Meeting Report

ELEVENTH BIREGIONAL MEETING OF NATIONAL INFLUENZA CENTRES AND INFLUENZA SURVEILLANCE IN THE WESTERN PACIFIC AND SOUTH-EAST ASIA REGIONS

25–27 April 2017
Kuala Lumpur, Malaysia

World Health Organization
Western Pacific Region

WORLD HEALTH ORGANIZATION

REGIONAL OFFICES FOR THE WESTERN PACIFIC AND SOUTH-EAST ASIA

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NOTE

The views expressed in this report are those of the participants of the Eleventh Biregional Meeting of National Influenza Centres and Influenza Surveillance in the Western Pacific and South-East Asia Regions and do not necessarily reflect the policies of the conveners.

This report has been prepared by the World Health Organization Regional Office for the Western Pacific for Member States in the Region and for those who participated in the Eleventh Biregional Meeting of National Influenza Centres and Influenza Surveillance in the Western Pacific and South-East Asia Regions in Kuala Lumpur, Malaysia from 25 to 27 April 2017.

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SUMMARY

The Eleventh Biregional Meeting of National Influenza Centres and Influenza Surveillance in the Western Pacific and South-East Asia Regions took place in Kuala Lumpur, Malaysia from 25 to 27 April 2017.

The overall objective of the meeting was to further strengthen influenza surveillance, and improve data use and virus sharing for pandemic preparedness through promotion of multisectoral response efforts and improved influenza vaccine use in the Asia-Pacific region.

The primary objectives were:

(1) to provide global and regional updates on seasonal and zoonotic influenza viruses, review progress of regional influenza surveillance, and identify future priorities within the Asia Pacific Strategy for Emerging Diseases (APSED) framework;
(2) to review best practices in laboratory detection and isolation of influenza viruses and encourage timely sharing of isolates and specimens;
(3) to identify methods to strengthen multisource surveillance, including improvements in zoonotic joint risk assessment capacities; and
(4) to discuss and outline action plans to utilize surveillance data, disease burden estimates and other relevant information to guide development of national vaccination strategies.

A total of 135 people were in attendance, including 66 participants from 24 Members States (14 from the Western Pacific Region and 10 from the South-East Asia Region), 7 temporary advisers, 31 observers, and 27 members of the World Health Organization (WHO) Secretariat representing headquarters, two regional offices and 14 country offices.

The meeting consisted of eight plenary sessions, one breakout session, a tutorial on the Global Initiative on Sharing All Influenza Data (GISAID), and a field visit to the Institute for Medical Research, Malaysia. The meeting was followed by a forum on the Pandemic Influenza Preparedness (PIP) Framework for PIP priority countries in the Western Pacific Region. The specific topics for the plenary sessions were as follows: (1) positioning influenza in a changing global context; (2) ensuring laboratory quality for influenza detection and characterization; (3) multisource information to inform influenza risk assessments; (4) data for action; (5) hospital-based surveillance to inform vaccine and control policies; (6) influenza vaccines and improving national policies and implementation; (7) influenza priorities for 2017 and beyond; and (8) public health research and development for influenza vaccines.

Meeting recommendations encouraged Member States to: (1) ensure the inclusion of influenza work in national action plans for health security, as guided by the *Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies* (APSED III), including strengthening surveillance, risk assessment and pandemic preparedness; (2) continue to strengthen event-based influenza surveillance systems that utilize multiple information sources, including animal health, to provide data when using severity and risk assessment tools to inform public health; (3) enhance timely sharing of (a) seasonal influenza viruses and genetic sequence data with WHO collaborating centres or sequence databases, and (b) national virological and epidemiological surveillance data with FluNet and FluID; (4) ensure influenza viruses with human pandemic potential as well as viruses not classified as “human seasonal influenza viruses” and related sequences are shared in a timely manner with WHO collaboration centres and reference centres for confirmation and further characterization; (5) sustain and use indicator-based surveillance,

including data from hospital surveillance sites, to provide critical evidence for burden of disease and severity assessments to support policy decisions; (6) continue to participate in external quality assessment (EQA) programmes for influenza diagnostics and use their findings to optimize laboratory performance; (7) encourage collaborations between influenza surveillance networks, policy-makers and immunization programmes to ensure evidence-based vaccination strategies are developed and implemented; and (8) review and update, if necessary, national pandemic preparedness plans to align with the Pandemic Influenza Risk Management (PIRM) framework and other WHO tools.

