the -- monitoring the system at First Energy didn't monitor and do anything about the fluctuations and allowed them to continue and allowed them to grow in amplitude.

When they got to a critical size, they tripped the whole system, and it started a chain reaction that essentially took eight minutes and blacked out 50-million people, because the power blackout just spread to the entire part of that -- of that grid.

So, you can say, well, is there any role, in fact, for forensics in that? And as we discovered afterwards, there is. We set up a Canada/U.S. task force to study it, and I served on part of that task force and looked at -- and we looked at, in fact, what can be the physical causes of power blackouts in the future and what can be the cybercauses of power blackouts?

And we took it from the point of view that it was human error, in this case, and overgrowing of vegetation, but it could have been terrorism as well. And all of these systems are potentially vulnerable to physical attack or cyberattack.

And certainly one of the big, big growing areas in forensic science right now is the whole digital area. We have enormous growth in forensic science, where we look at cell telephone records and we look at fax machines and we take computers into labs now and figure out what people think they've wiped off their hard drives. And all of that involves all kinds of -- because much of it is Internet, and it involves international law and international convention.

So, all of these areas, even in managing an emergency, we get into these kinds of issues. And in the middle of the power blackout, in our operation center, we got attacked by a blaster virus, lost our -- all our computers for a day or two. So, the rule in an emergency is if you have one, something else follows it in rapid order, and you're usually balancing two at the same time.

Certainly, this leads into the whole risk of terrorism. And all of us in North America, we're relatively complacent about terrorism until the events of 9/11. Why we didn't wake up with the first bombing of the World Trade Center? Or in Canada's case, we had an Air India crash that was a terrorist act. And -- but for some reason, it didn't stick in the consciousness of North Americans.

But worldwide, I can tell you the effect of 9/11 was dramatic and was quite instant. Sometimes it can be done, as it was in New York, by simple bombings. And this is the area that was bombed in Bali. The Bali bombing, just like New York, was done in stages. The terrorists' acts often are.

So, in fact, one of the things we've had to learn in managing these affairs is not to send everything in instantly when something happens, because a single event is usually followed by other events. And then you could, in fact, as happened in New York, end up with more people killed by overreacting and getting caught in the situation.

So, the Bali bombing, this was actually three bombs that went off, one in Paddy's Bar, one in the Sari Club and the big one in the street. And the idea of this bombing was that this was sending a message to the whole world, but in particular to Australia.

This is the playground. This is the Florida for Australians. And in the -- when they vacation, they often go to Bali. And the area that they chose to bomb was the area where the tourists hang out, rather than the locals.

One would say, well, why Bali? Why Indonesia? Well, again, it shows us that we slowly learned that the issue of terrorism is a global issue. And certainly, when we talk about security and terrorism in North America now, one of our great concerns is home-grown terrorists. Are we are seeing, in fact, people who have grown up in North America, have lived their whole lives in North America, suddenly get intrigued by Al-Qaeda, and can, in fact, operate at home?

So, no longer are we just looking at the -- at our borders. But we recognize in Indonesia, in fact that we have the largest Muslim country in the world, and many of you will remember that when the tsunami hit, the area of Indonesia that was hit was under military rule. It was under military rule because it's an area that has had a lot of problems with terrorism, as has Jakarta.

And so it affected, in fact, the whole relief effort and what could be done and what was done in that area. Fortunately, there was some -- peace was made out of it all and aid got in there, but the politics of managing an emergency very much depend on the area as well.

And that particular bombing was done by Jamias Lamia, which is really a group that is a first cousin of Al-Qaeda, same beliefs, and operates in that area. And the whole issues around Al-Qaeda exists in Indonesia, the south two provinces of Thailand, parts of the Philippines. So, it's a major issue worldwide.

This shows the fire. And in the Bali bombing, a quick event lasted only a few minutes, 200 people killed and 200 people badly injured, and major problems in evacuating people to Singapore, to Hong Kong to Australia because of an instant overload of local capacity.

And that's a common element of all of the kinds of emergencies, and certainly will be an enormous problem worldwide in the pandemic, which is what we'll finish up with the gloomy news of the pandemic today.

This is the bomb crater and the scene itself. And not too hard to figure out that this was a bombing. And so this is a form of terrorism relatively easy to investigate. When we get worrying about things like bioterror and trying to put it together, much, much harder.

But when we get a bombing forensically like this, we look -- we want to get fragments of the bomb; we want to see what it's made of. And it gives us a very good idea who made it and how they did it. Most of the time, with the Internet these days, all of the elements for a bomb will be available. They'll just be slightly different.

One form of nitrate, how you get it for the fertilizer, will be slightly different. And you can usually tell from the composition of the bomb where it was made, based on what elements it has in it.

This is a very tranquil and very pretty picture. This is my hotel in Bali. And the key element of this picture and why it's important is it shows that the effects of an emergency are much greater than just the effect of the event itself.

I took it as -- particularly to show the beauty, but to show that there was no one there. And the economic effect in Bali was punishing. This hotel should have had about 2,000 people in it. There were four of us staying there. The service was phenomenal. It was a bit too good.

It was very, very difficult to watch the people, wondering if the tourism would come back, wondering of the effect. And we saw exactly the same thing in Toronto during SARS. Our tourism dropped dramatically as a result of a disease that was localized to a couple of hospitals at the peripheral of the city, but people were afraid to come and go, and the economic effect on airlines and on hotels and conventions was really quite dramatic.

