



**Asia-Pacific
Economic Cooperation**

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APEC Conference on Digital Healthcare Innovation - COVID-19 Response by Health Information Utilization

APEC Health Working Group

July 2023



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APEC Conference on Digital Healthcare Innovation - COVID-19 Response by Health Information Utilization

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APEC Health Working Group

July 2023

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Executive Summary

This project was funded by APEC Health Working Group: HWG 08 2020A. Chinese Taipei organized the “APEC Conference on Digital Healthcare Innovation - COVID-19 Response by Health Information Utilization,” to be held in Taipei from 21-22 September 2022, aimed to establish an interactive platform or communication channel for APEC member economies to share and exchange experiences on effective healthcare approaches, scalable models or innovative strategies applied in improving healthcare delivery, service, personal health management or disease risk monitoring.

The goals included:

1. To demonstrate how to promote and effectively use interoperable digital data and facilitate digital technology adoption connecting to a variety of innovative healthcare services and applications.
2. To response to capacity building needs for those APEC developing economies that are now integrating digital data to develop the people-centered healthcare services and applications.
3. To introduce digital approaches to cope with the spread of disease while taking care of the health of the people.

The 1.5- day conference was held in a hybrid format. Around 450 participants joined the conference physically or virtually. A post-conference tour to Taipei Medical University Hospital to learn digital applications in hospital was conducted in the afternoon of 2nd day of the program.

The content of the report includes the purpose of the project, a summary of the conference and a synopsis of the post-conference visit.

Introduction

Since the beginning of 2020, the world has been severely impacted by the COVID-19 pandemic, causing the workload of front-line medical staff to double, and medical systems were under enormous pressures.

In order to deal with the COVID-19 crisis, medical systems and the medical industry are forced to break the limitations of the traditional framework and accelerate the adoption of smart tools in medical care.

In the post-epidemic era, emerging digital health services are likely to become normal after the epidemic, such as remote video diagnosis and treatment and AI-assisted systems. International policies on the use of digital tools, innovative applications, regulations, business opportunities are key issues for all economies.

The conference held in Taipei covers a wide range of topics centered around “digital health”, including "digital transformation of health care", "health care policy in the post-pandemic era", "trends and challenges in telemedicine", and "artificial intelligence and related applications". It had included (1) interactive sessions to exchange experiences, share applications and measures (sessions arrangement will respect diverse conditions, realities, and domestic policies of member economies) (2) exhibition booths to display applications in digital healthcare and (3) site visit to healthcare institution.

A documentation of the conference will bring inspirations to all professionals, policy makers and the general public in APEC economies who are concerned about the trend of medical and health cooperation.

Background

Now that we have learned from the pandemic, the issue of regional health cooperation will only become more important. The trend of digitalization is also rapidly entering the health field. The pandemic has given us a glimpse of how digital technologies can potentially change the way we produce and use health services, and see a brave new world of health in a future with less manpower and greater efficiency. Chinese Taipei holds high the banner of "digital health" at HWG, and promotes the application of digital technology in health cooperation in a practical manner.

In the early stage of the outbreak of COVID-19, to effectively avoid the flow of high-risk people and the risk of infection in medical institutions, Chinese Taipei's Ministry of Health and Welfare quickly planned the "MediCloud System" as the platform for medical institutions to check patients' TOCC (Travel history, Occupation, Contact history, Cluster) according to the instructions from higher authorities and the Central Epidemic Command Center. Under the premise of personal data security, a new function of TOCC inquiry of patients is added to assist front-line medical personnel to judge infection risks and take relevant infection control measures.

During the COVID-19 pandemic, people can log in to My Health Bank to pre-order name-based masks after they complete their identity certification or mobile phone certification. "COVID-19 Vaccination/Testing Result" and "COVID-19 Rapid Antigen Test purchase record" were also incorporated in the My Health Bank system, consolidating the results of COVID-19 vaccination records, COVID-19 Rapid Antigen Tests, SARS-CoV-2 Real-time RT PCR tests, and named-based COVID-19 Rapid Antigen Test purchase record.

Recognizing a number of APEC member economies have established National Health Insurance (NHI) programs, such as Thailand, Japan, Korea, the Philippines, Chinese Taipei and so on, therefore this project aims to provide economies with a platform to share and discuss proper utilization of the health insurance database to foster the development of digital health tools, and resilient measures of utilizing health information in response to pandemic.

Day 1

Opening Remarks

- ◆ Dr. Chung-Liang Shih, Vice Minister, Ministry of Health and Welfare:

First, I would like to welcome you, on behalf of the Ministry of Health and Welfare, to participate the APEC Conference on Digital Healthcare Innovation – Covid-19 Response by Health Information Utilization today.

And, I would like to express my special thanks to APEC Health Working Group (HWG) economies for their support, as well as the NHIA for its actively promoting international affairs and cooperation, which make it possible for holding this conference successfully today.

Faced with an aging population and the continuous advancement of medical technology, the use of smartphones, health information technology and wearable devices to provide telehealth, mobile and personalized digital health care has become a global trend.

It has been 27 years since our NHI system was established in 1995. The NHI system has covered the entire population and has contracted with medical institutions across the island, so people can freely choose medical institutions for medical treatment. In addition, various services using cloud technologies have been introduced since 2014. With digital technology, the health insurance administration has established “MediCloud” and “My Health Bank” systems, the medical information collected from different hospitals and clinics can be shared in real time across hospitals. During the COVID-19 outbreak period, the real-time sharing of medical information such as travel history and medical history is one of the important tools to assist medical personnel in discovering and tracking patients.

In the past two years of epidemic prevention, the NHIA has provided medical information and health insurance big data analysis to the Center for Disease Control to cooperate in pandemic investigations. In response to the epidemic, the NHIA has started to provide telemedicine to help people who are isolated and quarantined at home.

Recently, the NHIA has gradually released the NHI dataset and the health insurance medical images conditionally, to produce more digital care services and tools based on the NHI big data. Our

economy's efforts in combatting COVID-19 this time is a good example of how health data are applied smartly.

We believe that with the advancement of digital technology, not only can we gradually achieve the goal of digitalization of health information and medical care, but also create huge digital health innovation models and industrial business opportunities.

The goal of the HWG is to help reduce the impact of health-related threats to the economy, trade and security of member economies. The global outbreak of the COVID-19 in 2020 has made pandemic control and vaccination the focuses of HWG discussions.

Over the next 2 days you will hear presentations and panel discussions on the main facets of the digital healthcare application. We will undoubtedly learn from one another by exchanging valuable viewpoints. This is to promote the capacity building of the economies in the field of digital health and develop a more resilient healthcare system. We would also like to work with all the APEC economies to further participate in the activities of the digital health innovation to become a good partner of the APEC HWG.

Finally, I once again welcome and thank all the distinguished guests for your participation and support. I would like to wish today's conference a great success, and wish all the participants a good health and all the best.

- ◆ Ms. Sharon S.N. Wu, APEC Senior Official; Director General, Department of International Organization, Ministry of Foreign Affairs:

First, as a senior APEC official, I sincerely welcome all the guests to attend the "APEC International Symposium on Digital Health Care and Innovation" held in Taipei today in person or online.

Although the impact of the epidemic on international activities has far exceeded our expectations. From last year to this year, many APEC events were postponed or changed to be held online, which inevitably affected the effect of interaction among participants. However, the enthusiastic presence of all of you today shows the importance and enthusiasm you place on regional health cooperation. All officials and non-governmental representatives participating in APEC activities are deeply moved by this, and look forward to your continued support for APEC's various medical and health cooperation initiatives.

This activity is a project under the framework of the "APEC Health Working Group" (HWG) and has received APEC funding. I would like to express my special thanks to APEC HWG economies for their strong support, as well as our colleagues for its active participation in APEC. I will continue to support the health insurance administration, Ministry of Health to expand regional health cooperation.