Additional meeting recommendations requested WHO to: (1) support Member States to strengthen mechanisms for multisource information and risk assessment, especially at the human–animal interface, for timely public health action and pandemic influenza preparedness; (2) provide technical support to strengthen laboratory quality, including organizing EQA programmes; (3) provide guidance to Member States on the principles supporting the introduction of new laboratory technologies; (4) encourage and facilitate the sharing of viruses and sequences globally and the regular reporting of influenza surveillance data to improve severity and rapid risk assessments, and to improve the detection of unusual events and viral characterization; (5) support Member States to share and utilize data, including data from hospitalized acute respiratory infections, to facilitate introduction of influenza vaccines and encourage their use within at-risk populations in the Asia-Pacific region; (6) encourage Member States to participate in research on improving seasonal and pandemic influenza vaccines according to the updated WHO research agenda; and (7) develop and provide guidance for appropriate use of influenza tools, including Pandemic Influenza Severity Assessment (PISA) and Tool for Influenza Pandemic Risk Assessment (TIPRA).

1. INTRODUCTION

1.1 Meeting organization

The Eleventh Biregional Meeting of National Influenza Centres and Influenza Surveillance in the Western Pacific and South-East Asia Regions took place at Vistana Hotel in Kuala Lumpur, Malaysia from 25 to 27 April 2017. The meeting was coordinated by the World Health Organization (WHO) Regional Office for the Western Pacific in collaboration with the WHO Regional Office for South-East Asia and the WHO country office in Malaysia. The aim of the meeting was to bring together Member States, national influenza centres (NICs) and WHO collaborating centres, as part of the Global Influenza Surveillance and Response System (GISRS), to discuss issues, challenges and solutions to influenza vaccine policies and uptake as well as epidemiological and laboratory surveillance of seasonal, avian and emerging influenza viruses. The list of participants and the meeting programme are given in Annexes 1 and 2, respectively.

1.2 Meeting objectives and expected outcomes

The objectives of the meeting were:

(1) to provide global and regional updates on seasonal and zoonotic influenza viruses, review progress of regional influenza surveillance, and identify future priorities within the Asia Pacific Strategy for Emerging Diseases (APSED) framework;
(2) to review best practices in laboratory detection and isolation of influenza viruses and encourage timely sharing of isolates and specimens;
(3) to identify methods to strengthen multisource surveillance, including improvements in zoonotic joint risk assessment capacities; and
(4) to discuss and outline action plans to utilize surveillance data, disease burden estimates and other relevant information to guide development of national vaccination strategies.

The main outcome of the eleventh biregional meeting was the generation of recommendations for Member States and WHO. These are to be implemented over a period of 12 months or longer, if necessary, with a view to further strengthening influenza surveillance, preparedness and response in the Asia-Pacific region.

2. PROCEEDINGS

2.1 Opening session

The meeting was opened by the WHO Representative to Malaysia, Brunei Darussalam and Singapore, Dr Graham Harrison, who spoke on behalf of the WHO Regional Director for the Western Pacific, Dr Shin Young-soo. Dr Chong Chee Kheong, Director of Disease Control, spoke for the Ministry of Health, Malaysia. Dr Fadzilah Kamaludin, Director of the Institute for Medical Research, Malaysia spoke on behalf of the Institute. Dr Erica Dueger, Medical Officer, Emerging Disease Surveillance and Response unit of the WHO Regional Office for the Western Pacific, presented the objectives and expected outcomes of the meeting.

