



Contents available at [ScienceDirect](https://www.sciencedirect.com)

Diabetes Research
and Clinical Practice

journal homepage: www.elsevier.com/locate/diabres



International
Diabetes
Federation



Diabetes and COVID-19: IDF perspective in the Western Pacific region



Yerin Hwang^a, Altaisaikhan Khasag^b, Weiping Jia^c, Alicia Jenkins^d,
Chien-Ning Huang^e, Daisuke Yabe^f, Doo-Man Kim^g, Takashi Kadowaki^{h,i},
Moon-Kyu Lee^{j,*}

^a Department of Social and Preventive Medicine, Sungkyunkwan University School of Medicine, Suwon, Republic of Korea

^b Health Sciences University of Mongolia, Ulaanbaatar, Mongolia

^c Shanghai Diabetes Institute, Shanghai Jiao Tong University Affiliated Sixth People's Hospital, China

^d NHMRC Clinical Trials Center, The University of Sydney, Sydney, New South Wales, Australia

^e Institute of Medicine, Chung Shang Medical University Hospital, Taichung, Taiwan

^f Department of Diabetes and Endocrinology, Gifu University Graduate School of Medicine, Gifu, Japan

^g Department of Endocrinology and Metabolism, Hallym University School of Medicine, Seoul, South Korea

^h Department of Diabetes and Metabolic Diseases, Graduate School of Medicine, The University of Tokyo, Tokyo, Japan

ⁱ Toranomon Hospital, Tokyo, Japan

^j Division of Endocrinology & Metabolism, Department of Internal Medicine, Soonchunhyang University Gumi Hospital, Soonchunhyang University College of Medicine, Gumi, Republic of Korea

ARTICLE INFO

Article history:

Received 14 June 2020

Accepted 18 June 2020

Available online 25 June 2020

Keywords:

Diabetes

COVID-19

ABSTRACT

The World Health Organization (WHO) declared a pandemic, the highest risk level in the infectious disease alert phase, on 11 March 2020. In the Western Pacific Region (WPR), 192,016 confirmed cases with 7125 deaths had been reported as of 8 June 2020.

In people with diabetes COVID-19 can be more difficult to treat due to the wide fluctuations in blood glucose levels or presence of comorbidities such as diabetes complications, including cardiovascular disease and renal damage, which are recognized risks for adverse outcomes. National diabetes associations and governments have established guidelines for subjects with diabetes in relation to COVID-19, and are trying to supply emergency and their regularly required medical products for them.

The WPR is so large and composed of such diverse countries and COVID-19 situations, no one conclusion or program applies. Instead we could see a diverse COVID-19 pandemic profile in the WPR, and several creative diagnostic and therapeutic measures undertaken. This includes drive-through screening facilities, high-speed RT-PCR technologies, convalescent patients' plasma therapy, which potentially had some positive contributions in combatting COVID-19 in the WPR as well as globally. Although the numbers of confirmed cases are currently decreasing in the region, the COVID-19 pandemic is not over, and many experts are recommending to prepare measures for potential second or third waves of COVID-19.

© 2020 Elsevier B.V. All rights reserved.

* Corresponding author.

E-mail address: leemk4132@gmail.com (M.-K. Lee).

¹ Regional Chair, IDF Western Pacific Region.

<https://doi.org/10.1016/j.diabres.2020.108278>

0168-8227/© 2020 Elsevier B.V. All rights reserved.

1. Introduction

In January 2020, a novel coronavirus (2019-nCoV, COVID-19) from a cluster of pneumonia cases of unknown etiology was discovered in Wuhan, China [1]. The World Health Organization (WHO) declared a pandemic, the highest risk level in the infectious disease alert phase, on 11 March 2020. Globally, there has been 6,881,352 confirmed COVID-19 cases, including 399,895 confirmed deaths as of 8 June 2020. In the Western Pacific Region (WPR), 192,016 confirmed cases with 7125 deaths had been reported as of 8 June 2020. Detailed data for people with diabetes are not available, but in the WPR an estimated 136.5 million people, and 8% of the population have diabetes.

In people with diabetes COVID-19 can be more difficult to treat due to wide fluctuations in blood glucose levels or presence of comorbidities such as acute and chronic diabetes complications, including CVD and renal disease, which even in the general population with COVID-19 are recognized risk factors for poor outcomes, including death [2–5]. To mitigate COVID-19 infection and poor outcomes many national diabetes associations and governments have established COVID-19 guidelines for subjects with diabetes, and are trying to supply the emergency and routinely required medical products for them.

The following is a summary of the current situation of each country in the Western Pacific Region related to COVID-19.