I said that these things are international, and certainly the World Trade Center was -- a great number of countries. And you see the various countries involved. Even -- even with 200 deaths, there were people from really around the world that were involved, predominantly Indonesians and Australians, but certainly Brits, people from the United States and Canada.

And we have discovered really in the forensic world, we all do have a role in this. And those of us that are from countries that are fortunate enough to have really need to give during these situations, and we need to give expertise and both -- both as a matter of helping our national people who get involved in these, but very much to contribute to the world as well.

And whether it's 9/11 or whether it's Bali or whether, as you'll see in a few minutes, the tsunami, teams of people do come together now, organize themselves and get the job done and get people identified, do the investigation, as to what caused the bombing, help bring about justice. And also in the case of the -- both the tsunami and the Bali bombing, provide medical aid as well.

So, we very much live in a global world, global emergencies and global aid when things do happen. And this is a good illustration. This is an identification being done of some of the people that we've done dental identifications on. And this is the group of Australians who are working with the Indonesian authorities.

We went in, put a team together and did the identifications, but in the end, you operate by the rules of whatever country you are in. So, final judgments of an identification belongs, in this case, to the Indonesian government. We operate to their principles and we -- and we satisfy them and then the bodies are released.

And we had an interesting experience. We were very anxious to gather more forensic information from the bomb site. And one day, the Indonesian government were equally insistent that it was time to -- to close the site and to bulldoze it down for both religious reasons and for cultural reasons. It was important to them to do it.

And it was -- quite a high-level discussion took place, including one particular country threatening to lie down in front of the tractors to stop the scene from being contaminated. So, feelings were running quite strong. So, an agreement was struck that -- that nothing would happen.

Mysteriously, very early the next morning, the tape -- the yellow tape that you see on all of the crime shows instantly, somehow, got broken, and all of the people stomped through the site, and the matter of preserving it no longer became a matter of international debate. Everyone agreed it was time to clean the site up.

And what we face and all of us face in today's world, in fact, is the prospect that -- the difference now between what we would see in parts of the world where people were arguing about territory is we now have people trying to take over thought and -- without borders, and not after territory but rather after changing people and influencing people. But forensic science really can and does play a major role in all of these areas.

We could certainly, through pathology and lab work, operate on who died. And we clearly have a role to play in criminal justice and finding out some of the evidence as to who might have been the perpetrator. We very often have to figure out what really did happen and what caused it.

And you see this, for example, with the death of Mr. Milosovich in recent days. Yes, he's had a heart attack, but the critical question then becomes what caused the heart attack? Was it his natural disease? Could he have been poisoned? Could he have taken something himself?

And those become very crucial and very important. And certainly as you will see from some later sites may influence the direction that things go. And of course, how it was done becomes very important. Learning that lesson and again, as I mentioned, once we know how people do something, then we can tie things together as well, because people tend, if they get a bomb to go off once, they tend to use the same method over and over,

because it worked once, it will work again.

So, if we look, for example, at the shoe bomber, Richard Reed, we can -- forensically, we look at the analysis of the bomb. We use multiagencies and put them together and try to reconstruct things. And this is the sort of thing that you often see Henry Lee do.

Henry Lee's sort of the father of putting things together, and loves to do this. And you see there was a hair in that case that was important in somebody. We can analyze the hair using a DNA method called mitochondrial DNA, and we can learn who else might be involved from things like that.

Similarly, if we look at the anthrax situation, we can identify agents. We could give advice, forensically, about decontamination, because it was genetic -- it was modified anthrax. That gives you a clue what labs might be involved, when they may have done it, by how the sequence of the DNA within the anthrax.

So, the science -- what we're really taking is science and applying it in a forensic way. And as a of you know in this room, DNA really took all of the DNA work that was existing in medicine and in other places and then learned how to use it forensically a few years ago to rule people in and out of scenes, depending on -- on body fluids that they left at the scene.

And it's become the most powerful tool in forensics, and it's really revolutionized the way we do it, but it's really taking science from the bench and taking science from -- from the lab and from medicine and suddenly finding a forensic use for it. And of course -- my great regret is I didn't think of it first. Sir Alex Jeffries thought of it and he wasn't Sir Alex before he -- before he thought of it.

So, if we look for a minute or two at New York and at the World Trade Center, and again, at the importance of forensics in that and trying to identify people, becomes very, very important, because as opposed to a normal air crash, the problem in events like this or the tsunami is you have to figure out who was there.

And the list of people and eliminating people becomes a major piece of detective work. Again, the international nature, people from over 30 countries were in the World Trade Center. So, this was an event that affected the world instantly, but it affected us in Ontario as well.

When that second plane hit the Premier's office phoned and said "Where are you? Get over here instantly." And the first thing we worried about was that there were -- the planes had already hit in New York. On my way over to see the Premier, the plane hit the Pentagon. A few minutes later, the plane crashed in Pennsylvania.

And the question worldwide at that point, but particularly in North America, are there more planes in the air and where are they aimed for and which cities are going to be hit

and do we continue to operate our government? And then when we landed the planes, we got to find places to land them and people -- people to look after everyone.

But we immediately realized, for the first time in our two countries' history, the borders shut. And with the borders shutting, all of the just-in-time delivery of cars and everything suddenly stopped, instantly.

And most of us don't realize that the average car in North America that we drive crosses the border five times before it's built. And there's really quite full integration between our economies and the way that we operate. And that closing of that border affects the economies of both countries.

So, we've spent a huge amount of time and effort learning how to make the borders secure, but at the same time, in fact, promoting the kind of growth and trade that is vital both to the Canadian economy and to the American economy.