Dr Fadzilah Kamaludin of Malaysia and Dr Meerjady Sabrina Flora of Bangladesh were elected co-chairs of the meeting, while Dr Ian Barr and Dr Kanta Subbarao, both of Australia, were elected co-rapporteurs.

2.2 Plenary session 1: positioning influenza in a changing global context

Chair: Dr Fadzilah Kamaludin, Institute for Medical Research, Malaysia

2.2.1 Fighting influenza in a changing world

Dr Li Ailan, WHO Regional Office for the Western Pacific

Dr Li emphasized that influenza continues to pose a threat and remains a priority infectious hazard within the Asia-Pacific region. It is generally agreed across sectors, including the public health community, that the world is ill-prepared for the next pandemic. It is also agreed that the risk of pandemic influenza risk persists and the impacts of such a pandemic would be devastating. The global context, including the social, economic and political environment as well as availability of novel technologies, is rapidly changing, which brings new challenges but also new opportunities to address public health threats. The past few years have seen the quality and quantity of data increase dramatically, making it necessary to adapt so that these data can be used to better inform public health action. There is substantial momentum for health security as well as interest and investment from stakeholders from a variety of sectors.

In order to capture this momentum, Member States are encouraged to utilize the recently endorsed *Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies* (APSED III). APSED III provides a framework for action for Member States to advance their core capacities under the International Health Regulations (2005), or IHR (2005), to manage all emerging infectious disease threats and public health emergencies. This includes protection of health security and the detection, assessment and response to influenza threats. The GISRS family continues to have a vital part to play in fighting influenza in this changing world.

2.2.2 Global developments and NICs: connecting the dots

Dr Philip Gould on behalf of Dr Roderico Ofrin, WHO Regional Office for South-East Asia

Dr Gould highlighted how global frameworks such as the Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction, the Global Health Security Agenda, IHR (2005) and the Pandemic Influenza Preparedness (PIP) Framework as well as regional frameworks and strategies such as APSED III and Flagship Priority Area 6 (Response to emergencies) as designated by the WHO Regional Office for South-East Asia are all congruent and interconnected. Each framework emphasizes the importance of country preparedness and capacity development as well as the benefits of strong health systems within overall government structures. These frameworks overlie influenza programmes, which can be used as a backbone for many other diseases and contribute to the larger space of global health security. NICs can support these efforts in many ways, including by providing support to strengthen complementary surveillance systems, contributing lessons learnt to enhance preparedness and future response, and strengthening surveillance through coordinated information sharing.

2.2.3 Influenza activity in the northern hemisphere

Dr Takato Odagiri, National Institute of Infectious Diseases, Japan

Dr Odagiri presented an overview of the characterization of recent influenza viruses isolated in the 2016/2017 season in the northern hemisphere. During this season, influenza A(H3N2) accounted for the vast majority of influenza viruses isolated in most countries in the northern hemisphere. Influenza A(H1N1)pdm09 and influenza B activities were seen at lower levels. Antigenic and genetic characterizations of viruses analysed by WHO collaborating centres indicated that viruses circulating this season were similar to those detected in the 2015/2016 season. Recent A(H1N1)pdm09 viruses belonging to 6B.1, however, may be suggestive of antigenic drift from A/California/7/2009-like to A/Michigan/45/2015-like viruses. The majority of A(H3N2) viruses detected globally were antigenically closely related to vaccine virus A/Hong Kong/4801/2014, and the viruses belonging to subclades 3C.2a and 3C.2a1 were predominant. Since viruses of subclades 3C.2a and 3C.2a1 show low or insufficient haemagglutination assay (HA) titers for haemagglutination inhibition (HI) assay, neutralization assays are required for antigenic analyses of these viruses. Moreover, A(H3N2) viruses are well known to cause antigenic change by egg propagation, which means A(H3N2) candidate vaccine viruses (CVVs) result in antigenic mismatch of circulating viruses. However, a unique egg-propagated virus A/Saitama/103/2014 (CEXP002) does not cause antigenic change by egg propagation and recently became available as a CVV.