2. Current number of people infected with COVID-19 and diabetes and the deaths in Western Pacific Region (WPR)

1) Australia - In Australia, as at June 9, 2020, there have been 7,265 positive cases and 102 deaths. The first COVID-19 positive case in Australia was confirmed on January 25th 2020 in a person returning from Wuhan China. This was followed by a lag phase with a doubling of positive cases approximately every 7–10 days. However, by March 21st 2020, when COVID-19 positive cases in Australia exceeded 1000 with 7 deaths, Australia was clearly on the exponential part of the curve [6]. With introduced measures the number of new cases has substantially reduced since mid-April. Since early May 2020 daily testing nationally has ranged between 23,015 and 36,867 tests. Details regarding diabetes status are not yet available.

2) Chinese Mainland - December 27, 2019: Hubei Provincial Hospital of Integrated Chinese and Western Medicine reported cases of pneumonia of unknown cause to the Wuhan Jiangnan Center for Disease Prevention and Control. From January 3, 2020, on a regular basis, China began to update the WHO, relevant countries, and regional organizations, as well as its own regions of Hong Kong, Macao and Taiwan, on the development of the disease. On January 5, China sent a situation update to the WHO. The WHO released its first briefing on cases of pneumonia of unknown cause in Wuhan. On January 11, China started to update the WHO and other parties concerned on a daily basis. As of 24:00 of May 31, 2020, a cumulative total of 83,017 confirmed cases

had been reported on the Chinese mainland, 78,307 infected had been cured and discharged from hospital, and 4,634 people had died. This demonstrates a cure rate of 94.3 percent and a fatality rate of 5.6 percent [7].

China's fight against the epidemic can be divided into five stages. Stage I: Swift Response to the Public Health Emergency (December 27, 2019-January 19, 2020). Stage II: Initial Progress in Containing the Virus (January 20-February 20, 2020). Stage III: Newly Confirmed Domestic Cases on the Chinese Mainland Drop to Single Digits (February 21-March 17, 2020). Stage IV: Wuhan and Hubei – An Initial Victory in a Critical Battle (March 18-April 28, 2020). Stage V: Ongoing Prevention and Control (Since April 29, 2020).

3) Hong Kong - Since 31 December 2019, the Centre for Health Protection (CHP) of the Department of Health has recorded a total of 1045 cases of COVID-19 (up to 4/5/2020). Amongst these cases, there were 4 fatal cases. The total number of COVID-19 viral tests performed is 154,989 and total number of COVID-19 viral tests performed (per million population) is 20,665.

4) Japan - In Japan, there had been 17,174 confirmed cases with COVID-19 and 916 deaths reported as of 9 June 2020. Out of those cases, however, how many were with diabetes are currently not known.

5) Mongolia - Mongolia is not COVID-19 epidemic. All confirmed cases of COVID-19 were imported from foreign countries such as France, Korea, Germany, Turkey and Russia. The first case was a French businessman who works and lives in Mongolia and traveled to France, and 2-days after his return from France had symptoms of fever and cough. He stayed at a Ulaanbaatar city hotel, dined in several restaurants and traveled to Sainshand city by train for several meetings. He was subsequently isolated and treated by Mongolian doctors and nurses at the National Center for Infectious Diseases in Ulaanbaatar city and has now recovered well.

Other cases are all Mongolians who study and live in Korea, Germany, Turkey and Russia: There are 186 COVID-19 confirmed cases, 65 have recovered, 121 are in treatment. There is NO DEATH so far. With currently 1939 in isolation and observation. There is no COVID-19 confirmed cases among diabetic patients.

6) Philippines - As of 4:00 pm on May 10th, 2020, the Department of Health (DOH) reported a total of 10,794 cases of COVID-19 in the Philippines with 719 deaths. As of May 1, 2020, the DOH reported that 57% of deaths had known comorbidities. The top two comorbidities are hypertension at 65% and diabetes at 48%.

7) South Korea - In South Korea, there have been approximately 11,000 confirmed cases of COVID-19-infected people by 18th, May 2020. Among them, 263 people died, a fatality rate of approximately 2.4% fatality. COVID-19 predominantly adversely affects older people and those with comorbidities such as diabetes and hypertension. Our experience with severe cases of COVID-19 patients in Daegu, the southeastern city of South Korea which experienced the first community outbreak in Korea, diabetes (26.4%) was the second most common comorbidity next to hypertension (33.6%). In that area, subjects with diabetes was more likely to progress to severe disease courses by 16.7-fold (unpublished data). Unfortu-

nately, we do not have the nationwide data about the accompanied comorbidities in COVID-19 confirmed cases yet. However, several Korean reports have showed that proportions of patients with diabetes ranged from 29.6% to 46.7% accounted for the total fatal cases of COVID-19, which was much higher than the overall fatality in South Korea (2.4%).

