

PROFESSOR YUEN:

Good morning, Madame Chairman and Mr Thompson. There is one thing that I must agree with Mr Thompson -- Hong Kong can only be better. But there is a provision -- if we learn the lesson.

What I want to say in the next 20 minutes is to see what lessons can be learned from SARS. There is one question that has been repeatedly posted to me by overseas researchers -- they say, "Hey, KY, how come you guys can do this job with so few people and so little an amount of money?" That is for the vice chancellor, of course.

My answer is very simple. If you look at this diagram, that is how I design my department. We have clinicians who only look after patients. These are clinicians, are MDs. Another type of staff in my department are basic scientists who are PhDs training so they only do the lab work. There is a third type of person, that is myself and M Peiris, we are clinical microbiologists. I want to impress upon you again that I am not a microbiologist. I am a clinical microbiologist.

What I can do is I know what is happening in the laboratory and at the same time I can see patients, doing two things at the same time.

So within a very short period of time I can link up what is happening at the bedside to what is happening in the lab. In a way I am bringing the resources of the laboratory to the bedside, and I am bringing the problems at the bedside to the laboratory so that the whole thing can be integrated within a very short period of time and that is why we can do this job within such a short period of time.

More importantly it is because when we are generating new information in the lab all the time, we feed back this clinical and laboratory information back to Hospital Authority so that it can directly be used in the management of patients, and of course to the Department of Health so that rational decisions can be made in terms of epidemiology. That has been our strategy in the past three months and this strategy has been there since 1997 when we first faced the bird flu problem.

The agenda for the future is that I believe the Hospital Authority can train many more clinical microbiologists. I believe training of course is the most important responsibility of the university and I am happy to be part of it.

This is a very useful figure which is not complicated at all. You can see that the red thing is Professor Liu who is the index case of Hong Kong, and you know that he was a professor of nephrology, so it teaches you something that professors are important in one way or the other. So Professor Liu brought the disease to the Metropole Hotel; from Metropole Hotel he contacted a number of people and these people brought the disease back in all parts of the world within a very short period of time -- to Toronto, Vancouver, Hanoi, Ireland, Germany, Bangkok, etc.

More important is that one of the patients in yellow -- this patient went into the Prince of Wales Hospital, and from the Prince of Wales one of the cases went to Amoy Gardens. You can see that there are two important amplification mechanisms here. One is the hotel; the other is another type of hotel, which is the hospital.

The lesson to learn is if we do not fight the battle next time in the coming winter, at the hospital especially -- that is what I call the Normandy of SARS -- if you allow them to land there and amplify it, the result will be just disastrous.

This is the second lesson we should learn: those in Hospital Authority must now do everything that they can to set up the culture of infection control. In fact, if you look back at the infection control guidelines for pneumonia, the CDC guidelines say that if you have a patient with pneumonia of undetermined origin, you should treat it as, say, respiratory viral infection. Everybody who sees this patient must wear a mask and must wash their hands afterwards.

I heard that a lot of pulmonary physicians did not come down with SARS in one hospital. They had SARS patients -- even though they knew that there was SARS, they never came down with SARS, because they always wore a mask when they saw those patients -- without N95, and they

washed their hands afterwards and nothing happened. This is what we call the respiratory droplet precaution.

The lesson that I learned after I reviewed the whole thing is that in fact we just do not obey infection control guidelines at all -- doctors, nurses. When they have pneumonia cases they just sit there, they just do the usual thing that they are doing everyday, but they never comply with the infection control guidelines. Compliance is the issue, not that we do not have the guidelines; the guidelines are always there. We have the master there but we do not obey him.

Another lesson that I learned is that when we are facing unknowns -- we are facing an unknown called SARS -- what we should have done is, if you want to get the upper hand, you must know it better as soon as possible. In fact, what I did at that time in February is that I sent two of my staff, Dr B J Zheng and also Dr Y Guan into China. I actually have some regret -- I should have done it myself instead of asking them to go -- because unless you do it as early as possible you are not going to understand the disease better. If you do not understand the disease better as early as possible you are not able to control it.

I believe that it is very important for our Department of Health officers and myself to understand that it must be interception outside Hong Kong, not interception when it is within Hong Kong already. Of course, when it is inside Hong Kong you have to intercept it, but the interception must be done as early as possible. When it is happening in southern China, we should go in. There are a lot of political culture issues involved. I am not a politician. I cannot solve it, but it is the Government who should solve it.