So, the -- 9/11 and solving that and working on it all, immediately for us in Canada, and in managing the emergency, quickly turned to border issues and economic consequences. And we saw dips in the economies of all of the world economies, but certainly in Canada and the United States during that quarter. And the loss in travel and tourism, again, just like in Bali.

As I mentioned, trying to figure out who died and the death toll really is an issue. And you see the slides starting at about 5,000. Then at its peak, went up around 6300. And that's when we added in the names that day of all the foreign people that were missing.

Then the numbers worked their way back down to the 2,000 that we -- 2500 that it had ended up to be. Our numbers of Canadians were as high as 600. It turned out we whittled those numbers down and we're down to 24 in the end, we lost 24 Canadians in the World Trade Center.

But it's a big, big job and a very confusing job at the beginning, trying to figure out exactly who was there. And in situations like this you get people who disappear because they think it's convenient.

And we had two Canadians that disappeared, and one of them used their credit card soon after. And so if you disappear, you gotta give up your credit cards, too. And someone else forget to forgot to give up their cell phone number. And when we phoned their number, they answered their phone, but we were suspicious of both.

Ultimately, all kinds of forensic ways used to identify people. A significant number of people could be identified visually or by fingerprints or by dental records. But DNA did yeoman's service.

And DNA, we used it. I was involved in the Swiss Air crash, and that was the first time that DNA had been extensively used. And we were able, in the Swiss Air crash, to get

228 profiles of DNA, and there were 229 people on board. But there was a set of identical twins with identical DNA, and we could separate the bodies of those two. So, we were able to return remains from everyone from the Swiss Air crash, using DNA.

In New York, we knew from the beginning that given the intense heat where the planes had crashed, given the amount of time to recover bodies and decomposition and the continuing fires that went on, that they would be lucky to get -- very fortunate with massive work to get 50 percent. And they got 50 percent of people identified by the end.

Sir, you had a question? Yeah?

SPEAKER: (Inaudible question.)

DR. YOUNG: No, that was the total numbers of everyone that we were working from in those original times.

Canada, we were running around 500 Canadians. Then within a few days, we were down under 100. Then we brought it down to 50, and brought it down. We were, I think by October, even by September 29th, we were -- I think we were working with a number of Canadians at that point. So, that was worldwide. And then it just came down after that.

When we look at natural disasters, of course, I didn't bring Katrina, because I thought everyone has seen a lot of Katrina. I brought some of the slides of the tsunami. This is the -- again, the natural beauty of the beaches in Phuket and Thailand.

This is actually after the tsunami, but everything that you see in there has been new and has been replaced to get it back, ready for business. But, again, same question, what's missing? People are missing, because, again, the only people in Sri Lanka and in Thailand at that point in time were either locals or emergency workers. And there was no one going for tourism, which is probably some good bargains, and I could certainly recommend the beaches.

And this is the area around Krabi and Phi Phi Island. This was an area where Canadians and Americans traditionally go, and a lot of people go for diving. So, as a country, we concentrated our efforts in that area, along with teams from several other countries.

The size of this event, to put it in perspective, it was a massive earthquake. It would have been about half the size of California, the area that was affected. But again, we have two events: We've got the earthquake and the earthquake damage, which affects Indonesia, but then the aftereffect is the tsunami, which affects all of the other countries.

And there certainly is an answer, in part. If you happen to be in Indonesia and you're close to the event, the chances, in fact, of warning either about the earthquake or the tsunami are minimal, but we -- it is very clear that there was time to warn about the tsunami and to get people out of the area, the coastal areas, and up to higher ground. And

many, many lives could have been saved had there have been a system, warning system in place.

And as emergency managers, this issue of mitigation is a big issue for us. We saw it in New Orleans during the -- during, you know -- the level of preparation of the systems is to withstand a Level III storm. And that's okay, if countries want to invest to a certain level, but then your plans have to say if something is coming that's greater, then we are going to have to be prepared to deal with it.

We have a big ditch around the city of Winnipeg, which, believe me, is flat. And they built -- the Red River flood -- sometimes floods every 100 years, big time. They built a big ditch around it. It cost \$60 million to build it. Everybody laughed at it. It -- it's been tested ten times and it's been tested once big time, and the estimated saving was \$8 billion because the city didn't flood.

So, governments now need to be thinking in terms of big projects, sometimes to mitigate against things and certainly, this. In excess, I believe of 300,000 people died in the tsunami. So, a single event over a very quick period of time, 300,000 people dying.

These are satellite views that show you the extent of the -- of the damage. This is the -- red is -- really means vegetation in this case. So, the redder it is, the more the vegetation. And then you see in the right side of this slide that -- what was a single island is now multiple islands. And it is not only multiple islands, but there's very little vegetation left.

And if you took the same satellite, I don't have one from a few weeks later, but when you were at the tsunami and you walked along the beach, day by day, you could see the trees all dying as a result of being -- the saltwater and the size of the surge.

Same thing in this one. Green is green in this case. So, the upper one shows the coastline and lots of trees. The bottom one shows a completely different coastline, with very few trees and damage as far inland as ten miles.

Again, same thing in this one. A completely different harbor than what you had before. At ground level, some of the satellite photos look like the vegetation was gone, but there was still buildings. Well, the buildings, what you saw, what you were really seeing was the foundations.

This is quite a new development that was only a couple of years old. This was what was left, and most of those trees within a week would be dead as well. And again, this is a brand new development in a place called Cowlack in Thailand. And this was bulldozed down over the next few days.

This is quite a -- far inland. This is about a half a mile inland in Phuket, in the built-up area. This is blocks and blocks from the ocean, and yet cars and such picked up and just moved.