8) Taiwan - The first imported case of COVID-19 was diagnosed on Jan 21, 2020. Until June 7, 2020, there were 443 confirmed cases of COVID-19 infection in Taiwan. Among confirmed cases, 352 were imported, 55 indigenous and 36 cases related to navy ship cluster infection. Total 24 cases had received ventilator support due to respiratory failure, and 7 died from COVID-19. Most of mortality cases had underlying comorbidities, and three of them had diabetes.

3. Health personnel availability and support

1) Australia

- Reconfiguring wards- expanding or establishing new ICUs, with separate facilities for those with and without COVID-19: At no stage has there been a lack of ventilator facilities.
- Setting up separate inpatient COVID-19 screening “hot” wards that were separate from “cold” wards
- Setting up special “fever” clinics, initially attached to a hospital but separate from other services, particularly emergency departments
- Novel screening pathways with initially more than less restrictive criteria for screening: an on-line self-registration and self-screening tool, drive-through screening and rapid throughput screening, to allow hospital workers with mild symptoms to be screened and get back to work in 24 h
- Securing adequate personal protective equipment (PPE), including from pre-existing national medical resources stockpiles and providing training on specialized techniques for urgent/safe gowning up
- Suspension of non-urgent surgery and procedures in both public and private hospitals with graded reintroduction
- Arrangements between State governments and private hospitals for the latter to take COVID and non-COVID patients, if and when required
- Upskilling and education of appropriate staff in best practice in procedures such as intubation to minimize risk to health professionals
- Call-up of, and short-term registration of, recently retired healthcare professionals and senior medical students
- Limitation or suspension of face-face non-urgent medical ambulatory or outpatient services (including outpatient

adult and pediatric endocrinology/diabetes services), with a provision of telehealth services that would prevent emergency department presentations/admissions. Newly diagnosed Type 1 diabetes patients were often still seen.

- Contact tracing those exposed to a person diagnosed with COVID-19, and planning, and subsequently implementing the COVIDSafe contact tracing app
- Fast-tracking of approval and implementation of COVID-19 related research studies, with additional specific funding being made available by our national research funding agencies
- Implementing telephone/telehealth consultations for most endocrinology/diabetes services (including pediatric endocrinology)
- The provision of inpatient diabetes education and medical review by telephone where possible for patients admitted with COVID-19 to reduce exposure to essential diabetes staff [6,8].

2) Chinese Mainland - China’s goal in its medical response to Covid-19 has been to improve the patient admission and cure rates and reduce the infection and fatality rates. A condition-specific and category-based approach was applied to medical treatment of patients.

Pooling premium resources to treat severe cases. By directing resources to Wuhan, China expanded the capacity of designated hospitals to deal with severe cases and increased the number of beds. Two hospitals with 1000-plus beds each – Huoshenshan and Leishenshan – were built as specialist hospitals for treating infectious diseases, and a number of designated and general hospitals were expanded or remodeled. The number of beds for severe cases quickly increased from around 1000 to more than 9100.

Early intervention for patients with mild symptoms. China has been quick to have patients with mild symptoms admitted to designated medical facilities for early medical intervention, and has done its best to prevent mild cases from worsening. The national clinical treatment network has been expanded to include more than 10,000 hospitals dedicated to the treatment of Covid-19 patients. A national network of medical treatment coordination has also been formed to provide technical support through online consultation. In Wuhan, faced with surging infections and considering that 80 percent of cases were mild, the city government mobilized resources to repurpose stadiums and exhibition centers into 16 temporary treatment centers. With some 14,000 beds, these centers were able to admit all confirmed mild cases for treatment. The 16 treatment centers received a total of more than 12,000 patients; 8000 and more were cured and discharged; and more than 3500 were transferred to hospitals. Temporary treatment centers, or Fangcangshelter hospitals, are a major innovative solution that provided enough beds to admit all confirmed cases, thus turning the tide in the battle against Covid-19.

China mobilized all its medical resources to support the efforts in Wuhan and other locations in Hubei. From January

24, Chinese New Year's Eve, to March 8, it rallied 346 national medical teams, consisting of 42,600 medical workers and more than 900 public health professionals to the immediate aid of Hubei and the city of Wuhan. Nineteen provinces and equivalent administrative units assisted 16 other cities in Hubei in the form of paired assistance. The government urgently solicited automatic temperature measuring equipment, negative pressure ambulances, ventilators, electrocardiogram monitors, and other key medical supplies from across the country for Wuhan and other locations in Hubei. It mobilized 40,000 construction workers and several thousand sets of machinery and equipment to build two hospitals. The construction of the 1000-bed Huoshenshan Hospital was completed in just 10 days, and that of the 1600-bed Leishenshan Hospital in just 12 days. In 10 short days, 16 temporary treatment centers providing over 14,000 beds were built. To increase blood supply for clinical use in surgery, 10 provinces donated to Hubei 45,000 units of red blood cells, 1762 therapeutic doses of platelets, and 1370 L of fresh frozen plasma (not including convalescent plasma).