Our leaders recognize the importance of digital technologies, especially for safeguarding public health and enhancing the resilience of health care systems. We the APEC senior officials also remain dedicated to fostering collaboration and innovation to deliver better health care to the entire APAC region.

Digital health is the wave of the future. Electronic health records, telemedicine health apps and wearable devices have become the backdrop of the digital health ecosystem. This new sector is rife with the business potential and offers countless opportunities for cooperation among APEC members and stakeholders.

Our Ministry of Health and Welfare, for instance, employs artificial intelligence and the cloud computing will ever reach the health insurance data bases or public benefit. This patient centric system is enhanced by digital health technologies which have improved the quality of a care and a system efficiency. And our system pays special attention to privacy protection. We are willing to share experience with APEC economies.

Moving forward, digital health is certain to played a pivotal role in overcoming the challenges of the post pandemic area.

- ◆ Dr. Po-Chang Lee, Director General, NHIA, Ministry of Health and Welfare:

On behalf of the Ministry of Health and Welfare, I sincerely welcome the experts and representatives of APEC economies and all of you to participate in the *APEC Conference on Digital Health Innovation- COVID-19 Response by Health Information Utilization* for sharing the valuable experiences of the different economies.

By holding this conference, we believe we will deepen our partnership and establish a network for strengthening the cooperation and interaction among member economies in Asia-Pacific region.

Since 2020, member economies have been confronting the challenges of COVID-19. This pandemic demonstrates health

security is a high-level security issue and the basis of the economic and political stability. For Chinese Taipei, the NHI has upheld the basis of the health security by ensuring everyone accessible to health care since 1995. Moreover, with a strong health information network, the NHI has become the backbone of the health systems during the pandemic.

Also, digital health and health information innovations have secured the access to health care during the pandemic. In the post-pandemic era, we believe digital health transformation will result in new health policies and challenges and affect the future of health care.

This conference will not only provide participants successful cases to broaden their horizons and build their capacities, but much establish the communication network to facilitate exchanges of the successful experience and make people's health better.

With your participation in this conference, we are sure to expect a delighted and fruitful outcome to this APEC approved-project.

Plenary 1: Digital transformation of healthcare and related innovations

Topic 1: How the IT system of NHI program plays a role in fighting COVID-19?

- ◆ Dr. Po-Chang Lee, Director General, NHIA, Ministry of Health and Welfare
 - Our NHI system is quite unique in the following ways: first, it is a single payer system. The government assigns specific portion of fiscal budget to finance the spending of HI. Second, around the 93% our medical providers have contracted with NHI, which underpins the wide coverage of NHI. For some foreigners if they stay in this island legally, they also can be covered by our NHI.
 - Given a fix total of budget, if we spend too much money in the examinations or in the tests, it means that medical providers cannot get a reasonable reward. Every patient, when they go to the hospital, they can accept CT scan, MRI, and so on. They don't need to pay any money. It's the government paying under the NHI. It's a real challenge for us to maintain a high quality and affordable NHI.
 - Examination data and medical image uploading allows efficient transfer of data across hospitals and prevent duplicated examinations.
 - AI model applications make it easier for doctors to find similar disease by image data comparison. Recently in one of our hospitals, they use our CT scan to detect early pancreas cancer, sometimes the cancer symptom is very difficult to detect.
 - Application of NHI big data is another example of digital healthcare in our economy. In the App of "My Health Bank", people can find his/her information regarding travel, occupation, contact and cluster. It is in the hand of individual patient to manage his/her own health conditions. It benefits research and disease control. Till June 29, 2022, there are over 10 million users.
 - By adopting precision medicine, we can spend money in such a treatment on rare disease or sometime the cancer. Recently, we know immune checkpoint inhibitor is very useful to treat cancer. It is a very hot topic compared to traditional family therapy or traditional chemotherapy. Real data can adjust our treatment

policy. Targeted therapy applied in the earlier stage can bring a true difference.

- Our economy's NHI system has accumulated a huge population-based health database since 1995. With the rapid rise of Big Data in recent years, the claim data has been gradually open to the public in different ways for academic purpose or healthcare applications. NHI big data are efficiently used by academic scholars to public real-data based research papers.

Topic 2: Telemedicine policies in the USA

- ◆ Dr. Peter Hou, Assistant Professor of Emergency Medicine, Harvard Medical School, the United States
- Regarding privacy, the Privacy Act of 1974 established a code of fair information practice does govern collection, maintenance, use and dissemination of personal identifiable information about individuals that it's maintained in systems or records by the federal agencies more than 20 years later, the 1995 medical records confidential act, granted patient's right to review their own protected health information and establish safeguards restrictions on user disclosure and sanctions that included criminal sanctions.
- Regarding licensure, it is governed by each state in the United States, providers can only practice in a state where license is issued. The earliest state laws that allow out of state physician consultants to provide reinstate services were in 1995 in the state of Kansas and Texas, in 1996, in the state of South Dakota.
- Regarding reimbursement the Balanced Budget Act of 1997 require Medicare to pay for health services provided to health professionals.
- Regarding liability patients can claim malpractice only point there is provider patient relationship, no relationship or telephone consultation. In the following cases were determined so in 1982 86 and 99 in 2005, authorized the US Department of Health and Human Services to make declarations that provided immunity from liability in certain emergency circumstances.
- During the pandemic, the US's telehealth policy is adjusted. HIPAA Privacy Rule, state that protected health insurance is

balanced to ensure appropriate use and disclosures of the psi. It still may be made when necessary to treat the patient to protect the economy's public health and for other critical purposes. covered health care providers will not be subject to penalties for violations of the HIPAA Privacy Rules that occurred in the good faith provision of telehealth. During the COVID public health emergency, on December 3 2020, the US Department of HHS issued a fourth amendment to the declaration under the prep act for medical countermeasures against COVID-19 to designate a telecom provider under the covered versus if a telehealth provider is delivering a “covered countermeasure” via telehealth to a patient in a state the telehealth provider was not licensed, state laws including state licensure requirements that prohibited such actions would be pre-empted.

- In summary, the telehealth policies principles are to ensure patient choice, access and satisfaction to expand access for underserved or risk populations to support seniors and expand aging in place to protect patient privacy. And mitigate cybersecurity risks to enhance provider autonomy to enable healthcare delivery across state lines and to ensure access to non-physician providers.

Topic 3: Reimagining Health – Digital Health Transformation Post-pandemic

- ◆ Dr Maheshwara Rao A/L Appannan, Senior Principal Assistant Director, Disease Control Division, Ministry of Health, Malaysia:
 - The imperatives for advancing digital healthcare is, first, need digital enablers. We need digital drivers. We need digital minds. We can do fantastic tools. We can have everything on your table. But if you don't have digital mind, you will not succeed. We must change from being an analog person to a digital person. Digitization will not take away your work. It augments what doctors do. It augments what nurses do. It augments what allied health personnel is number two, change management. I'm sure all your digital enablers here have gone through this tough time of change management. We had a tough time. How do we go to the ground and tell our friends that don't use papers anymore? Don't use Excel sheets anymore. Data guys on the ground they don't have Excel Microsoft Excel they have withdrawal symptoms. But now we have databases we have systems where

we can collect and intelligently analyze data.