And body recovery, much as we've seen in New Orleans, very complicated, very difficult. Lots of bodies washed out to sea. Lots of bodies buried in beaches and took many, many isolated places.

So, it took literally weeks and months to recover the bodies and get some semblance of a body count, but in southeast Asia, there aren't sensors in many of the villages. So, the best we have are estimates, because our best estimates, as I say, are in excess of 300,000 people who died.

And this was, unfortunately, all too common a scene. Figuring out, again, there were 35 countries who lost people in the tsunami. And trying to figure out who was in southeast Asia, in Thailand, in Sri Lanka those days is a lot harder than it seems.

We had the experience of one of our kids traveling in Europe one summer. He went to Pakistan and phoned us and we said, "Last we looked, Pakistan wasn't in Europe. Get back to Europe." And so he chose to return to Europe through Turkey the day of the earthquake.

But it never occurred to him that there was an earthquake that day and we might wonder where he was. So, two weeks later, when he finally phoned home, we realized that he wasn't in Turkey that day. We did -- we assumed he probably wasn't, but that's the problem in southeast Asia. All kinds of people, nobody knows exactly where someone is. And it's really, really difficult. It takes you weeks to figure out who really is there and who wasn't.

And to -- and then people these days with multiple nationalities and different spellings of names. So, you get six sets of relatives reporting the same person with six different spellings. And then you have to go back and figure out that there really is only one person or that that same person is on the list for Canada and the United States or Britain and the United States, and which country is going to count them and who is going to do the consular work? And so it's really quite complex and complicated.

Again, the key is consistency. You're working for the government that's there. So, if we are in Thailand, we operate by Thai principles. But we did, thirty countries got together and we said nobody should go in and just try to find their own people. What we should do, we should treat all bodies the same and with the same respect, and we should work out a system that maximizes the number of identifications and then repatriate those bodies.

But the same thing should be done for Thai people as are done for North Americans as are done for Chinese. And so it's not a matter of getting in and trying to figure out where are the Canadians and let's get them found or let's get them back to Canada or the United States or et cetera. And again interestingly enough, we ended up with 24 Canadians in southeast Asia.

So, you have to establish identity in very difficult circumstances, and you need all kinds of antemortem information. You need DNA samples and dental records, fingerprints, if they are available. And then you need to do postmortem examinations, and then you need to reconcile both sets of records and figure out who was who.

And then one of the big questions in antemortem, you're collecting information from all over the world, but you've got to do it consistently. It's a global problem. So, if we are going to do DNA testing in labs in our own home countries, it's got to be the same tests that we're going to be using on the postmortem sample, so that we are comparing apples with apples.

And we have to enter dental records in the same manner, so that the computer system in Thailand is considering the same things as the way that they were entered in the home country.

So, there's a lot of work to doing that, and a lot of work to figuring it out when you start it. We were missing, again, several hundred Canadians. So, we go to the work of entering all these people, and many of the families weren't prepared to give us dental records and such at the beginning.

So, you have to wait till the right time to start on this, when families are ready to accept that their loved ones are missing, and when you're down to manageable numbers of records. So, it becomes an issue of deciding how.

And then establishing standards. And so the first work I did in the tsunami was spending days sitting in meetings with the 35 countries saying, "What are the standards going to be? What are the protocols? What DNA tests? Where are we going to do it? What samples are we going to use? Can we all agree on how we do these?"

So, advance teams, in fact, have to go out and have to start this work before we're ready to actually do the work. The work itself was generally done in morgues that were in temples. Not an ideal setting. There was local people walking through, but again, you operate in the culture of the place where you are. And if that was acceptable where the Thai authorities wanted it done, that's where it was done. But very, very difficult circumstances.

The first time I saw the bodies, people were bent over, looking at the bodies and trying to do physical identifications, which is why the authorities had chosen that, but I'm not used to standing in a morgue and having camera crews coming through, doing news reports. But that was the way it was in southeast Asia.

This is all the bodies outside. I didn't bring the bad slide. The bad slide is before we had body bags. It wasn't very hard to find the morgue. If you were within a few blocks of it, you just followed your nose. And it was very warm and very, very difficult. We were quite concerned about disease.

Eventually, we got refrigeration trucks, and it got harder to find the morgue, once we could get the bodies frozen. And then we would bring them out and thaw them and do autopsies as we worked.

The key is establishing a pattern. And what we did in -- where we were in Phi Phi Island area was we merged all of the national teams that were there and we all worked as a team. So, the beginning there, you see the bodies for the day are laid out. The area to the right side of the slide is the area where we begin X-raying the bodies and doing the dental work. And that's done on all bodies. And then after that, they go to an area to be autopsied and to be photographed.

But the whole process flows just like an assembly line, with all of the countries working together, not any one country saying "I'm taking this body" and "I'm taking that body." It really is an example of working together to solve a problem. That system then was adopted by the -- all of the other teams around the country and became the way we did things.

Outside of the gates, you could have lunch, you could get a haircut. All the satellite news, common feature anywhere you go in the world in these emergencies now, the satellite trucks and the reporters are there, and that is a big part of managing it as well.

And just like happened in New York, same thing happened in southeast Asia, row on row on row of photos of missing people and people looking for their loved ones by hanging around the area, trying to see if someone recognizes someone.

The cultural difference there was they were prepared to show photos of decomposing bodies as well, and people making identification, which in North American standards would not be accepted, but quite acceptable and expected there.