Reviewing diagnostic and therapeutic plans and applying effective ones on a broad scale. Based on scientific knowledge and accumulated evidence, research results and the diagnostic and therapeutic regimens that proved effective were incorporated in the national diagnosis and treatment plans. These include seven versions of the diagnosis and treatment protocol, three editions of the protocol for severe and critical cases, two editions of the manual for mild case management, two editions of convalescent plasma therapy treatment protocol, and one rehabilitation treatment program for patients discharged from hospitals [7].

3) Japan - Since early April 2020 with the sharp increase in the number of COVID-19 cases, the health care systems in Japan has barely evaded collapse by ramping up the number of hospital beds dedicated to those with the disease (more than 12,000 beds nationwide) as well as by reallocating medical resources. That has accompanied postponing significant numbers of elective procedures and outpatient clinic visits.

4) Philippines - As of May 26th, 2020, there are 13,384 total dedicated beds for COVID-19 in facilities, and 1942 mechanical ventilators.

5) South Korea - Since the outbreak of the COVID-19 in early 2020, the medical staff in South Korea have been making tremendous efforts to prevent the spread of the virus. As many as 74 hospitals have been designated as hospitals dedicated to COVID-19 and over 7500 beds in total have been made operative in preparation for a surge in cases. As the number of confirmed cases decrease, there was a stage-by-stage bed reduction to ultimately operate 1500–2300 beds, viewed as the lower limit for emergencies. Aside from public hospitals, private medical centers are serving as main centers of treating patients with COVID-19. In addition, 3729 medical staff were additionally allocated to support the hospitals, screening and treatment facilities. Specifically, the Korean government newly recruited and stationed 750 public health doctors and 96 army doctors, while continuing to recruit nurses. Most of them were dispatched to Daegu and Gyeongsangbuk-do, which is the major epidemic region in Korea.

6) Taiwan - The Central Epidemic Command Center (CECC) was established as early as January 20, 2020 to integrate medical institutions and health personnel in Taiwan to fight COVID-19. There were 134 response and isolation hospitals designated for treatment of confirmed mild cases of COVID-19, while 52 regional hospitals or medical centers have been designated for treatment of severe cases. There were a total 1024 negative-pressure isolation rooms in Taiwan. According to nationwide statistics in 2017, there are 9409 internal medicine, 5590 general medicine and 1876 emergency medicine doctors registered in Taiwan. Since February 23, 2020, the Taiwan government announced the policy of restricting health professionals from going abroad to high-risk countries. Both high standard nosocomial control guidelines and adequate supplies of Personal Protective Equipment (PPE) reduce risk of COVID-19 infection among healthcare professionals.

4. Support from the local and international agencies including government

1) Australia - Australia has a national medical insurance policy that subsidises health care of all Australian citizens. More recently, the Australian Government released a COVIDSafe tracing mobile phone app and has encouraged all Australians to download this app and linked this to relaxation of social distancing and shutdown measures. Interestingly, there were some reports that this app may have interfered with some diabetes apps and interstitial fluid glucose monitoring devices [6].

2) Chinese Mainland - China has put in place an efficient system under which the central authorities exercise overall command, while local authorities and all sectors follow the leadership and instructions of the central authorities, perform their respective duties, and cooperate with each other.

Legal safeguards for epidemic prevention and control were strengthened. China listed Covid-19 as a Class B infectious disease, but addressed it with measures applicable to a Class A infectious disease under the Law of the People's Republic of China on Prevention and Treatment of Infectious Diseases.

A multi-level, category-specific, dynamic and targeted approach was adopted. China also applied a region-specific, multi-level approach to epidemic prevention and control. To better prevent and control the epidemic, each region at or above the county level was classified by risk level on the basis of a comprehensive evaluation of factors such as population and number of infections in a given period of time. There are three levels of risk: low, medium, and high. Regions could take measures according to the risk level, which was dynamic and adjusted in light of the evolving situation.

Implement the strictest social distancing and flexible, people-centered social management, involving governments at all levels and the whole of society, to block its transmission routes. The Chinese government defined a set of requirements: **early detection, reporting, quarantine and treatment with a focus on the four categories of vulnerable people (confirmed cases, suspected cases, febrile patients who might be carriers, and close contacts).** To identify the four categories of vulnerable people, community grid-based screening was carried out across the country. Task forces comprising both full-

time and part-time community workers were set up, while officials at the sub-district/township and community/village levels, health workers of community medical facilities, and family doctors all performed their duties as a team. A number of measures were taken in accordance with the law, such as tracing, registering, and visiting each individual, placing them under community management, and transferring them, if necessary, to designated medical facilities for quarantine or treatment as per due procedures.