2.2.4 Influenza activity in the southern hemisphere in 2017

Dr Ian Barr, Victorian Infectious Diseases Reference Laboratory, Australia

Dr Barr presented an overview of influenza activity in 2017 in the southern hemisphere. He highlighted that as of April, the 2017 influenza season had not yet started and is at preseason levels based on FluNet data. In the first 15 weeks of 2017, influenza A(H3) circulation was highest in the southern hemisphere, followed by influenza B and A(H1N1)pdm09 viruses. This trend was also seen in Australia and Chile. Meanwhile, Viet Nam and India, both countries that use the southern hemisphere seasonal influenza vaccine strain, showed higher activity of influenza A(H1N1)pdm09. A recent WHO analysis indicated that the southern hemisphere seasonal influenza vaccine is recommended for many northern hemisphere countries. Progress is being made by Member States in submission of epidemiological surveillance data to the FluID (Flu Informed Decisions) platform.

Other measures of seasonal influenza activity that are being used in Australia include monitoring of respiratory outbreaks in institutions, primarily aged care facilities. As of March 2017, there have been eight outbreaks, of which seven were attributed to influenza. This is an increase in activity from 2016 and may be an early indication of the 2017 seasonal activity. Vaccine effectiveness was measured to be 46% (95% confidence interval: 29–58%) in the Australian adult population based mostly on quadrivalent influenza vaccine. There was one change to the southern hemisphere vaccine recommendation for 2017, from an A/California/7/2009 (H1N1)pdm09-like virus to an A/Michigan/45/2015-like virus. Thus far, there have been few viruses analysed against the vaccine viruses, but the majority detected have been A(H3N2) in subclade 3C.2a or 3C.2a1, both of which are antigenically most similar to the A/Hong Kong vaccine virus. A recent viral mutation in influenza B/Victoria, a double amino acid deletion at positions 162-163, has been detected in the Dominican Republic and 11% of isolates in the United States of America. There has been no isolation of this mutant variant outside these areas, but it is of concern because it is antigenically distinct from B/Brisbane/60/2008-like viruses, which are currently recommended for the seasonal vaccine.

2.2.5 Global update

Dr Katelijn Vandemaele, WHO headquarters

Dr Vandemaele provided an update on the NIC review process, which will be based on criteria from the recently updated NIC terms of reference. This review will provide an opportunity to evaluate roles and responsibilities and ensure that NICs are maintaining high-quality performance and complying with the terms of reference. Following the review, NICs will have the opportunity to improve compliance with the terms of reference in order to remain part of the GISRS network. This year marks the 65th anniversary of GISRS and the 70th anniversary of the Global Influenza Programme.

An update on global tools and guidance was also provided. The Review Committee on the Functioning of IHR (2005) in relation to the 2009 influenza A(H1N1) pandemic found that the guidance provided by WHO was too rigid. As such, there was a recommendation to ensure guidance was more flexible and multisectoral and followed an all-hazards approach. This led to the development of the Pandemic Influenza Risk Management (PIRM) framework, which promotes an all-hazards approach to emergency risk management and emphasizes risk-based approaches with high-level guidance on risk assessment. The uncoupling of global phases from national actions introduces increased flexibility for planning and response.

The recent GISRS antiviral and polymerase chain reaction (PCR) working group meetings were held in April 2017 and both resulted in recommendations to update protocols and guidance documents. The WHO Global Influenza Programme is working to derive regionally and globally representative estimates of the disease burden of influenza. At this point, 82 countries have used the WHO method to measure the burden of disease. Additional work is ongoing to determine global morbidity and mortality estimates for seasonal influenza as well as the burden of influenza-associated respiratory hospitalizations. A recent systematic review considered 243 articles that discuss risk factors associated with serious outcomes following influenza infection. The systematic review supports previous evidence that pregnant women in high-income countries had no increased risk for severe outcomes, while pregnant women in low- and middle-income countries did have a higher risk of severe outcomes.