- We must start investing to develop capacity and capability. We must produce tools which is fit for purpose. Just because you have a digital tool you must use it that's not the case. It must be dictated by policy. Policy dictates technology. Not technology dictating policy. Democrat democratization of digital health services it's gone are the days where you reinvent the wheel. You build everything from scratch. You don't have to because there are digital players out there who's already created good platforms for quick adoptions, quick deployment, use whatever is already available.
- Interoperability is very important. If you want to democratize services, it must be interoperable. We need to satisfy international standards like fire HL seven.
- And lastly, and the most important is digital trust. We need to ensure that we have a good data governance framework. And we must ensure that all our people trust what we do with that

Panel Discussion

- ◆ Moderator: Dr. Ray-Jade Chen, Chair professor of Surgery, School of Medicine, Taipei Medical University; Consultant Surgeon, Taipei Medical University Hospital
 - The Panel discussion focused on three points: disparity under the digitalized healthcare system, the budget management issues and trust.
 - On disparity, Dr. Maheshwara Appannan thinks that we need very strong support from the government. We made sure that the primary user can also assess the health of the old and the young ones, as smartphone penetration is quite good. They may not be digitally literate, but they might be somewhere far away. Malaysia uses single unique ID registered in the Malaysian governmental registration system to identify every end user. And there are Catholic caretaker or their dependents, as well as the relatives, can monitor those in need. Only one thing that was difficult for us was to investigate the visually impaired.
 - In addition, we talked a lot of cooperation from big players like the telecom companies. They made sure they improved connectivity, because not only help even the education sector

use a lot of digital systems.

- As the pandemic strike, to empower everyone our communication channels were just COVID, COVID, and COVID. From radios to television, to everyone. There is at least a phone or landline for people living in the remote areas.
- Dr. Lee admits that in our economy there is still disparity issues given the population living in the high mountain area. He is curious about how Malaysia enhance their education system to address the disparity issue.
- Dr. Hou said that in the US our hospitals provided returns of iPads. For example, for people who can't afford it, and they can communicate with their family members or providers as well. As the general picture is concerned, the key is to offer incentives to help people cross the financial barrier for technology to become cheaper and cheaper.
- Budget management issues, Dr. Lee, as the Director General of the NHIA, is always thinking about how to manage the budget of NHI to make healthcare more effective while balancing the interest and expectation of all the stakeholders, including doctors and patients. Sometimes extra budget is necessary. He wonders how the issue is address in other economies.
- Dr. Mahesh stresses the budget issues are universal among all economies. We are quite thankful because our leaders at that point of time, allocated a huge amount of budget for pandemic COVID-19. We quickly mobilize whatever we can in terms of PPE in terms of medications, of having the vaccine into Malaysia, and of course for digitalization. So, for COVID-19, it was not too bad. However, sometimes when the required budget is there, at the end of the day, we end up spending more than we should. So now we have taken this PPP model, the private public partnership, to reduce waiting time, and to have experts in the private sector, signing MOU with us right now to send patients over. If digitalization is managed properly, we can save money. And we need innovation especially when budget is limited.
- Privacy protection, Dr. Mahesh believes that there is no one more protective over citizens' data than healthcare people. will ensure that we will maintain it and utmost secrecy, privacy, and maintain confidentiality. Every economy should have a strong

data governance framework. Secondly, very strong laws and regulations must be in position. In Malaysia, we were relying on the infectious disease act 1988 and the medical act 1971 to govern our data. There is still room for improvement.

- Dr. Hou said that it's not necessary to store or transfer all the information. We need to know what we need to use for meaningful purposes before we decide how to store and transfer health data. And the storage and transfer of personal data can be something profitable. In my experience, we make personal health record portable by linking medical systems across different hospitals.
- As for the reimbursement for data storage, Dr. Hou doesn't think it is the government to pay for storing the data. The business or the healthcare system should take part and share the costs.
- In the very last minute before the end of this session, speakers were asked to deliver the most important message they want to share with participants. Dr. Maheshwara Appannan appealed that we have got the momentum going. We need to carry on with whatever we're doing. We must think digital, go digital for help. It's not to replace anybody's job – it is simply to augment our work.
- Dr. Lee believe the meeting today makes us cherish the momentum and drive of regional cooperation for promoting digital transformation of healthcare. Dr. Hou mentioned that as telemedicine is concerned, the critical thing is patients' preference. Patients want to be treated and cured at home. And digital tools can make it more efficient and effective. That's the trend we should follow.

Plenary 2: New Health Policies and challenges in the post-pandemic era

Topic 1: “MorPrompt”, Leveraging COVID-19 for digital health transformation in Thailand

- ◆ Dr. Supharerk Thawillarp, Head of IT Unit, Division of Epidemiology, Ministry of Public Health, Thailand
- Dr. Thawillarp’s topic is about “Experience for Thailand to promote Digital Transformation in Medical Care during the Pandemic”. MorPrompt is an online platform in Thailand, where “Mor” means “doctor” and “Prompt” means “Ready” and “Promptly” in Thai. The popularity of MorPrompt, which already has 32 million users including smartphone users and non-smartphone users, can be compared with Line and Whatsapp in Thailand. In addition, it’s available for all citizens in Thailand, including foreigners, expats, and migrants, which amounts about 5 million users. Thailand government wish to provide health care to overall people regardless of their status, citizenship, physical and mental state, and capacity.
- Thailand launched MorPrompt in February, 2021, initially using it as vaccination platform to record the side effects. After vaccination, users were able to reply their symptoms though the survey in their apps. Afterwards, Thailand continued to develop many functions, such as common application with LINE, to enhance interaction from people and help them receive the information of the pandemic. Other applications include:
 - ✓ Connecting Platform:

MorPrompt connect with more than 10,000 hospitals and 10,000 clinics and Pharmacies, establishing a workstation, where they share digital medical records that gather in Ministry Data Hub. Finally, the Hub output big data. It’s beneficial for medical practitioners to gather associated information and make crucial decision.
 - ✓ Electronic Medical Certificate:

The pandemic has prompted the medical system to transform. During the early pandemic period, most medical institutions are closed or patients must be quarantined, so it’s hard to get certified documents. To deal with this problem, MorPrompt was

added electronic medical certificate function with the digital signature technique to assure the authenticity.

✓ Chatbot:

Chatbot has created great benefits during the pandemic. Some people suspect themselves have Long COVID after infection, so MorPrompt launch a Chatbot function. Via interaction, one's condition could be initially assessed. So far, there are about 14 million conversations, which point out that not every user used phone but use chatting to seek consultation.

✓ Mental Health Service:

Caring about the mental health service post pandemic, Thailand arranges consultation service by mental health experts on MorPrompt. At the meantime, it also provides services for the disabled. For example, the sign language translation.

✓ Electronic Insurance-Claims:

The digital signature technique can be further applied to insurance payment system. To prevent people from scams, Thailand enhanced the cooperation between private insurance company and government insurance department. Users can also track their insurance online. Additionally, Thailand plan to extend the service of MorPrompt, launching function of personal health record access.

Topic 2: Artificial intelligence model for pneumonia detection in chest X-ray images

- ◆ Dr. Jung-Hsien Chiang, Distinguished Professor, Department of Computer Science and Information Engineering, NCKU
- Dr. Chiang's topic was about "successful case of Artificial Intelligence application during the COVID-19 pandemic". Dr. Chiang believed the healthcare technology transformation is imperative and urgent. The healthcare technology has changed doctors' treatment to patients.
- Precise medicine means "the right treatment for right person at the right time". However, precise medicine is not easy as we think it is. As a computer science expert, Dr. Chiang wished to use AI on data aggregation & integration, clinical research & Analytics and predictive analytics, aiming to predict, prevent and

diagnose.