Work was done to strengthen the monitoring and online reporting of cases identified at fever clinics of medical facilities. All such cases had to be reported online to higher authorities within 2 h; their test results sent back to the reporting clinics within 12 h; and on-site epidemiological investigation completed within 24 h – so that confirmed cases and asymptomatic carriers would be identified and reported without delay. As of May 31, a total of more than 740,000 close contacts had been traced and handled as appropriate.

Providing free treatment for patients. Government funds for Covid-19 control were made available in advance to ensure that patients could receive timely treatment and local authorities could proceed smoothly with measures for medical treatment and epidemic control.

A strict system of information release has been established. China has released information on Covid-19 in a timely, open and transparent manner as required by law. On December 31, 2019, the Wuhan government began to release coronavirus information in accordance with the law, and gradually increased the frequency of release. Since January 21, 2020, the NHC has provided daily updates on nationwide cases on its official website and social media platform, and provincial health departments have done the same on local cases. Starting from February 3, the NHC has released the information simultaneously on its English-language website.

Key progress has been made in scientific research. Following the principles of safety, effectiveness and availability, China has accelerated the R&D and application of medicines, vaccines, and new test kits. To date, four inactivated vaccines and one adenovirus vaccine have been approved for clinical trials. Research teams have also been assembled to trace the origin of Covid-19.

Big data and artificial intelligence have been used in epidemic control. China has fully utilized big data, artificial intelligence, and other new technologies in research and analysis to forecast the trend of Covid-19 developments [7].

3) Hong Kong – The first confirmed case was diagnosed in January 2020 and there was a surge in case numbers in March when overseas residents started to move back to Hong Kong. The local epidemics have been controlled via various methods and the real time reproductive number and mortality rate has been one of the lowest in the world. This is achieved with effort from different parties including border control, surveillance and contact tracing by the government body Centre for Health Protection (CHP) with timely information sharing; public awareness and strict practices of mass mask wearing and social distancing; committed work by health care professionals such as a dedicated infection control team, hospital infrastructure on handling infectious diseases and trimming of non-emergency clinical services supported with flexible drug refill services to align with manpower resources.

4) Japan - Dissemination of updated information of this pandemic has been constantly made by the Japanese government as well as Japan Association for Diabetes Education and Care (JADEC) and the Japan Diabetes Society (JDS) since early February 2020.

5) Mongolia - The Mongolian Diabetes Association (MDA) is working closely with the WHO country office in Mongolia. We have Diabetes team at each hospitals. We have translated and disseminated the IDF guideline for COVID-19 and diabetes.

6) South Korea - In order to lead the public to actively participate in infection prevention/control and protect their lives and livelihoods, confirmed cases were provided with hospitalization and treatment expenses and suspected cases were provided with diagnostic (PCR) testing and expenses via the National Health Insurance and government expenditure. The Rapid Ab kit was not used for the confirmatory diagnosis, only RT-PCR has been used for the confirmation test in standardized laboratories at the hospitals in different cities and regions. Living expenses to those put under self-isolation and hospitalized treatment and paid leave expenses were provided to their employers, as well as funeral expenses for deaths due to COVID-19. The Korean government is planning to provide compensation for losses of healthcare institutions incurred due to COVID-19 patient care and the business suspension measures, of the central and local governments to ensure their active participation in infection prevention/control activities.

With the tracking system for COVID-19 positive patients in Korea, it is legally permitted to follow their movements for a certain period and to follow contacted persons who are also need to be tested for COVID-19. GPS and text message alerts were used by the local governments. This legal background was facilitated by the prior experience of chaos during the earlier SARS and MERS situations in Korea.

7) Taiwan - National Health Insurance (NHI) was founded in 1995 and has contracted with about 93% of medical institutions in Taiwan. High-accessibility of medical care and low copayment conditions allow patients with COVID-19 to receive health care without major worry about medical expenses. During the COVID-19 epidemic, a NHI database assists the medical profession to track or reach potential infected people by providing travel and occupation history details. Local government has set up centers for COVID-19 consultation and support services, including daily follow-up calls of patients under home quarantine, and assistance to people for medical care arrangements if they have any discomfort. The Taiwan Tourism Bureau has cooperated with several hotels to provide rooms for people who cannot found places to quarantine. A subsidy of NT\$1,000 per room per day is offered. Finally, the Central Epidemic Command Center (CECC) established a Name-based Mask Distribution System based on their National Health Insurance (NHI) card. People could easily buy the allocated masks at local pharmacies, convenience stores or online.