In fact, going back -- this patient was the brother-in-law of Professor Liu. Professor Liu was already ventilated and intubated for six days before I had the chance of seeing him, but on this patient an open lung biopsy was performed and it is from this open lung biopsy that we grew the virus. So you can see that this is the lung which is very badly damaged. Usually the lung looks like very thin honeycomb structure. This is markedly thickened, there are two abnormal cells, very big, on the left

upper quadrant of the slide. So we know that it must be an unusual viral infection.

Then we grew it and we cultured it. At this stage, I must say to our ex-CE, Dr York Chow that we do not have a viral culture facility for our patients in Queen Mary Hospital. The culture was done because we made use of the university's facilities in doing bird flu. We stopped doing bird flu, we changed everything into growing SARS viruses. I hope that one day Queen Mary Hospital can have a viral diagnostic service. It is reasonable for a teaching hospital.

Of course, you know that we have a lot of difficulty because we have so few manpower so all those who are doing bird flu immediately went to do SARS and we were able to fish out genes. This had a lot to do with the presence of genomic facilities in Hong Kong University. What I have learnt from the HKU Pasteur Research Centre, you know that the Institute of Pasteur has given a lot of genomic help to Hong Kong University. That is why, within a very short period of time, we were able to fish out important genetic information that shows that this virus is a novel virus.

Again, there should be a lot of international collaboration, a lot of know-how before a disaster comes.

Of course, Dr Y Guan was very pivotal because he identified the source in wild animals. We do not know what is going to happen because it still could be that some other wild animal transmitted the virus to the civet cat before the civet cat gave it to humans; or maybe the civet cat is transmitting the virus to some other wild animals before it goes into humans. But there is one thing on which we are certain: we must have a research agenda on how to control our wild life.

Can you stop Chinese people from eating all these wild animals as game food? Well, it is unlikely. So if it is unlikely that we can change this culture within such a short period of time, what can we do? Can we do surveillance? Can we consider immunising the animals? Can we consider all these bio-security measures when we rear these wild animals

as a delicacy? All this has to be thought about and on the agenda of research from now on.

Of course, the first general diagnostic test that we are using is not that satisfactory. We could only detect one-third of the cases at the beginning and it is not until 14 to 21 days that we can identify over 90 per cent using the genetic test called RTPCR.

We are going towards a second generation diagnostic test and we hope that this research agenda could be pursued at a faster speed so that by the end of the year we can have a test that can identify more than 90 per cent of the cases when the patients are admitted. That is very important because we know that there are silent SARS patients, patients who do not have a fever or on the chest X-ray there is not every pneumonia. These types of silent SARS patients can spread infection to a lot of our health care workers. That means that a point of management diagnostic tests is one of the most important research agenda now in all the universities.

I just want to say that there were a lot of unknowns when we first faced SARS. One of the things was that we did not realise that the virus was present in stool. Only when we started seeing patients from Amoy Gardens admitted to the United Christian Hospital did we find that 70 patients had diarrhoea. Then we immediately did tests and found that the stool is an important mode of transmission. That is a very, very important point because we now know that the Amoy outbreak is largely related to a faulty sewage system. Of course, we now know that the virus is so stable and that is why it was causing so much of a problem to our health care workers.

Another item on the research agenda that we are worried about is because we do not have very effective anti-viral agents. We have been able to know from the genomic sequencing that there are enzymatic targets that we can use against this virus -- the protease enzyme that splits the protein, and also the RN replicase, so replicating of the RNA genome of the virus.

Unfortunately, all those drugs that we are testing which are commercially available, are all very weak agents. At that time so many patients were

dying in the United Christian Hospital so we started what we call our non-randomised clinical trial. You can see at the top that there were 41 patients. By 21 days after we gave the patients this drug called keletra and ribavirin, only one patient required ventilation or intubation, while for the historical control the 111 which were given only steroids and ribavirin, one-third of them required intubation and half of them died. So it can be seen that at least what we call non-randomised study, combination of two very weak anti-viral agents might have some effect. I know very well that Dr Vivian Wong of Hospital Authority is centralising all this and trying to do randomised placebo control in the coming winter if SARS comes back. I admire her because she is able to do a marvellous job.

I think this is very serious and you may not be very interested so we will go back into a little bit of the history. What happened is that we have very little money in the Hong Kong University Department of Microbiology. We are a very, very small department. When I became chair in 1999 I did a little bit of “selling” so that I got some more donations. In 1999 when I became chair of the department I reviewed the history of infectious diseases in Hong Kong. That is very important because what hit the economy very badly is not the 1998 economic attack that brought sorrows. It was the 2nd World War that was the worst and the 1894 plague.