- In developing economies, healthcare inequalities always exist. Dr. Chiang wished to deal with time and space problems in medical care through AI that even a Harvard doctor can remotely provide medical services to people in rural area. He also shared his example of “MedCheX” platform. His team created MedCheX, an electronic alert system that can detect pneumonia from chest X-rays and automatically alert doctors two years ago, and it has become as one of the 89 highlighted projects among 1,560 submissions in the COVID-19 Global Hackathon organized by the WHO seeking solutions for challenges related to the COVID-19 pandemic. The system only takes one second to determine if a chest X-ray of a patient needs further screening for the novel coronavirus.
- The team created a machine learning model that can automatically detect the presence of pneumonia. Using this learning model, the system is able to automatically detect high-risk patients by scanning their chest X-rays to more quickly determine whether they have developed pneumonia. If the test is positive, the doctor receives an e-alert via computer or mobile phone containing both the original scans and the detection results. The system has been deployed at the hospital and has greatly increased diagnosis efficiency.
- There are two reasons to use AI as a base of pneumonia detection. First, assist rural area hospitals. For those rural area hospitals who have a shortage of experienced physicians, the MedCheX can be an excellent first-line COVID-19 assistant to perform early diagnosis. Second, to reduce burden of medical professionals. Using AI technology to identify pixel-level abnormal information via deep learning algorithms, and provides heat maps to physicians for further diagnosis. MedCheX can quickly screen a large volume of X-ray images and let radiologists do more productive work efficiently

Topic 3: Accelerating digital health transformation

- ◆ Dr. Ted Chang, Co-chair, APEC ABAC Digital Working Group; CTO, VP&GM, Quanta Computer
- Dr. Chang mentioned how to support digital health transformation from two prospective: IT industry and ABAC digital working group. Dr. Chang believed that AI has

significantly changed people's behavior, business model and applied technology model while facing uncertainty of the pandemic. The pandemic causes the emergence of "zero economy", so the industry is changing. Devices, data and algorithm played a crucial role on this trend. Above all, IoT is imperative, which can help us collect patients' data and lead us to precise medicine.

- AI is a new type of services, so the development strategy cannot be ignored. Quanta thus launch related strategy and cloud platform aiming to promote smart healthcare. In addition, Quanta has other two cloud platform to handle remote medical care from hospital to hospital and from hospital to patient. There are about 30 hospitals in Chinese Taipei working with Quanta to integrate patients' data. Quanta also involves in research in Japan, French, the UK and the EU.
- Dr. Chang believed partnership between private and public sectors is necessary when we develop telemedical care. Taipei Veterans General Hospital now use this platform to categorize 200 hospital beds, provide service to home health care patients by coworking with nursing station and service center. It has created significant benefits during the pandemic.
- Telemedical care not only involves in distance problem, but also involves in data processing problem and lack of labor force. Quanta wishes to deal with these problems by telemedical care, trying to virtualize medical expertise to help people easily access to the medical treatment.

Panel Discussion

- ◆ Moderator: Dr. Jiun-Yu Yu, Associate Professor, College of Management, NTU
- Dr. Yu thanked speakers from Thailand, NCKU and Quanta for their speeches. Digital health is an important issue, assisting the authorities to deal with the COVID-19 pandemic. There are still many challenges and difficulties to be solved in the post-pandemic era. Please share experiences and expectations, as well as imagination of the post-epidemic era.
- Dr. Chiang indicate that digital health is a future trend to improve quality of medicine, including the way patients receiving the treatment. Doctors can get more assistance from technology. In

the future, the development of digital health and the transformation of the medical system are imperative and urgent. Dr. Chiang called for humanity to be an important issue and that future health inequality must be reduced.

- The question from online attendees to Dr. Thawillarp: Many things cannot be provided digitally, such as medications, and how medicines can be delivered in a more integrated and real-time manner?
- Dr. Thawillarp mentioned that there are logistics services that can deliver medicine to patients, pharmacies can then deliver them to patients after receiving orders, specific medicine have special conditions, such as maintaining a specific temperature, avoiding sunlight exposure, etc., Thailand does have relevant logistics response practices.
- Dr. Yu said that Quanta plays a coordinating role in the medical field, providing telemedical services, and asked Dr. Chang to share further with the participants.
- Dr. Chang said that the early days of digital transformation were not easy, especially in the medical and pharmaceutical sectors. From personal observation, we should first solve the problem of mentality, such as trusting the diagnosis made by the robot or AI, and encouraging the physician to cooperate with the AI to make more personalized examination results and medical treatment. If AI is acceptable to change everything, then the further attention should be paid to the retraining and re-improvement of personnel skills. From an ICT perspective, the big challenge and obstacle is that hospital staff or other partners must adjust their mindset and improve themselves to cooperate with each other. ABAC has also been working to address the knowledge and skills gap in 21 economies and understand the benefits of digital transformation. In addition, ensure that advanced technology is easy to use and enables leaders to understand technology and set the right policies to achieve the right goals. At this stage, the Ministry of Science and Technology hopes to create a new digital health economy through the establishment of a sandbox plan.
- Whether human resources in the healthcare system can really apply these innovations, and whether doctors and nurses are willing to embrace these practices.

- Dr. Chang mentioned that new medical products in the industry must be started in-house and experienced by doctors and nurses at the earliest stage, rather than waiting until development is complete. Two-thirds of engineers must interact and engage with healthcare workers in the hospital, and in addition to labeling the data and data, the hospital understands how the hospital categorizes the data and waits until the product is launched and then fine-tunes the product from the patient's point of view. Therefore, it is not directly developed by the laboratory and sent to the hospital, but developed in the hospital at the beginning, to understand the user's behavior, including the experience of doctors, nurses, and patients, and then fine-tune and correct it to gradually reduce the intermediate bottleneck and reduce the situation of poor communication and inability to cooperate.
- Dr. Thawillarp said as a doctor, if any technological system can make the work easier, he is willing to try, if he can better take care of patients, he is also happy to see it succeeds. Thailand is still in its infancy, still in the process of collecting data, and collects users' questions about new technologies, including privacy aspects. Thailand expects to plan after gathering information and questions to find a balance between privacy and medical care. Dr. Thawillarp believes that although the situation of each economy and medical facilities is different, they all hope to achieve more innovation in medical care.
- PCR testing was time-consuming in the early stage of the epidemic, but the diagnosis can be made in a short period of time with the MedCheX system. Dr. Chiang said that when developing AI models to diagnose pneumonia and COVID-19, it was first necessary to find key data sets, that is, medical images that match the symptoms, and to understand the process of radiologist interpretation, so that the machine can use the same learning process. Regarding the case of small molecule lung cancer of NCKU, when the team examined the medical imaging, it found that some symptoms were like the symptoms of pneumonia, so the team adjusted the model and test, and finally proposed to the Ministry of Health and Welfare.

Plenary 3: Telehealth and the future for hospitals

Topic 1: Sustainability of telehealth beyond the COVID-19 pandemic

- ◆ Prof. Anthony Smith, Director of the Centre for Online Health, the University of Queensland, Australia; Adjunct Professor at the University of Southern Denmark
- Australia has a population of 24 million. One-third of the population lives in non-metropolitan areas. Therefore, this creates a huge medical challenge. Most medical services are limited to coastal cities. Because of Australia's population is scattered over a large area of land, it is quite suitable for the development of telehealth and digital healthcare.
- Australia has considerable transport needs. Queensland spends \$19 million a year to pay or support patient transport. Therefore, the issue of equitable access to health care is very important. Telehealth takes geography into consideration, providing medical care to people in rural areas, especially under the influence of multiple factors such as population aging, chronic diseases, and improved survival rates.
- Digital healthcare is no longer limited by distance. It provides medical services while using different communication skills, including real-time storage, forwarding technology, imaging, video, telephone, email, remote patient monitoring. Digital healthcare can bring more support and services to patients. In fact, patients can go to the hospital for treatment in a way that does not spend much money.
- Prof. Smith started promoting digital health 20 years ago. He hopes to provide medical services to people 2,000 kilometers away from the hospital. Telehealth has been around for decades. The epidemic has highlighted the benefits of telehealth, including maintaining social distancing requirements, keeping medical staff safe (reducing exposure to the risk of infection), and protecting vulnerable patient populations. Prof. Smith shared that there were 270,000 telehealth visits before the epidemic. After the epidemic, the number of telehealth visits increased to 45 million. Telehealth today is mostly carried out by telephone, and it is hoped that more video services will be added in the future.
- Prof. Smith points out that there is no one-size-fits-all solution to telehealth. Telehealth should have a customized approach, thinking about the main needs of the local community and planning with the community. Telehealth faces many issues, including human issues (finding more physicians, nurses to

provide care), time, flexibility, culture, equity, digital gap, language translation, etc. Telehealth hopes to bridge the medical gap. However, some people in Australia still do not have computers and Internet access, or cannot afford smartphones. Therefore, Australia also needs to work to improve the affordability of telehealth services.