5. Supply of emergency medical supplies, including insulin, for people with diabetes

1) Australia - The Australian response was swift, positive and proactive, to ensure that all people with diabetes had access

to required medications, products and services and that they were aware of their greater risk of adverse outcomes from COVID-19. There was strong collaboration among the national diabetes organizations: Diabetes Australia, Australian Diabetes Society (ADS), Australian Diabetes Educators Association (ADEA), Australasian Diabetes In Pregnancy Society (ADIPS), Australasian Paediatric Endocrine Group (APEG) and the Juvenile Diabetes Research Foundation of Australia (JDRFA), with the Australian Government Department of Health leading the provision of coordinated and consistent information, advice and communication about the COVID-19 pandemic. To prevent stock-piling of diabetes supplies dispensing of medications and supplies was limited to the usual 1-month supply at a time and pharmacists were allowed to remain open during the pandemic, unlike many other businesses. Furthermore, if people or their representatives were unable to get to a pharmacy postal delivery of their medicines was made possible [6].

2) Chinese Mainland – All Covid-19 patients, including those with diabetes, received subsidies from state finance for any medical bills not covered by basic medical insurance, serious disease insurance, or the medical assistance fund. These also cover the diabetic medication, including insulin support for patients. Besides, urban and rural residents, enterprises, and social organizations donated money and materials. Charities and the Red Cross Society of China improved the allocation of donated funds and materials, with a focus on Wuhan and other severely affected areas inside Hubei Province and elsewhere. As of May 31, they had received donations totaling about RMB38.93 billion and 990 million items of different materials. Of these, RMB32.83 billion and 940 million items had been disbursed. Further, the Red Cross Society of China has donated fast glycosylated hemoglobin meter analyzers, glucose strips and Continuous Glucose Monitors, etc. to Wuhan. The Chinese Diabetes Society (CDS) has issued a “Management suggestions for patients with diabetes and novel coronavirus pneumonia” to guide diabetes management during this the special time of COVID-19 [7,9].

3) Hong Kong - Initially some patients with diabetes mellitus, they may have difficulty in sourcing alcohol swab, posing a challenge especially for those requiring insulin injections, in the initial period of COVID-19 outbreak. However, the supply of disinfectant products was stabilized in a reasonable time frame.

4) Japan - Although reduced, visits to clinics, hospitals, and pharmacies by those with diabetes had not been restricted in Japan. Likewise, distribution logistics in general has been constrained but maintained especially for medical supplies. Although some hospitals and clinics reported a shortage of alcohol swabs used for insulin injections and/or finger-pricking for blood glucose testing, no major incidence of shortage has been reported for medical supplies for those with diabetes including insulin. This is partly aided by temporary lifting of restrictions on telemedicine, which had been only limitedly covered by Japan's national care insurance. Now, willing medical providers are able to send prescriptions and medical supplies to their patients by consulting over communication tools such as phone and video conference. Continuity of medical care is relatively maintained by those

means, but not ideally. For example, some diabetes specialists show concerns on patients' limited access to diabetes self-care education and support, which potentially deteriorates their glycemic control.

5) Mongolia - We have some problems of insulin supply because borders are closed.

6) Philippines - Diabetes Philippines conducted a survey on its members with type 1 diabetes last April 16–28, 2020 during the Enhanced Community Quarantine (ECQ) imposed by the national government. Based on our survey, only 10% of type 1 patients surveyed had no problems getting their insulin supply until the end of the ECQ or its extension. Around 40.4% reported a problem with insulin supply in the drug-stores/pharmacies in their region. Another 41.9% reported financial problems and had difficulties buying their insulin even if it was available in their local drugstores. Nine percent reported being unable to buy their insulin because of transportation problems (mass transport was suspended during the ECQ which started March 15, 2020 and was extended until May 15, 2020).

Similar numbers were reported when we asked these patients about other supplies such as glucose test strips and lancets. Only 10% had no difficulties, while another 10% reported unavailability of strips. 40% could not buy strips because of financial constraints and another 40% could not travel to access their supplies.

7) South Korea – Fortunately in the case of medical supplies for people with diabetes, we have not faced any shortages. The Korean government distributed for free glucometers to low-income subjects with diabetes living in a special disaster area (Daegu and Gyeongsangbuk-do). This free distribution was achieved in collaboration with the local government agency. For other subjects with diabetes, they can purchase equipment, including insulin needles, lancets, glucose test-strips and sensors for the CGM without visiting the health care facilities as is usually required.

8) Taiwan - Local health agencies contact people in home isolation to check their health twice a day, and if they develop symptoms they are placed in the hospital in isolation. For patients with diabetes who require insulin use, doctors can prescribe medication through another person in the presence of a Quarantine Notice. If patients under home isolation require medical care, they can dialed a ‘1922 hotline’, which provides 24-hour service on disease reporting and consultation. Patients may be referred to a designated hospital and receive further medical care. The supply of insulin in Taiwan is sufficient to cope with both emergency demand and usual care.