2.3 Plenary session 2: ensuring laboratory quality for influenza detection and characterization

Chair: Dr Takato Odagiri, National Institute of Infectious Diseases, Japan

2.3.1 Laboratories under APSED III

Dr Frank Konings, WHO Regional Office for the Western Pacific

Dr Konings highlighted the importance of keeping laboratory achievements in mind but also looking forward to see the overall direction of NICs in the Asia-Pacific region. Under APSED III, the primary goal of the public health laboratory system is to identify infectious and non-infectious hazards accurately and rapidly. Laboratory systems must be built on fundamental laboratory functions and then enhanced by incorporating new technologies and functionality assessments while improving connections to surveillance data and risk assessments. The importance of new technologies both within the laboratory setting and in point-of-care and field settings was highlighted. The region is extremely diverse and, as such, new technologies must be reviewed periodically to make decisions based on country context. Ultimately, however, laboratories must be focused around quality, including external quality assessment programmes, to ensure accurate results to inform risk assessment and public health actions.

2.3.2 Global external quality assessment programme: molecular detection of influenza

Dr Janice Lo, Department of Health, Hong Kong SAR (China)

Dr Lo presented an overview of the global external quality assessment (EQA) programme for molecular detection of influenza. The programme started in 2007 and is currently on the 15th panel. In 2016, 151 laboratories in 124 countries reported results. This includes five laboratories in five Member States in the WHO South-East Asia Region and 24 laboratories in 16 Member States in the Western Pacific Region, of which 60.0% and 87.5% reported all correct results, respectively. Of the 151 laboratories, 148 use reverse transcription PCR (RT-PCR) for molecular detection while the remaining use conventional PCR. Of the four H5 virus samples, the sample with the lowest concentration resulted in 6 of the 14 incorrect results.

At recent working group meetings, it was suggested to focus on influenza viruses other than influenza A(H5) and ensure that all laboratories can detect non-seasonal influenza viruses. This panel also saw more laboratories participating in the optional genotypic or phenotypic antiviral susceptibility testing as compared to previous years. The third Good Laboratory Practices survey was distributed to participating laboratories and the responses showed significant changes compared to the second survey, which was conducted in 2012. Important improvements included more laboratories providing professional development training opportunities, adoption of standard operating procedures, use of electronic database systems and implementation of counter-checking. Moving forward, the global EQA programme will continue to be reviewed regularly to ensure continuous development and global capacity to detect novel influenza viruses for pandemic response.

2.3.3 Initial EQA of isolation and characterization of influenza viruses in cell culture in the Asia-Pacific region, 2016

Dr Patrick Reading, Victorian Infectious Diseases Reference Laboratory, Australia

Dr Reading presented the rationale and results behind the first EQA of isolation and characterization of influenza viruses in the Asia-Pacific region conducted in 2016. In total, 21 NICs (14 in the Western Pacific and 7 in South-East Asia) participated. Laboratories were requested to perform virus isolation on 16 samples of cell-cultured isolates of influenza A, influenza B and negative samples. Laboratories were requested to perform virus isolation on the shipped EQA samples using usual protocols from each laboratory and record cytopathic effect and/or HA titres at prescribed time points. A variety of isolation protocols were used, although 57% or participating laboratories used either the WHO laboratory manual or WHO collaborating centre protocols. The ability to confirm virus identity differed among laboratories, but overall this preliminary EQA of isolation and characterization revealed good proficiency from participating NICs. Most of the 21 NICs were able to obtain isolates from samples containing high amounts of virus (threshold cycle of 20–25) and did not obtain isolates from negative samples. The diversity of laboratory techniques and protocols was highlighted, from cell culture approaches to methods for confirming virus isolation and identification. Importantly, the EQA revealed the need to strengthen laboratory capacity to isolate viruses from samples with low amounts of virus.