- Telehealth is a necessary development. For traditional medicine, telehealth is a supplement rather than a replacement. Through telehealth, more outpatient space can be freed up. In the future, we should continue to promote the change and transformation of medical care, and provide patient-friendly and patient-centered medical services. Finally, Prof. Smith promote the Symposium on Success or Failure in telehealth (SFT-22) on November 9-11, 2022 and welcome to join the symposium.

Topic 2: Telemedicine: domestic and cross boarder arrangements, what are the options?

- ◆ Dr. Enrique Tayag, Director of Knowledge Management and Information Technology Service, Department of Health, the Philippines
- Dr. Tayag believed that the goals of telehealth are broad and cannot be achieved all at once. Therefore, he would like to explore how telehealth can overcome obstacles and make telehealth sustainable during and after the pandemic.
- COVID-19 is a challenge to the global healthcare system. Philippines is also badly affected and recognizes that telehealth is the solution during the pandemic. For decades, the Philippines has been actively looking for different ways to provide health care. Philippines has a population of more than 100 million and 7,000 islands. There are some regions are quite undeveloped and vulnerable, so they did not expect that telehealth evolve so rapidly during the epidemic.
- APEC Health Working Group examines policy frameworks of 21 APEC economies in emergency medical plan. They found that 21 economies have developed different levels of digital health care, and there are significant differences in the level of data protection.
- The Philippine government wants to set up a platform based on medical institutions. The platform establishes hospital

communication channels through an electronic document exchange system to effectively grasp data and assist decision-making. Therefore, four different policies have been introduced to guide government units and the private sector to ensure consistent standards.

- While most arrangements are in place, some challenges remain. To counter the challenge, speaker mentioned the GAPS architecture: G is governance, A is architecture, P is project management, and S is standards and interoperability. Through the GAPS framework, it will be helpful to examine the implementation status and implementation of telehealth. The infrastructure in the Philippines is not perfect, especially in rural areas. There is also a shortage of human resources that only physicians can perform telehealth in the Philippines.
- To unify telehealth outcomes, APEC has compiled 13 policies to help economies identify maximizing benefits from telehealth and other digital health applications. In the future, through loosening of regulations and Mutual Recognition Agreement (MRA), the policy will be more flexible to implement cross-border telehealth. Suppose that there is an emergency in the journey of our people to Philippines, we can see a doctor domestically through telehealth.

Topic 3: The conceptual road map to the future hospitals in metaverse

- ◆ Dr. Yi-Lwun Ho, Professor of NTU and Director of the Telehealth Center, NTU Hospital
- To create a new medical path in metaverse, telehealth needs to include ABCDEF pathways: A for algorithms, B for big data, C for cloud computing, D for devices, E for edge computing, and F for financial technology. Through the ABCDEF pathway, we can provide telehealth to anyone and anytime.
- Algorithm transmits data over the Internet at home and stores it in the hospital system. The evolutionary algorithm is then input by the nurse, and the processing time is about 2 minutes.
- The telehealth platform has accumulated millions of data, including voice, image, text, etc. With the update and expansion, the ECG platform has big data interpretation and analysis functions, which can analyze atrial fibrillation and present the

interpretation results.

- ECG automatic interpretation system conducts arrhythmia investigation and Atrial Fibrillation screening through cloud computing. Screening with just one technician.
- Dr. Ho shared many different devices to monitor patients in the center, including wearable devices, ECG patches, ECG watches, temperature patches, etc. In addition, Dr. Ho also shared the remote monitoring device of the ward.
- E-edge computing provides real-time analysis as a data source between devices, clouds, and data centers. The transmission pipeline of cloud computing reduces the round-trip between the data center and each pipeline.
- ◆ Finally, the future hospital in the metaverse. Dr. Ho believed that it is very important to collect data through GPS and GIS. iPhone14 has mobile satellite communication and connection function, it can be used to promote health care. Through spatial analysis and map system, diseases can be tracked more quickly.

Panel Discussion

- ◆ Moderator: Dr. Cheng-Hua Lee, Deputy Director general, NHIA, Ministry of Health and Welfare and Dr. Jiun-Yu Yu, Associate Professor, College of Management, NTU
- Dr. Yu thanked speakers from Australia, Philippines and Chinese Taipei for sharing their telehealth experience and vision. Although Australia has 20 years of experience, there is still a shortage of interpreters.
- Prof. Smith said because Australia was a multicultural society, the interpreter service was aimed at helping patients who did not speak English. Australia wants to provide care services to people from different cultural backgrounds. Although there are many good interpreters in Australian hospitals, there are not many. Therefore, effective time and space arrangements can ensure that the process is in place so that every patient can get the services they need.
- The moderator asked the speaker about what skills should a qualified medical interpreter possess?

Prof. Smith responded to the professional skills of the interpreters, not only providing the information needed by the patient, but also allowing the family or the patient's information to be passed on to the medical staff for understanding. Consequently, both medical personnel and interpreters should be cautious when conducting telehealth. Video telehealth transmits information differently from physical. It contains body language limited by telehealth. As a result, medical translators must have considerable training to complete the work of telehealth.

- Dr. Yu said that the option mentioned by Dr. Tayag, does not mean that a choice has been made. Could you explain the details of the option?

There are many different options to promote the sustainable development of telehealth. Even the pandemic is over, the Philippines wants to continue promoting innovation and telehealth. When telehealth was planned in the Philippines, it was aimed at rural and remote areas, but now telehealth has many advantages. When we have different telehealth options and platforms, it is recommended to retain certain flexibility and enough resources. The key is to make choices and decisions.

- Dr. Yu asked Dr. Ho to explain how to provide medical services in a timely manner. Dr. Ho shows the information about the environment, which can analyze whether there is a virus, oxygen and content, etc. Integrating environmental cloud information with physiological cloud information can generate personalized information and even predict whether there is a risk of contracting a specific disease. Telehealth makes it easier for governments and hospitals to act to reduce human-to-human contact. If the patient is highly contagious, telehealth can be used to reduce the hospital infection rate. It can help the medical system to respond more efficiently to possible future crises.
- Prof. Smith explained the "incentives" of telehealth. There should be a good reward system. Rewards are given according to the effort and time of the service provider. Telehealth has changed the dynamics of medical care in the past, including medical staff responsibility, patient responsibility, etc. Funding and payment systems should be changed accordingly to provide incentives for more people to participate in telehealth. In the future, we need to think about more flexible ways to saving and

promote telehealth to maximize the benefits.

- Dr. Yu concluded that telehealth services are the mainstream of the future. We have seen the potential and benefits of telehealth. In the future, more innovative software, hardware, payment methods and mentality changes are needed to work together to promote health.