The 1894 plague is interesting in a sense that one-third of the population of Hong Kong disappeared. I hope that Article 23 will not do the same thing. But actually the minority died from the plague; the majority went back to China. At that time, because the British soldiers in Hong Kong, the only way that they can control the plague was to bury all the dead and also burn all the belongings of the patients.

Now that is a horrible thing to do for Chinese so the Chinese community at that time there was a rumour occurring because they did not have all these very open mass media, no information. Everything was just rumours. They said that the British soldiers were grinding the patients into powder making tablets and used as aphrodisiacs and tonics for British Royalty. That was why everybody was so afraid. They

therefore went back to China but brought the disease back with them. They wanted to die inside their home village in China in their homeland.

Now, that of course was disastrous because when you have movement of people during an epidemic you are transporting diseases everywhere. This time the same happened. People were finger pointing and saying, "This is Hong Kong." People are finger pointing and saying, "This is Guangzhou." As you know, infectious diseases know no boundaries. Within 24 or 48 hours the disease is everywhere so there is no point in finger pointing but history just repeats itself.

Another piece of history that has repeated itself is that there are two groups of people trying to compete and try and find the bacteria causing plague. One group was a Japanese group, Dr Kitasato. The other group is a Swiss from Institute Pasteur, France and he is Dr Alexander Yersin. So two groups came to Hong Kong to find the plague bacilli. Dr Kitasato announced that he found it first. But 20 years later everybody knew that it was Dr Alexander Yersin who was correct. Both found the bacteria but Dr Kitasato mixed the culture and that is why he was not able to make the correct diagnosis and the bacteria's name, *Yersinia Pestis*, named after Dr Alexander Yersin .

There is a lot of important implications even this time. There are more than three international overseas centres who say that it is a promixa virus. They are right because many times in respiratory tract infection the infection is often mixed, with more than one pathogen at the same time. But there is only one major pathogen and that is the corona virus.

Another lesson that we should learn because in 1894 the plague initially discovered by Dr Kitasato -- Dr Kitasato was Dr Robert Koch, who was a German, and you know Germany and Japan's axis. Thirty or forty years later the Japanese used *Yersinia Pestis* as a biological weapon in the 2nd World War against Chinese civilians in the Zhangzhou Province and also in Manchuria.

So it is very important that Hong Kong University and Hong Kong and China be very vigilant on the research of emerging infectious disease because it not only has significance in terms of public health. It is

because with emerging infectious disease outbreaks it is often at times very difficult to be distinguished from an attack by biological weapons. And you know that bio-terrorism is now one of the most important agenda in the American government. I believe that is very important for Hong Kong because Hong Kong is one of the most important sentinel posts for guarding the world against emerging infectious diseases for many years.

Of course, we know about the outbreak of cholera with thousands of people affected in 1963/1964. You know that the pandemic stream of the 1968 influenza was also identified in Hong Kong and of course you know about the 1997 H5N1 and of course now the SARS.

You can see that it is because we understand the history and that is why Hong Kong University postures itself on emerging disease for so many years.

I just want to say again that the Government should consider the universities, both the Hong Kong University and the Chinese University. They have a lot of resources and know-how that is able to support the new CDC. For the Hong Kong University side you can see that we have a lot of know-how on bio-informatics and functional genomics. We will have a P3 laboratory very soon for small animals. We have support from Dr David Ho on advanced vaccinology and we hope that we could be part of the rapid response team for the new CDC of Hong Kong.

Lastly, people always ask me, "Will SARS come back?" The answer is that I do not know. There is only one thing that I know which is that all the previous human corona viruses have a winter and spring seasonality. I also know that SARS in Guangzhou started in November, peaked in February and then came down. So there more than 50 per cent chance that SARS is going to come back.

It is very important for all the research agenda to be targeted towards these few issues: can we control the animal-to-human spread? Can we control the human-to-human spread now? Can we control our borders? Can we really set up very good infection control culture in all our hospitals so that emerging infectious disease would not land on them?

Of course, Professor Chau has spoken a lot this morning about architectural design, U-pipes, etc. I am sure the Government is looking very hard on all these issues. I hope that I am wrong that this curve will not go up again by December.

There is only one thing that I have not really gone into which is whether we have sufficient isolation facilities in the hospitals. I believe the Government is doing everything that it can in finding the isolation facilities. But hardware is one thing; it is the software that is most important. The reason I am so confident about Hong Kong is because what happened in SARS is that the professionalism of all the frontline health care workers was so impressive. I believe that is why I can say that Hong Kong can only be better. Thank you for your kind attention.