Ultimately then, the same sets of records would be brought, the postmortem and the antemortem, and there is the long, tedious job of figuring out whose DNA profile matches, which set of fingerprints match, which set of dental records match.

And that's done, essentially, in an office building. So, we set up all the processes, all the procedures, and -- to this day, people from around the world take one-month shifts. And we send DNA people or fingerprint people to that center, and they go through the records and try to figure out who they can identify.

We do it by DNA and fingerprint and dental, but we use jewelry, clothing, personal effects and scars, moles and tattoos to some extent, but we have to be careful about the presumptive evidence, because it can lead you down the wrong trail.

We had a -- found some personal identification on a body, sent the police it was someone from the U.S., sent them to the person's house. They knocked on the door, and they -- the person who answered the door was the person whose identification it was. They had lost

their identification in Thailand a month or two earlier. So, if you've made that identification, you would have been completely wrong.

Tattoos we found are a little more reliable, even -- but we had instances where we had the same tattoo in the same place in more than one body, but we had some that were pretty unique and pretty unforgettable. So, we tended to be able to use them to more or less of an extent.

But ultimately, you don't get people to identify people, because they will glance at a body and if it looks within 100 pounds, then they will say, "Yeah, that's them." And so if you send the wrong body to the wrong country, you got a problem, 'cause you're never going to solve the puzzle. And you've made an error.

So, it takes a great deal -- it is a lot harder than you would think. It takes a good deal of time to do it right. A lot of good work has gone on. So you see, 3600 identifications, or 2700 out of 3600 bodies that are there.

So, it's going. It's slow work. It's tedious work, but it is going along. And different emergencies, different methods work. DNA is not working very well at the tsunami because of the decomposition of the bodies. Fingerprints, tattoos, other things are working better.

Swiss Air, we did them all, as I say, by DNA. So, none of these techniques can be thrown out and we can't use just DNA. In fact, what we have to do is just add more things, but we can't ever stop doing a number of things.

We need to build teams internationally. These events are happening. They are happening with increasing frequency. It is very useful. When I walked in the room in southeast Asia, I knew the British people, I knew the Americans, I knew the Australians, the New Zealand people. So, we can sit down at a table, we can begin to work, because we've already established a way of working together.

Forensic science can play a role in political deaths as well. I will go through this fairly quickly, but this is a case I was involved in in Nigeria. Nigeria is a country that is -- or a country that has gone in and out of democracy at different times, went through a terrible period in the '90s and early -- up to '98, where dictators were in control. The country was corrupt and has great stores of oil and has about 20 percent of the African population.

This man won an election. The dictator at the time allowed an election, but when it became clear the last day of the election that the dictator was going to lose and Chief Abiola was going to win, the election was abruptly called off and Chief Abiola's new home was a jail cell for the rest of his life. So, he was put in jail.

When the dictator died, a more benevolent dictator took over and he started to announce that he was thinking about releasing Chief Abiola -- Abiola and other political leaders from jail, and he was thinking about allowing elections.

A high-ranking team from the U.S. and from the United Nations were visiting Chief Abiola in jail and -- to set up his release and to find out his political intentions, when he said he wasn't feeling well and he collapsed and he died.

That resulted in people rioting in the streets. And when they talk about ethnic conflict in Nigeria, the major ethnic conflict was the Biafran War, and a million people died. And so what was beginning was an escalation toward civil war again in Nigeria, and it was clearly in the world's interest to -- to stop that and put it down.

So, the net result of that was that a team of us were sent to Nigeria. And at the time, Canada had no diplomatic relations even. So, I was told to make good friends with the U.S. and the British and seek protection from -- if something went wrong, from those countries.

This is the -- our team waiting for the body, and the guy on the right is from Britain. The two in the middle -- the middle guy is a military -- U.S. military assistant, and the guy on the left is the medical examiner for Indianapolis. So, I led a team from three countries that investigated the death.

Ultimately, much like Milosovich's death, we, in fact, found that Chief Abiola had died of a heart attack. He had bad coronary arteries. The interesting thing was that that was quite acceptable to the government, but the family didn't necessarily want to believe it. But we pointed out that he had had long-standing medical problems and they had not been well looked after in jail, and that may have, in fact, hastened his death.

And so they were quite happy then, because that meant the government was complicit in his death. The government was content with that because it was -- the last dictator had done that. So, that was the last government. So, that was acceptable, too. So, in fact, through forensics, we found an acceptable solution.

Finally, I'd like to finish up a little bit with a little bit of SARS and a little bit about the pandemic. And believe it or not, forensics has a role in these emerging diseases as well. Frankly, I can find a role for forensics in everything, but it does in these as well.

If you think about SARS and what happened and you think about what would happen in a bioterror attack, there is virtually no difference. And when I was describing, I used to go on lecture to police and I would say to them, "Bioterror is more than capturing the person and more than discovering who did it. It is going to be a medical issue, and a government issue that has to be solved. You've got a raging disease now that you have to get under control. And so it involves all areas of government, all at the same time, including the issue as to who did it and how to stop it."

And it was a good example at the beginning of what a pandemic may look like at the beginning. The difference with SARS is we didn't know it, but it turned out not to be a bug that did very well in the community.

And so it did -- it spread within hospitals, and it loved hospitals, but if we protected everybody in the hospital, we could stop its reproduction and stop it in its tracks.

Had it have spread in the community, I'd be coming here talking about how the pandemic has swept the world. And we were toward the end of the pandemic now, and we have a vaccine, and we would be having a very different talk today than we are. But there are very big lessons net out of it.