Day 2

Plenary 4: Bring artificial intelligence in action in healthcare

Topic 1: Role of Technology in Promoting SDG 3 and SDG 5

- ◆ Speaker: Dr. Padmini Murthy, Professor and Global Health Director at the School of Health Sciences and Practice at New York Medical College, the United States
- Role of technology in promoting SDG3 and SDG5, including digital divide, unequal in some economies, global partnership, brought along with government, experts, business.
- Global health digital investment is in need. We need to have a roadmap so that we do not waste any resources and we can use that as efficiently as fast as possible.
- Focus on the social, economic condition. Need to recount the strategy. The social determinants that a that is existing concern the context that economic conditions.
- Gender equity needs to have access to this digitalization both by men and women and data as you know it does not depend on issue does not event all socio-economic status. Women and girls are left out in some middle- and low-income economies, we need to address gender equality.
- 2030 Agenda for Sustainable Development highlights that spread of information and communications technology and global interconnectedness, helping to bridge the digital divide and sharing knowledge and hopefully what the outcomes of this can be transmitted more to see how they can work that love is artificial intelligence, low-cost technology.
- WHO's strategy in digital health and digitalization is easily accessible and become more crucial during COVID-19. We should be supportable about gender quality by helping them access to digitalization.
- Digital health can be helpful and sustainable for improving health and well-being, we should continue to improve quality and equitable care, strategy on global interconnectedness.
- Introduction to "The International Digital Health & AI Research

Collaborative” (I-DAIR), which is an international collaborative striving to improve access to cutting edge research on digital health and artificial intelligence for clinical researchers, policy makers and patients around the world. It is an international initiative that aims at creating a multi-stakeholder platform for the responsible R&D of digital technologies and artificial intelligence (AI) for health.

- Finally, digitalization should be careful on data protection, regulation; for medical devices, we aim to develop high quality ones.

Topic 2: Framework of support for utilization of AI in medical and health sector conducted by MHLW, Japan

- ◆ Mr. Takuro Umekita, Unit Chief, Office of the Counsellor for Information and Technology Management under the Director-General for Statistics, Information Policy and Industrial Relations, Ministry of Health, Labour and Welfare, Japan
- AI Strategy in Japan is published from Council for Science, Technology and Innovation (CSTI) since 2019. Based on a data infrastructure grounded in architecture design, being at the forefront globally in achieving AI social implementation in five key areas: health, medical care and long-term care; agriculture; economy-wide resilience (to disasters); transportation infrastructure and logistics; and regional revitalization (smart cities).
- Areas where AI is expected to be useful in the health, medicine, long-term care and welfare. We bring health and data to the top of our priority list for utilization which reflects our recognition that this area is so vital in the super aging society.
- In this project, we plan to use AI in various aspects, focus on the target selection part molecule designed for AI to be utilized. Exact example is the regulation on the AI assisted medical devices. We put AI for long term care and care for dementia.
- We also need to develop a framework for AI development, technology and information framework in health medicine and long-term care.
- In drug development, failure of development is partly attributed to drug targeting relying only on animal experiments and

insufficient patient classifications. New approach by AI based on human data is advantageous. We conclude that area with AI utilized, such as AI-aided clinical trial patient registration, virtual clinical trial (remote monitoring), as well as automated case report generation turns out well.

- The PRISM (Public/Private R&D Investment Strategic Expansion Program), constructing data-driven medicine-targeted discovery technology based on human data such as omics data and clinical information. It includes 3 Initiative: data collection, analysis and interpretation.
- Construction of practical and comprehensive drug discovery AI platform through integration of the strength of Japanese pharmaceutical company and drug discovery chemistry and high-end AI technology.
- About government regulation, Japan has its own regulation system for drugs and medical devices in which draft and major devices should be subject to regulatory they use. In the guidance for evaluation of artificial intelligence-assisted medical imaging systems for clinical diagnosis, at least some major problems: black box, change in performance, assigning responsibility.

Topic 3: The status of AI use in the Korean health care system and the acceptance of AI by the NHI

- ◆ Dr. Hyoung-Sun Jeong, Professor, Department of Health Administration, College of Software and Digital Healthcare Convergence, Yonsei University, Korea
- Briefly introduce standardization of health and care information in Korea, EMR Certification Program, how they use big data for enhancing people's health, pilot for precision medicine health information system as well as Telehealth.
- Telemedicine is regulated restrictively in Korea, which only allowed between doctor and medical professions like nurses, but not allowed to perform between doctor and patient. For at last more than 10 years, it is only demonstrated for isolated areas and groups. Fortunately, COVID-19 allow telemedicine accessed by patients which not only eliminated anxiety about direct care, which has always been made by the doctors themselves.

- In terms of validation of technology, safety and efficacy. There are two areas: new medical devices and new medical service technology, which is separately in the case of a new member devices safety and efficacy are validated through their approval procedure by the Ministry of Food and Drug Safety.
- Health AI in Korea and medical device industry grow rapidly. AI in Korea includes diagnose disease, medical care, new drug development, modeling for clinical patients, personal health management. Radiology for image and pathology, 80% cases are AI images.
- Korean National Health Insurance Service (NHIS) applied de-identification and anonymization methods to protect the privacy information of the data provided by the NHIS. Since AI has very complex structure, there may exist many hidden problems. Consultation process is needed to handle safe and ethical issues in the future. In terms of policy or data driven values and privacy protection law, we should be considered in the use of private data for learning process of AI. NHI is single payer like evaluation methods to protect the privacy information with data provided.
- New administration's plan for health insurance coverage for digital health, request to improve relevant regulations for rapid clinical use after designation as innovative medical devices. Sometimes, college provides new or diagnostic information that does not exist before.
- The guidelines for health issues application of AI based radiology technology is becoming a new medical knowledge that we can assist with so. Whether it will be covered by NHI in consideration of treatment effectiveness and when it helps these operators it is permitted to improve patient treatment resource such as cost effectiveness and spending adequacy.
- Brief introduction on GDHP (Global Digital Health Partnership) and related products, which analyze and read the presence of disease such as lung cancer, tuberculosis, pneumonia and breast cancer in X-ray image with 97-99% accuracy. This is expected to improve the quality of various medical such as health care.

Topic 4: Leveraging hospital resources to accelerate medical AI development

- ◆ Dr. Chang-Fu Kuo, Director of the Center for Artificial Intelligence in Medicine, Chang Gung Hospital
- Dr. Kuo introduced the current status of AI-enabled medical devices and related regulatory approvals and medical research. He also introduced how to leverage hospital resources to accelerate medical AI development.
- The definition of AI enabled medical devices is clearly defined by the US FDA as one of the greatest potential benefits of machine learning resides in its ability to create new and important insights from the vast amount of data generated during the delivery of health care every day. So, it is based on data-driven development.
- Interest in medical devices incorporating machine learning functionality has increased in recent years. FDA-approved devices via 510(k) clearance and De Novo request with machine learning across many different fields of medicine increase in number. It is important to know that this effort of FDA has put software into the framework of traditional medical devices.
- By reviewing FDA approvals of AI-enabled medical devices in the past 4 years. It is found that AI technology is flourishing in recent years, but FDA approvals are not so many, especially for De Novo approvals (for new indications and new technologies). In the past 4 years, only 11 De Novo items are approved by the US FDA, and most of the approvals are for the traditional 510(k) (for previous indications), and among them most of the indications are on radiology.
- Looking at the trend of approved devices, the hype is not continuing, because commercializing the medical device is quite different medical research. Radiology field has many 510(k) approvals, but only 1/11 for de novo. Imaging process is also one important part.
- It is very important to introduce the device - Viz.AI LVO here, which is approved in 2018 by FDA, and is the first and only AI-assisted medical technology reimbursed by Medicare this year. If no one pays for the technology, how can medical AI continue to survive on the market. So, it is very important. The device shows improved outcome of the patients. Dr. Kuo also showed other de novo devices approved by FDA in 2021, including Gili Pro Biosensor, a contact-free table-top sensor enables remote

measurement of multiple physiological indicators, important during COVID-19 outbreaks.