2.3.4 Panel discussion: EQA experiences from the perspective of the provider and participant

Moderator: Dr Nancy Wen Sim Tee, KK Women's and Children's Hospital, Singapore

Panel Members: Dr Malinee Chittaganpitch, Ministry of Public Health, Thailand
Dr Janice Lo, Department of Health, Hong Kong SAR (China)
Dr Patrick Reading, Victorian Infectious Diseases Reference Laboratory, Australia
Dr Socorro Lupisan, Department of Health, Philippines

The panel began with a question about experiences with EQA for molecular diagnostics. Dr Lupisan discussed how the Philippines has participated in the assessment since 2007 and at first found the H7 and H9 panels quite difficult because guidelines were not available at the time. Dr Lo clarified that if a laboratory does not normally perform H7 and H9 testing, there is no reduction in score if they successfully identify the sample as neither H1 nor H3. Dr Chittaganpitch discussed how Thailand has also been participating since 2007 and found that the quality of the diagnostics improved after updating their protocols. All panellists agreed that the findings from the EQA led to changes to improve the quality of laboratory diagnostics.

In response to a request for advice on EQA of virus isolation in subsequent years, Dr Lo highlighted the importance of remaining flexible to deal with unexpected challenges, whether in the form of import permits and strict import regulations, broken equipment, or lack of reagents. In addition, it is important to remain concise while providing sufficient information such that participants are clear on expectations. Dr Reading agreed that flexibility was important and that logistics proved to be very challenging as each participating laboratory had different requirements. Despite these challenges, all 20 shipments arrived at their destination with samples still frozen. Dr Lupisan was pleased with how the Philippine laboratory performed but it had run into problems with import permits of live viruses. Dr Chittaganpitch believed that the EQA was timely as there are some challenges with virus isolation and a monitoring tool was therefore greatly desired.

All panellists saw value in both the EQA programmes for virus isolation and molecular diagnostics in assuring continued strengthening of laboratory capacity with improved credibility of results. The two EQA programmes also offer guidance for implementation of national EQA programmes, a step both the Philippines and Thailand have adopted. Drs Lo and Reading both acknowledged that the capacity, context and priorities of different laboratories differ and as such each laboratory should set their own priorities and goals. Regardless, the EQA programmes for virus isolation and molecular diagnostics offer a good method to check capacity and progress against an international standard.

2.4 Plenary session 3: multisource information to inform novel influenza risk assessments

Chair: Dr Hnin Yadanar Naing, National Health Laboratory, Myanmar

2.4.1 HxNy: event-based surveillance

Dr Erica Dueger, WHO Regional Office for the Western Pacific

Dr Dueger discussed how detection of novel HxNy influenza viruses has increased dramatically over the past decades. This is of course in part due to better detection and reporting mechanisms but also likely due to a true increase in circulation of these viruses. This is particularly true in the Asia-Pacific region, where several novel influenza viruses have first been detected and where we continue to see human cases of H7N9 and H5 viruses. An important aspect of detection of human cases of HxNy has been event-based surveillance, which contributes invaluable information for risk assessment and decision-making. APSED

III provides guidance on how the relative importance of surveillance components, for example laboratory or media surveillance, may change during different phases of an event. Surveillance, along with the other APSED III focus areas, ultimately combine to move forward the ultimate goal of pandemic preparedness.