In our case, we are often asked, "How do we get the SARS?" We got the SARS through bad luck. The -- a doctor from Guangdong Province and China was keeping the existence of SARS a secret. A doctor who was treating SARS patients went to a wedding in Hong Kong, stayed at the Metropolitan Hotel. Interestingly enough, he stayed in room 911. If they give you room 913, it is room 911 renumbered. So, don't stay in the Metropolitan, room 913, unless you are a history buff.

But while he was there, he spread SARS to a couple from Toronto, a doctor from Vietnam, some people from Singapore and a hotel staff, all of the places in the world that got SARS badly and battled it. This was ground zero and he was virtually a viral bomb and started it going.

This is the way pandemics will start as well. There will be a change in a virus, which is what happened in SARS, a rather harmless virus that year changed and became transmissible, human-to-human, and increased its ability to kill. And so SARS killed 10 percent of the people that got it, and it could be transmitted human-to-human.

The pandemic that we fear will start much the same way. Probably the avian virus that we see spreading around the world because of the amount of it around, it's the most likely culprit, but it is not the only possible culprit. But when it suddenly becomes transmissible, human-to-human, unless we see that happen and unless we pick it up near the beginning, in fact, the chances are that it will begin spreading. And the genie will be out of the bottle before we actually recognize what we're dealing with, which is what happened in Toronto.

This was our couple who were in the Metropolitan Hotel. These were their relatives and their doctor. But what happened, our lady returned on February the 23rd. She got ill. She was given antibiotics and she died at home. She never went to a hospital.

Her son, patient two here, went to hospital on the 7th of March. If you had asked him, he didn't recognize he got ill from his mother's illness. He just thought he got a flu, nor if you asked him and said "Have you traveled," would he have told you that he traveled, 'cause he hadn't.

And so he went to hospital. And the date, the 7th of March, is important. And the 13th is important, because the first warning of the disease happened on the 12th of March, five days after he was in hospital.

And so the virus had made it around the world and was in Canada and was in Singapore and in Vietnam and in Hong Kong and hitting Beijing all around the 12th of March, but this was the disease that had never been described before. We knew we had it on the 12th of March. As soon as this e-mail went out, people in Toronto figured out that it was the new disease.

But what had already happened by that point in time is everything you see on the slide, here's our first lady, here's our man that goes to the hospital, these are the people that blew on the first slide or the earlier slide. These are the two people who were on the stretchers in the emergency department next to the man, and they spread it to everyone else.

We got it. We had 13 more travel cases that came into Canada over the course of the SARS. We found all of them. That was easy. The problem is finding these two, and then everybody they've been in contact with. And until you find them all and until you isolate them, you don't stop the spread of the disease.

And this was with an illness that turned out to be droplets spread and – but had one giant advantage that the pandemic won't, and that is that SARS, you weren't -- you couldn't spread it until you were symptomatic. And so quarantine worked.

And you could use quarantine, 'cause if you found these people, who were in contact with these people and you quarantined them. Then even if they got SARS, they hadn't spread it beyond themselves. The pandemic -- we expect that the influenza pandemic, you'll be able to spread it the day before you get sick. And for the first -- and you'll be most infectious the first days when you are sick.

So, the idea of quarantine being successfully and widely used in a pandemic, in fact, probably won't exist, and it probably won't work. In fact, forensics, again, played an important role.

Our -- one of our autopsy samples in Toronto was the one that went around the world and proved that it was a Coronavirus. Once we knew that it was a Coronavirus, we recognized that in the list of symptoms, we hadn't realized that people showing up with diarrhea were -- had SARS, because diarrhea is common with Coronavirus.

So, all of a sudden, we had a whole group of people we had to go back and find them and find who they had been in contact with, because we didn't realize they had SARS during the opening days of SARS.

It also gave us the genetic map of the virus. And we could then watch to see whether it was changing. And that's what's being done with the H5 virus now. It's being constantly genetically analyzed in order to see whether or not it's making the transition changes that will lead to it being able to be transmitted, human-to-human, and start the pandemic going that we all fear.

And certainly, even in managing it, we needed sometimes to do autopsies to figure out whether or not someone truly had SARS, because if they had it, then we had to quarantine all of their areas and shut hospitals and do things. If they didn't have it, then we didn't have to take action. So, in fact, forensics continued to play a role in managing SARS.

So, the pandemic, I want to emphasize, first of all, we believe the pandemic will come. And the reason we think it will come is that pandemics hit every 40 years to 50 years, on average. The last pandemic we had was in 1968. The one before that was in '57, and the big one in 1918, 1919.

But pandemics vary tremendously, and this is one of the major things that people have to remember about pandemics. We lose in Canada 1500 to 2,000 people a year from flu. Every year. In a pandemic like '57 and '68, that number goes up to between 3,000 and 4,000.

If we have a really severe 1918-, 1919-type pandemic, clearly, the number will go way, way up from that, and we expect with hospital systems and antibiotics and antivirals and other things, that we would lose about 60,000 Canadians. And your numbers are usually about 10 times Canadian numbers.

So, roughly, other areas of the world, proportionally, would lose more because they wouldn't have the hospitals, the antibiotics, the infrastructure, in order to stop the spread as much. But the range of a pandemic can be anywhere between this. And so what we are saying is we plan for the worst, we hope for the best.

So, we shouldn't be saying that it all -- everything's going to be terrible. It may not be. It's clearly incumbent upon us to watch it happen, to see what it's like to understand, as quickly as possible, whether it's the strain, like '57 or '68, or whether it's the 1918-, 1919-type of strain and to do something about it.