- Another one is GI Genius by Medtronic, which is conceivable by all gastroenterologists. The device can reduce errors from colonoscopy. In fact, there are many papers in high impact journals.
- Many of these devices can reduce human errors and improve patient outcome. It is different from medical researches. Medical researches aim to gain insights, but not about improving patient outcome or reducing medical errors.
- To summarize the real challenge of how to apply or how to develop more AI devices. First, new ideas and the regulation is needed. Technology is ready, but smart applications are rare. Fitting technology into clinical scenarios is one of the most important parts. Manufacturers do not know if the device can really help doctors or the patients, and for the hospital they need experts' supports to develop AI technologies using data science technologies. All devices need to go through clinical trials. And finally, is the business support. It is very costly to develop medical devices. It needs to be paid.

Panel discussion

- ◆ Moderators: Dr. Feipei Lai, Professor, Department of Computer Science and Information Engineering, NTU and Dr. Shu-Ling Tsai, Deputy Director General, NHIA, Ministry of Health and Welfare
- Dr. Tsai said AI assisted technologies is more and more popular in our medical delivery process. Even though many kinds of medical devices have been approved by FDA, our NHI coverage includes many practical devices. We need to collect the experience of other economies and consider other experts' opinions.
- Prof. Jeong mentioned financial burden is the main issue in the medical health field. How to be better in paying for this kind of medical devices run by AI. Korea is very positive about this issue; and try to find some sort of solutions for this way. Actual cost of labor, such as doctor can be lowered, may reduce the costs. It can be heightening the low-cost effectiveness of the health insurance and new services can be enlisted. AI would assist us

with increasing efficiency during the diagnostic care, so hospitals tend to hire fewer doctors, this the hospitals save money to manage resource costs.

- One participant mentioned have a whole system it seems like the biggest blockage is that we find it very difficult to change our funding programs. Whilst we have these amazing opportunities to provide better health care. What seems to be dragging us down is the fact that we can change the funding models and where they seem to be the blocks.
- A hospital cannot be completely artificial without personnel within the hospital setting. It is more of a supplementary process. AI is a little bit different to telehealth in the sense that telehealth is very transactional. It usually involves people and interactions with AI is probably anticipate for costing perspective as the costs are in the development and the establishment implementation.
- The costs of medical health would eventually come down over time in more maintenance mode. But we want to always be creating new forms of AI.
- We must not only think about new ways of providing care but need to make sure we look at a whole system's perspective and be very clear and understand what clinicians need to provide the care that they must provide to their patients. We must be very mindful of what patients want in terms of receiving care, not just from a technology perspective.
- Improving healthcare, AI is a tool, a toolkit, and need to make sure that if we're serious about using it for all the right reasons, that we modify other aspects of our health system to be able to accommodate AI in routine practice.
- Dr. Appannan said In Malaysia, they use a very progressive financing system where they have a heavily subsidized public health care sector, which is thus an easy way in implementing things like AI in Malaysia in terms of current financing mechanism.
- About AI, we need to make sure that we are very clear that all these devices are not replaced our current workforce, and it helps a lot at our allocation of human resource. AI is the way forward especially in primary healthcare facilities with no

specialized care.

- About cost and management in healthcare, people need to follow the rule and it's not very expensive. Educating a human resource is much more expensive than implementing artificial intelligence.
- The AI supported medical devices will have a difficult process. For APEC, the database on the medical devices that are used for demand and if they are ongoing or data have been approved this way, the demand will not be restricted to a specific family, but the data will be shared across the region.
- Digital economy is to put together an economical premise, accelerating implementation of digital economy. It is based on the new technology which can be implemented on our tax-based financing. The strategy is what we do is the little economic blueprint, that specific initiative that we do in terms of implementation of that we put the AI machine learning strategy.
- Dr. Tayag mentioned in the Philippines, there is still a long way to go. For hospitals to incorporate it in the processes, they had some displays workflow in their facilities in terms of which one to prioritize and setting up the telemedicine room. They anticipate these types of operational decision making to incorporate it in our regular processes. But with this continuous collaboration among the economies and similar engagements, hopefully everyone can all learn from each other, and slowly adapt and make it effective to provide better patient care and effectively using it for NHI coverage.
- Deputy Director Tsai said different economies have different starting point to see these according to their habits. If we can find the value of this type of support by AI and the purpose of using this device, we can find a solution to the question.

Closing Remarks

- ◆ Dr. Po-Chang Lee, Director General, NHIA, Ministry of Health and Welfare:

Distinguished guests, ladies and gentlemen, after 1.5 days of lively exchanges and discussions in the "APEC Conference on Digital Healthcare Innovation – COVID-19 Response by Health Information Utilization", the conference is about to end successfully. I would like to express my special thanks to all the distinguished guests, speakers and participants. It is because of everyone's dedication and participation that this event can be carried out smoothly. I would like to express my sincerest gratitude to all of you.

It is not an easy job to prepare for a physical conference when COVID-19 is still a threat. I also want to thank my colleagues who had worked day and night to make everything happen for us.

We also look forward to opening more discussions on the impact of the digital age on medical care in the Asia-Pacific region in the future, and based on the fruitful outcome of this event, we will continue to discuss the ways for APEC to continue to strengthen health care in the future, including promoting digital health care cooperation between economies, strengthening digital health and disease management, and strengthening digital medical care application and innovation, to jointly build a better health care system and establish a more stable cooperative relationship between economies in the region.

Finally, on behalf of the Ministry of Health and Welfare, I would like to thank you again for your participation, and look forward to the continued support our initiatives in the future. I wish you good health, and look forward to our next meeting soon. Thank you!

Post-Conference Visit to Taipei Medical University Hospital

Taipei Medical University Hospital (TMUH), the first affiliated hospital of Taipei Medical University (TMU), was founded in 1976 and has built up the basis between clinical service and medical research education. TMUH continues enhancing medical care quality and reinforcing the hardware and software equipment to provide high-grade medical services. Since 2018, three medical buildings have been renovated; moreover, TMUH introduced an intelligent medical system that gives the hospital a whole new look. The number of hospital beds has increased to nearly 800 beds so far, and the number of faculty and staff has exceeded 2,000 people, making TMUH the benchmark of domestic and international medium-sized hospital.

In the afternoon of 22 September 2022, experts from the Taipei Medical University Hospital introduced how the hospital has launched the "Healthcare Blockchain Platform" and rolled out the "Smart Chain Passport" to improve the paperwork processing problem during referral. Within 24 hours, the patients can obtain complete medical record summaries, examination images and other medical information, and authorize other hospitals and clinics to browse. Thus, patients under referrals do not require special application for medical records, which greatly improving the accuracy and convenience of the medical system. After applying for a smart chain passport, patients can log in to their personal private key through the official APP to obtain their complete case information in the hospital. This will help patients to make their medical records more transparent and faster when seeking treatment between small clinics and large hospitals. Blockchain technology helps the overall medical care system to be more perfect, and implements a hierarchical medical system of seeing hospitals for major diseases and clinics for minor diseases.

During the COVID-19 outbreak, the hospital digitalized the vaccination process to reduce the waiting lines for vaccination. The hospital staff also demonstrated their design of the smart ward and the use of smart pump, and gave a short tour to the consultation room for international tourist patients to all the visitors.

Conclusion

Digital healthcare can improve the efficiency and cost-effectiveness of care, allowing for new business models in the delivery of services. In addition, as we see in the COVID-19, digital technology has proved a useful measure to help ensure that the economies on the frontline of the emergency are able to take proactive monitoring, contact tracing and provide essential health care services.

Digital Health is the wave of the future. Electronic health records, telemedicine health apps and wearable devices have become the backdrop of the digital health ecosystem. This new sector is rife with the business potential and offers countless opportunities for cooperation among APEC members and stakeholders.