6. Perspectives in managing the pandemic in the country

1) Australia - It is recognized that that people with diabetes are at greater risk of serious outcomes during pandemics such as COVID-19 than people without diabetes. It is anticipated that effective management of blood glucose in people with diabetes and COVID-19 may lead to better outcomes and lower mortality rates. Whether the resources that have been developed and measures that have been implemented

have had a positive effect on the health of people with diabetes is not yet known. Feedback from people with diabetes and health professionals has been positive and supportive of the proactive approach to this unprecedented pandemic. Australian healthcare professionals and researchers are also proactive in proposing and participating in national and international COVID-19 related research [6,8].

2) Chinese Mainland –Facing the sudden onslaught of a previously unknown virus, China has rapidly mobilized the manpower and resources of the whole nation and done everything possible to protect the lives and health of its people. China's fight against the COVID-19 has now moved to Stage V with ongoing prevention and control nationwide. Sporadic cases have been reported on the mainland, resulting in case clusters in some locations. Inbound cases are generally under control. Nationwide virus control is now being conducted on an ongoing basis. China has made vigorous efforts to resume work and reopen schools. Since diabetic individuals might be susceptible to COVID-19 infection, the following principles for COVID-19 patients with comorbid diabetes were put forward by the Chinese Diabetes Society (CDS). For in-patients, blood glucose target should be individualized to minimize the risk for hypoglycemia after a careful evaluation. For out-patients, self-management of blood glucose and following doctors' advice are suggested [7].

3) Hong Kong - Outdoor activities have been restricted for all, which may have a negative impact on exercise. Yet, people have cut down on dining as well, which may mean a healthier diet.

4) Japan - Although the widespread lockdown seen in many other countries has not been implemented in Japan, a nationwide state of emergency was declared by the Japanese government in the middle of April 2020. This resulted in significant reduction of social and commercial activities in many sectors and it appeared that Japan may have passed the current apex of infection rate as of early May. It is, however, difficult to predict whether this pandemic will end soon in Japan and we are still undecided when and how to ease social and economic restrictions.

5) Philippines - The current transmission classification in the Philippines is identified as clusters of cases with evidence of community transmission in highly urbanized areas (National Capital Region (NCR), Cebu and Davao). In spite of continued enhanced community quarantine in most affected regions in the country, several barangays (districts) are reporting a large increase in cases, resulting in local authorities to issue total lockdowns in these areas.

Over 7,000 COVID-19 tests per day are being conducted by 23 accredited laboratories throughout the country using PCR tests. No rapid antibody test kit has as yet been validated by the WHO or DOH, so is not in use.

6) South Korea - We are proud that health care professionals and the Korean government could minimize the COVID-19 spread in Korea so far. The Korean Diabetes Association (KDA) and Korean government are especially cautious when caring for patients who are vulnerable to this viral disease. Subjects with diabetes are one of the top prioritized groups over any other chronic disease. The KDA have announced recommendations for people with in this COVID-19 outbreak. We will continue to do our best to prevent the spread COVID-19 in

Korea and minimize deaths and complications related with COVID-19.

7) Taiwan - There have been no indigenous cases of COVID-19 since April 22, 2020, and the Central Epidemic Command Center (CECC) in Taiwan will continue active surveillance and border control programs to prevent future outbreaks. Meanwhile, the academic facilities in Taiwan continue their work on improving laboratory diagnostic capacities, development of rapid testing, vaccination and antiviral agents. Although the risk of community transmission of COVID-19 in Taiwan is very low, the pandemic has changed Taiwanese ways of living and medical-seeking behaviors. How to track and educate patients with diabetes in Taiwan, as well as providing necessary medical support and diet consultations has become challenging. We will develop individualized online education programs, and promote efficient data sharing between healthcare providers and patients via a National Health Insurance (NHI) Medi-Cloud system.

7. Suggestions

The WPR is so large and composed of such diverse countries and COVID-19 situations, no one conclusion can be developed. We see such diverse COVID-19 pandemic profiles in the WPR, and several creative diagnostic and therapeutic measures have been implemented, such as drive-through screening facilities, high-speed RT-PCR testing technologies, convalescent patients' plasma therapy (which seems to show some benefit in the WPR and globally). Although the numbers of confirmed cases are decreasing in the region, the war against the COVID-19 pandemic is not over, and many experts are recommending to prepare measures for potential second or third waves of the COVID-19 pandemic and for pandemics of other infectious agents in the future. A spirit of cooperation and knowledge sharing between countries and organizations is key to reduce the negative consequences of such infectious agents.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

Acknowledgements

D.Y. and T.K. would like to acknowledge the contribution of Prof. Yutaka Seino, Chair of Japan Association for Diabetes Education and Care and his colleagues for the survey on patients' related issues of COVID-19 infection in Japan and Dr. Mitsuru Ohsugi, Head of Diabetes and Metabolism Information Center, Research Institute, National Institute for Global Health and Medicine for the survey on epidemic logical data of COVID-19 infection in Japan.