2.4.2 Influenza A(H1N1)pdm09 in Fiji

Dr Viema Biaukula, WHO Representative Office in the South Pacific

The Fijian context presents unique challenges for health security, in part because of the distribution of the approximately 800 000 inhabitants over 300 islands, the susceptibility to natural disasters and threats of climate change, and the increasing health crisis presented by noncommunicable disease. The health system is predominately financed by the government under the Ministry of Health and Medical Services, which manages a decentralized health system and includes one severe acute respiratory infection (SARI) surveillance site. In April 2016, an alert was raised by an intensive care unit (ICU) consultant regarding five pregnant women presenting with SARI within a five-week period. Four of these patients passed away and three of the four cases tested positive for influenza A(H1N1)pdm09. At the same time, four paediatric deaths due to SARI occurred and there was an increase in influenza-like-illness (ILI) cases. The Fiji NIC and the Victorian Infectious Diseases Reference Laboratory conducted genetic analyses and found no modifications or mutations that suggested enhanced transmission or virulence. A risk assessment conducted by the Ministry of Health and Medical Services and WHO determined that there was moderate risk for additional deaths or adverse pregnancy outcomes. The seasonal influenza vaccine uptake in Fiji is low to very low, so a targeted vaccination campaign was undertaken to vaccinate 20 000 pregnant women and health-care workers following this event. However, there are no plans for the government to formally introduce the influenza vaccine. WHO provided personal protective equipment for health-care workers and 1500 courses of Tamiflu for pregnant and other high-risk individuals with suspected cases of influenza and SARI. Surveillance efforts were intensified with support from the Global Outbreak Alert and Response Network (GOARN) who were in Fiji responding to Cyclone Winston, and risk communication and training on the importance of infection prevention and control were undertaken.

2.4.3 Bangladesh situation: H5N1

Dr Meerjady Sabrina Flora, Institute of Epidemiology, Disease Control and Research, Bangladesh

The influenza surveillance system in Bangladesh takes a One Health approach and is comprised of six platforms, including hospital-based surveillance, community-based surveillance, contact tracing for groups at high risk of avian influenza, wet market surveillance, and event-based surveillance which includes a hotline and media monitoring. This surveillance system has proven effective at identifying avian influenza outbreaks. The first avian influenza H5N1 outbreak was detected from a poultry farm in 2007 and almost 3 million chickens have been culled since then. In early 2017, there were several unusual events detected through event-based surveillance, including crow die-off where approximately 95% of the dead crows tested positive for avian influenza A(H5), as well as the death of two fruit bats that tested positive for avian influenza A(H5N1). A total of eight human cases of avian influenza A(H5N1) have been detected in Bangladesh, but there have been no additional cases since 2015. Several challenges are present for influenza surveillance in Bangladesh, including funding sources particularly for community and live bird market surveillance, limitations for serosurveillance, and detection of influenza A viral RNA in human respiratory specimens in the absence of infection in heavily contaminated environments. It is known that avian influenza is circulating throughout the country, but additional research is needed to understand transmission dynamics. Live bird market surveillance and

community-based surveillance systems are both important for identification of avian influenza in poultry and human populations.

2.4.4 Avian influenza in India

Dr Varsha Potdar, National Institute of Virology, India

The epidemiological surveillance for influenza in India is led by the National Centre for Disease Control and the laboratory surveillance network is headed by the National Institute of Virology in Pune, India, which is a WHO reference laboratory for diagnosis of influenza A(H5) as well as a NIC. The first poultry outbreak of influenza A(H5N1) was detected in February 2006 and since then there have been several other outbreaks throughout the country, many of which are phylogenetically related to the Europe, Middle East and Africa (EMA) subtypes. Migratory bird flyways and international trade are suspected to have been the cause of many of these outbreaks of avian influenza in poultry. In 2016, the first outbreak of influenza H5N8 in India was reported in migratory and wild birds. There were no reports from poultry and domestic farms, and laboratory testing determined that there were no antibodies detected in samples collected from poultry workers. Following outbreaks of influenza H5N1 and H5N8 in poultry, control measures including screening, quarantine, and stamping out have been engaged. However, vaccination in poultry and treatment are prohibited. The National Institute of Virology has also been investigating the crossover of avian influenza viruses through seroprevalence surveys in poultry workers, tracking of migratory birds to determine their potential role in avian influenza outbreaks, and the role of other species in transmission of avian influenza viruses.