Based on this notion, we hope to continue to promote digital health care issues in the APEC field, strengthen interaction with various economies, and share the application of digital technology, etc., to promote the construction of digital health in the Asia-Pacific region. The ability to apply data to develop a more resilient health care system and hopefully contribute to future opportunities for collaboration in digital health care areas.

The outcomes of this project are conducive for APEC economies to make action plans to seize opportunities for promoting digital transformation of healthcare by utilization of data-driven innovations. In the future, apart from sharing fruitful deliverable of this project in HWG and other fora inside and outside of APEC, Chinese Taipei will keep expanding new trends in digital transformation of healthcare.

In the meantime, we will further explore issues of how to develop good capacity-building programs, to enhance the exchange of policy experience, and the dissemination of skills and technologies, to make contribution to constructing an inclusive and sustainable digitalized health system in the APEC region. A new APEC project in 2023 will be conducted in Taipei to provide workshops for APEC members to further explore practical digital health solutions and bring back suitable ideas to their own economies.

Appendix.

Conference Agenda

Day 1 · 21 September 2022 Taipei/UTC+8

Venue: Chang Yung-Fa Foundation International Convention Center, Taipei

Time	Agenda
09:00-09:30	Registration
09:30-10:00	Opening remarks by the Host
09:30-09:40 09:40-09:50 09:50-10:00	Dr. Chung-Liang Shih, Vice Minister, Ministry of Health and Welfare Ms. Sharon S.N. Wu, APEC Senior Official; Director General, Department of International Organization, Ministry of Foreign Affairs Dr. Po-Chang Lee, Director General, NHIA, Ministry of Health and Welfare
10:00-10:10	Group photo
10:10-10:30	Break and Media time
	Plenary 1: Digital transformation of healthcare and related innovations
10:30-10:45	Moderator: Dr. Ray-Jade Chen, Chair Professor of Surgery, School of Medicine, Taipei Medical University; Consultant Surgeon, Taipei Medical University Hospital (Chinese Taipei)
10:45-11:00	How the IT system of the NHI plays a role in fighting COVID-19 Speaker: Dr. Po-Chang Lee, Director General, NHIA, Ministry of Health and Welfare (Chinese Taipei)
11:00-11:15	Telemedicine policies in the USA Speaker: Dr. Peter Chuanyi Hou, Assistant Professor of Emergency Medicine, Harvard Medical School, (USA)
11:15-11:30	Reimagining Health - Digital Health Transformation Post-pandemic Speaker: Dr. Maheshwara Rao A/L Appannan, Senior Principal Assistant Director, Disease Control Division, Ministry of Health (Malaysia)
11:30-11:50	Panel discussion Moderator: Dr. Ray-Jade Chen Panelists: Dr. Po-Chang Lee, Dr. Peter Chuanyi Hou, Dr. Maheshwara Rao A/L Appannan
11:50-13:30	Lunch
	Plenary 2: New health policies and challenges in the post-

	pandemic era
13:30-13:45	Moderator: Dr. Jiun-Yu Yu, Associate Professor, College of Management, National Taiwan University (NTU) (Chinese Taipei)
13:45-14:00	“MorPrompt”, Leveraging COVID-19 for digital health transformation in Thailand Speaker: Dr. Supharerk Thawillarp, Head of IT Unit, Division of Epidemiology, Ministry of Public Health (Thailand)
14:00-14:15	Artificial intelligence model for pneumonia detection in chest X-ray images Speaker: Dr. Jung-Hsien Chiang, Distinguished Professor, Department of Computer Science and Information Engineering, National Cheng Kung University (NCKU) and the CEO of Health Data Resource Center, NCKU Hospital (Chinese Taipei)
14:15-14:30	Accelerating digital health transformation Speaker: Dr. Ted Chang, Co-Chair, APEC ABAC Digital Working Group; CTO, VP&GM, Quanta Computer (Chinese Taipei)
14:30-14:50	Panel discussion Moderator: Dr. Jiun-Yu Yu Panelists: Dr. Supharerk Thawillarp, Dr. Jung-Hsien Chiang, Dr. Ted Chang
14:50-15:10	Break
	Plenary 3: Telehealth and the future for hospitals
15:10-15:25	Moderator: Dr. Cheng-Hua Lee, Deputy Director General, NHIA, Ministry of Health and Welfare (Chinese Taipei)
15:25-15:40	Sustainability of telehealth beyond the COVID-19 pandemic Speaker: Prof. Anthony Smith, Director of the Centre for Online Health, the University of Queensland and Adjunct Professor at the University of Southern Denmark (Australia)
15:40-15:55	Telemedicine: domestic and cross border arrangements, what are the options? Speaker: Dr. Enrique Tayag, Director of Knowledge Management and Information Technology Service, Department of Health (the Philippines)
15:55-16:10	The conceptual road map to the future hospitals in metaverse

	Speaker: Dr. Yi-Lwun Ho, Professor and the Director of the Department of Internal Medicine and Director of the Telehealth Center, NTU (Chinese Taipei)
16:10-16:30	Panel discussion Moderators: Dr. Cheng-Hua Lee and Dr. Jiun-Yu Yu Panelists: Prof. Anthony Smith, Dr. Enrique Tayag, Dr. Yi-Lwun Ho

Day 2 · 22 September 2022 Taipei/UTC+8

Time	Agenda
09:00-09:30	Registration
	Plenary 4: Bring artificial intelligence in action in healthcare
09:30-09:45	Moderator: Dr. Feipei Lai, Professor, Department of Computer Science and Information Engineering, NTU (Chinese Taipei)
09:45-10:00	Role of Technology in Promoting SDG 3 and SDG 5 Speaker: Dr. Padmini Murthy, Professor and Global Health Director at the School of Health Sciences and Practice at New York Medical College (USA)
10:00-10:15	Framework of support for utilization of AI in medical and health sector conducted by Ministry of Health, Labour and Welfare of Japan Speaker: Mr. Takuro Umekita, Unit Chief, Office of the Counsellor for Information and Technology Management under the Director-General for Statistics, Information Policy and Industrial Relations, Ministry of Health, Labour and Welfare (Japan)
10:15-10:30	The current status of AI use in the Korean health care system and the acceptance of AI by the NHI Speaker: Dr. Hyoungh-Sun Jeong, Professor, Department of Health Administration, College of Software and Digital Healthcare Convergence, Yonsei University (Korea)
10:30-10:50	Break
10:50-11:00	Moderator: Dr. Shu-Ling Tsai, Deputy Director General, NHIA, Ministry of Health and Welfare (Chinese Taipei)
11:00-11:15	Leveraging hospital resources to accelerate medical AI development Speaker: Dr. Chang-Fu Kuo, Director of The Center for Artificial Intelligence in Medicine; Chang Gung Hospital (Chinese Taipei)
11:15-11:40	Panel discussion Moderators: Dr. Feipei Lai and Dr. Shu-Ling Tsai

	Panelists: Dr. Padmini Murthy, Mr. Takuro Umekita, Dr. Hyoung-Sun Jeong, Dr. Chang-Fu Kuo
11:40-11:50	Closing remarks Dr. Po-Chang Lee, Director General, Ministry of Health and Welfare (Chinese Taipei)

Post-conference Visit Itinerary

Date: 22 September 2022

Venue: Taipei Medical University Hospital

Time	Agenda
13:30~14:00	Transportation
14:00~14:15	Reception
14:15~14:25	Welcome remarks by Taipei Medical University Hospital Superintendent
14:25~15:05	“Healthcare Blockchain Platform”
14:45~15:05	“Digitalization of vaccination”
15:05~15:15	Break
15:15~15:55	“The design of smart ward and the use of smart pump”
15:55~16:30	Hospital tour