We now believe in fact, the 1918, 1919 was the actual avian flu itself that modified itself and became lethal. We think that the other two were combination viruses, an avian joining with a human virus, forming a new virus.

But that's why the genetic coding is so important. We're watching to see what the virus does. But the chances are that when it happens, the same thing will happen that happened to us in Ontario and to Singapore and other places. Likely, the virus will already be out and spreading before we realize we have the problem.

So, closing borders and, in fact, probably if we get lucky and try, let's say, for the sake of argument, it happens in southeast Asia, in a country the world will sent antivirals in. They will try to geographically isolate the area. We may stop travel from that area for a few -- for a period of time. Best estimate is that will slow the virus for two weeks, if it slows it at all. So, it buys two extra weeks.

Once it's in North America, it's going to be in North America. It's going to pop up. It's going to come in from all directions. So, closing the Canada/U.S. border is going to hurt our trade and probably make no difference in the end to how we manage it.

It's going to be in our midst. When it's in our midst, people will be sick, but the consequences are not what people -- and the managing people's expectations and managing their fears and keeping people working is going to become the real challenge.

We believe -- we've done quite a bit of economic and medical modeling in recent months in Canada, and we now believe in our -- that when it hits its peak in a wave, and a wave will last six weeks usually, but the middle two weeks are the time that will probably be the worst.

At its peak then we believe that 20 percent of people will be away from work. Now, that's sizable, and it's significant, but it's not crippling. Where it becomes very important, and the problem, of course, is in health care settings, where you not only have the problem of keeping up productivity and dealing with more -- with more, but you've got a surge in the system, and you're getting more and more sick people and you're trying to decide who gets respirators and who doesn't, et cetera.

So, there are special issues around health care, but if people stay calm and recognize that staying home from work isn't going to solve people or fix them from getting the influenza, your kids are going to bring it home from school, your grandchildren are going to give it to you. You go to the mall, you're going to get it in stores. It is going to be everywhere. So, staying home from work only damages the economy and only makes the overall effect worse.

Most of the time, most flus, what's going to happen to most of us in this room is that we're going to get sick for five days, really sick for a couple of days. We are going to recover. We are going to be back to work inside of a month. If you're very young or very old, then the effects can be worse. If you have multiple medical problems, then you're at higher risk and higher risk of complication, but the normal work force are going to just simply get ill.

They will be immunized against it at that point in time and they will recover and they will be able to go back to work. And it is going to be a worse problem if we make it a worse problem. And if we can manage to get people to understand that, then, ultimately, what will stop it is the ultimate answer will be either enough people have it and are immunized and it gets harder to spread within the community, or/and governments are working on this; we create a vaccine for it. And the push from the beginning will be to create a vaccine as quickly as possible.

In the interim, there are things we can do. We teach people to stay home when they're sick so they are not spreading it through workplaces. We go on, as we did with SARS, a big hand-washing binge. We keep a little bit more distance between us so we avoid close

contact when -- when the surge is in the area. And antivirals -- but the antivirals, the Tamiflu are wildly overstated. We think that if they are overused, we may get resistance to them. They're in short supply. They're expensive. And when you start figuring out who is going to get them, you get into a slippery slope that you wouldn't believe.

And our general approach of many countries right now, and certainly Canada is moving this direction, is to buy antivirals for treatment and to not use too many for prophylaxis, because to try to use them to prevent the disease, you use five times as many pills for each outbreak of a resource that's already short.

If we use them for treatment, we can prevent people from developing complications. We can stop them from getting hospitalized. We can treat them better with antibiotics and save lives. So, we think that will become the priority, but it is going to be a matter of common sense and riding it out.

The good news in all of this is that the waves -- we'll have either one, two or three waves. We hope by the second wave, that we are beginning to get vaccine and we are able to immunize people, but the waves won't hit all places at the same time. It is the same as the flu now. The flu may be raging in New York City and it may be raging in San Francisco and Tampa is fine.

And so different companies and different areas will be experiencing the stress of losing 20 percent of the work force and having the medical complications at different times. So, it is not something that hits everyone and it's there for 18 months straight. It will come and it will go and it will come and go at different times and it may be very severe and it may be relatively mild.

And so with all of that, it really does become a -- where do you invest? We invest in some antivirals, invest in vaccines, you invest in educating people what's going to happen, and then keeping them home. And you work on safe measures like hand-washing, et cetera.

In all of this, and whether it's managing a pandemic, whether it's managing a power outage, whether it is running a forensic lab and investigating a murder, all of these things depend on team work.

And we live in an age where none of us have all of the answers. You bring in all the best minds and then you sit down and you solve the problem in a consistent team work manner. And you do it in partnerships and between levels of government, between outside government, private interests and government. You do it across-the-board. And you recognize that in an emergency, none of us is as smart as all of us, and human ingenuity is our answer. We will get through the pandemic. We got through the tsunami and the world managed to prevent disease in the camps that were set up there. And we saved lives. We lost a lot of lives in the tsunami, but we saved a lot of lives afterwards.

So, we can do these things and we are doing gradually a better job of it. Thank you very much.

MS. HENDERSON: Anyone have any questions for Dr. Young?

SPEAKER: (Inaudible)

DR. YOUNG: We need the --

SPEAKER: Pinellas County just had a planning session about pandemic influenza just recently, and the debate came in, social distancing and closing of schools.

DR. YOUNG: Yep.

SPEAKER: -- it depends -- depending on getting children sick and making people stay home, what is your opinion on that regard?

DR. YOUNG: We're working on that, and I'm actually going to Washington to a conference with a number of U.S. people around it, and we are looking at the same thing in Canada and thinking about it.