I wish to thanks to contributors from member associations to sharing valuable information:

Diabetes Australia
Chinese Diabetes Society

Dalong Zhu, Drum Tower Hospital Affiliated to Nanjing University Medical School, Nanjing, China
Lixin Guo, Beijing Hospital, Beijing, China
Bo Feng, Chinese Diabetes Society, Beijing, China

HongKong Society for Endocrinology, Metabolism and Reproduction

Japan Association for Diabetes Education and Care

Dr. Akinobu Nakamura, Hokkaido University Graduate School of Medicine

Dr. Yuki Matsushashi, Hirosaki University Graduate School of Medicine

Dr. Hironori Waki, Graduate School of Medicine and Faculty of Medicine, The University of Tokyo

Dr. Kazuhiro Tsumura, Kawasaki Municipal Hospital

Dr. Taiga Shibata, Ogaki Municipal Hospital

Dr. Nagaaki Tanaka, Kansai Electric Power Hospital

Dr. Junpei Hamada, Ehime University School of Medicine

Dr. Takashi Nomiya, Interantional University of Health and Welfare, Ichikawa Hospital

Secretariat of Japan Association for Diabetes Education and Care

Japan Diabetes Society

Prof. Nobuya Inagaki, Graduate School of Medicine, Kyoto University

Dr. Kohjiro Ueki, Diabetes Research Center, Research Institute, National Center for Global Health and Medicine

Prof. Toshimasa Yamauchi, Graduate School of Medicine and Faculty of Medicine, The University of Tokyo

Prof. Ryo Suzuki, Tokyo Medical University

Secretariat of the Japan Diabetes Society

Mongolian Diabetes Association

Diabetes Philippines

Dr. Grace K. de los Santos, President

Dr. Marsha C. Tolentino, Secretary

Korean Diabetes Association

Prof. Sung Hee Choi, Seoul National University College of Medicine & Seoul National University Bundang Hospital, Korea

Prof. Changhee Jung, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Prof. Sunghwan SUH, Dong-A University College of Medicine, Busan, Republic of Korea

Taiwanese Association of Diabetes Educators
Chines Taipei Diabetes Association

Dr. Kuan-yu Lin

Dr. Tien-Jyun Chang

Funding

The authors received no funding from an external source.

REFERENCES

- [1] World Health Organization, WHO Western Pacific Regional Action Plan for Response to Large-Scale Community Outbreaks of COVID-19, <https://www.who.int/westernpacific/emergencies/covid-19>.
- [2] Muniyappa R, Gubbi S. COVID-19 pandemic, coronaviruses, and diabetes mellitus. *Am J Physiol Endocrinol Metab* 2020;318(5):E736–41. <https://doi.org/10.1152/ajpendo.00124.2020>.
- [3] Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, Xiang J, Wang Y, Song B, Gu X, Guan L, Wei Y, Li H, Wu X, Xu J, Tu S, Zhang Yi, Chen H, Cao B. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The Lancet* 2020;395(10229):1054–62. [https://doi.org/10.1016/S0140-6736\(20\)30566-3](https://doi.org/10.1016/S0140-6736(20)30566-3).
- [4] Zhang JJ, Dong X, Cao YY, et al. Clinical characteristics of 140 patients infected with SARS-CoV-2 in Wuhan, China. *Allergy* 2020. <https://doi.org/10.1111/all.14238> [published online ahead of print, 2020 Feb 19].
- [5] Yang J, Zheng Y, Gou X, et al. Prevalence of comorbidities and its effects in patients infected with SARS-CoV-2: a systematic review and meta-analysis. *Int J Infect Dis* 2020;94:91–5. <https://doi.org/10.1016/j.ijid.2020.03.017>.
- [6] Andrikopoulos S, Johnson G. The Australian response to the COVID-19 pandemic and diabetes - lessons learned. *Diabetes Res Clin Pract* 2020. <https://doi.org/10.1016/j.diabres.2020.108246> [published online ahead of print, 2020 Jun 2] 108246.
- [7] “Fighting Covid-19 China in Action” released by The State Council Information Office of the People’s Republic of China June 2020. Accessed on: <https://baijiahao.baidu.com/s?id=1668913001492011118&wfr=spider&for=pc>, Jun. 9th; 2020.
- [8] Venkatesh N, Paldus B, Lee MH, MacIsaac RJ, Jenkins AJ, O’Neal DN. COVID-19, Type 1 diabetes clinical practice, research, and remote medical care: a view from the land down-under. *J Diabetes Sci Technol* 2020. <https://doi.org/10.1177/1932296820929708> 1932296820929708.
- [9] **Chinese Diabetes Society. Management suggestions for patients with diabetes and novel coronavirus pneumonia.** *Chin J Diabetes Mellitus* 2020;12(02):73–5.