Historically, the answer is it doesn't work very well. People think that if they stay home, they are going to not get it. It doesn't work. We didn't close schools in SARS; Hong Kong did. We see no appreciable difference in that case.

When we did quarantine kids from schools, it was great. They stayed home from school and they went to the malls. So, they all met at the malls and they all -- there was no social distancing at all. Very, very hard to enforce.

There are those that think it might work to slow it down. I'm -- right now, the jury's out, but I think it won't be as successful as people think it will be.

We'll probably -- there'll probably be pressure to do these things, just as there is pressure to, say, close the airports. Well, closing the airports isn't going to be a solution.

Some of the island countries like Taiwan are going to -- hoping to be able to hold it off longer, but North America isn't an island, and you get into a lot of different waves.

So, I think all of these things, we'll probably try them. To some extent, I think vaccines, hand-washing, all -- staying home when you are sick are going to be the things that are going to work. Please?

SPEAKER: A few weeks ago, our own governor recommended that we stockpile and prepare for the possible pandemic, the same way we do for a hurricane, buy supplies, water, groceries, things like that so we don't have to go out as often.

DR. YOUNG: Yes – that's ...

SPEAKER: Is that the same theory as closing the stores?

DR. YOUNG: Saying the same thing to people, there may be, particularly at the beginning, there may be disruptions; people learn to manage around it, and you could get into supply chain disruptions.

It's -- I mean, if I lived in Florida, I'd have water and all the things, the personal stuff anyway, and it's the same package, essentially, so that it's a really, really good idea to do that in any event.

Overall, we're doing a lot of economic studies in Canada on this as well. And overall, we don't believe that the economic effect of the -- of a pandemic is going to be as great as some of the fear-mongering that's going on.

Even in a severe outbreak, we think if we're right, about 20 percent of the people being away, people managing businesses, and we look at what happened in 1918 and 1919, look at SARS and other things, there will be some -- obviously, there's going to be a lot of human misery. There will be some industries like tourism and travel that will dry up.

Who is going to want to travel, if different areas are having a pandemic? Generally, manufacturing and other things we do when we run an economy will have little blips, but recover relatively quickly. And we suspect there are those that are -- everything about the pandemic is doom and gloom.

We're much more optimistic about it from the sense that we think we need to prepare, we need to be transparent in what we do, we need to be ethical, but we need to not be -- everything isn't worst-case scenario, and we'll make it through if we stay calm.

SPEAKER: We cannot begin to make a vaccine until it mutates. Is that it?

DR. YOUNG: We're beginning to make a vaccine in both countries. The problem, we don't know if the vaccine will work against -- once the -- once the virus -- if it turns out to be an -- H5 modifies itself; it could be that we made a vaccine that's useless. It could be that it gets us well along the road.

What we're also working on, we're working on the ability, you make the vaccine right now from eggs and the -- avian flus kill eggs. So, we're learning how to work with the -- to not kill the eggs, learning to make the vaccine more powerful using some -- some tricks to make a better vaccine faster.

So, there's a lot of work going on that will be useful. But probably we'll be sort of starting from square one when the -- and that's -- means then three to six months from the start of a pandemic until you have a vaccine. Then there is the time to make enough vaccine.

But the current vaccine that was developed in the States doesn't work terribly well, and it takes ten times the dose. So, if it takes ten times the dose, one-tenth of the people are gonna get it. So, there is a lot of work to be done, but it is being done.

And I think wisely, governments in Canada and the United States are investing in vaccine right now. It is a -- yes, they are working together. We work very closely, the CDC and Health Canada and Public Health, we have people in each other's office. We work in our area. We're essentially Homeland Security with a long name, Public Safety Emergency Preparedness Canada, but we are Homeland Security. We work with the Homeland Security people.

I saw the doctor in Homeland Security in Washington a couple of days ago. He is coming up to Ottawa to work with us. So, we're exchanging information. We are exchanging studies. We are working together on border issues to ensure, in fact, that we approach it in similar manners.

SPEAKER: The SARS virus originally came from Guangdong?

DR. YOUNG: Yes.

SPEAKER: From what I understand, there is a bioterrorism lab which they experiment and create viruses from in there. So, this means that, I think, international governments have to closely watch that province and what's going on.

Even though it is under the Chinese regime, somehow, they've got to strategize a way to get in there in order for this not to happen again.

DR. YOUNG: There's lots of issues and questions around. People wondered at the beginning whether the SARS was -- was a bioengineered virus or not. In retrospect, we don't think it was, but I can't comment about that particular -- that -- I've heard that story, and I can't comment on it, but worldwide, people have to pay much more attention to labs.

We -- after we captured all of the SARS virus, it -- there's work going on vaccines and such in various labs in the world, but within those labs it actually -- lab workers in Taiwan, Singapore and China actually got SARS. And the case of China got out of the lab and got into someone's family. And they had to get it sort of stomped out and stopped again.

So, it shows you our labs have some very -- they have the potential viruses sitting around, and biosecurity is phenomenally important. And there's been concerns for years about small pox and whether or not small pox got out of the Soviet Union when it was breaking up. CDC has small pox and everyone is quite confident CDC has all the small pox they're supposed to have, but no one's as sure about communist countries. So, it is a big concern worldwide in the security world.

SPEAKER: Well, I mean, I think these labs need to be closely watched by governments in some form, even if it means having Google having a satellite over them in some way, you know?

DR. YOUNG: There is concern. I can tell you a lot of what I do now centers on security as well, and so I -- it is an area that people are very alive to and very worried about.