2.4.5 Experience in handling A(H5N1) outbreak among poultry in Kelantan, Malaysia

Dr Norizah binti Ismail, Ministry of Health, Malaysia

The first outbreak of avian influenza A(H5N1) in Malaysia for 10 years was detected in 2017 in the north-eastern state of Kelantan. Viruses isolated from the poultry outbreak were from clade 2.3.2.1 and closely related to the Viet Nam strain. Prior to this outbreak, there were poultry cases detected in four states of peninsular Malaysia between 2004 and 2007. There have been no human cases of H5N1 reported in Malaysia. During the 2017 outbreak (through end of March), six districts reported cases, all of which were within 30 kilometres of the index case. Following laboratory confirmation of H5N1, the guidelines provided by the Ministry of Health for management of avian influenza were activated. These guidelines include active case detection with daily monitoring of high-risk cases and those with ILI symptoms, health education initiatives, and intensive monitoring of outbreak response teams. During the outbreak, the National Public Health Laboratory in Selangor received 21 samples from 20 human cases of suspected avian influenza. Of these samples, three tested positive for A(H1N1)pdm09 and five for influenza B, but there were no cases of H5. Dr Norizah highlighted the importance of multisectoral collaboration to address public health security risks, including the risks posed by avian influenza.

2.4.6 Human infection with avian influenza H7N9 virus in China

Dr Wang Dayan, Chinese Center for Disease Control and Prevention, China

The Chinese National Influenza Surveillance Network has increased steadily in size since 2000 and in particular in response to the 2009 A(H1N1) pandemic. There are now 556 sentinel hospitals and 411 network laboratories, of which 99% routinely perform RT-PCR. Since the first human case was identified in 2013, there have been five distinct waves of A(H7N9) in China. As of the end of March 2017, cases have been reported in 22 provinces, mostly from eastern and southern China (82%). Cases remain highly sporadic regarding geographic distribution with 84% of townships reporting one case

(936/1120). Of the 35 clusters, all involved two or three persons and most had poultry exposure. Dr Wang highlighted the impact of live poultry markets on human infections with H7N9. Across the five waves, 69% of cases had exposure to live poultry markets and another 21% had exposure to backyard poultry. Given this strong association, the Government of China has proposed several different closure methods, including the 1110 policy (clean every day, disinfect every week, close for one day a month and a ban on overnight poultry storage) and temporary or permanent closure. It is clear from the data that closure of live poultry markets is associated with a decrease in H7N9 positivity. However, the demand for live poultry remains high and changing this demand requires a sociocultural shift, which will take a substantial amount of time. Additionally, control measures may be poorly implemented and closure of markets can lead to informal trading and sales. Ultimately, live poultry markets should be receiving safe poultry to decrease the risk of influenza spread. There are ongoing changes to avian influenza viruses, including H7N9, with high pathogenic viruses recently isolated. There have also been viruses that are not similar to the CVVs, which has resulted in the recommendation of additional CVVs. In order to address the risk presented by avian influenzas, there is a need for sustained surveillance, strict control measures across sectors and improved clinical treatment.

2.5 Plenary session 4: data for action

Chair: Ms Ann Moen, United States Centers for Disease Control and Prevention, USA

2.5.1 Information for action

Dr Philip Gould, WHO Regional Office for South-East Asia

There is a plethora of information that can be used to inform public health action including indicator- and event-based surveillance, studies, risk assessments and specialized risk assessment instruments. By making use of multiple sources of information, a more comprehensive understanding of the situation is possible in order to better use the data for action. Dr Gould presented the recent outbreak of A(H1N1)pdm09 in the Maldives as an example of indicator-based SARI surveillance signalling a possible outbreak. Event-based surveillance is also an important factor for detection of unusual events, for example reports from concerned clinicians who helped detect H7N9 cases in China and reports of bird die-off in Bangladesh and India that resulted in detection of avian influenza outbreaks. Studies can include outbreak and case reports, burden of disease efforts as well as vaccine and antiviral effectiveness to inform policy decisions. All these information sources can be used to inform risk assessments for defensible decision-making, appropriate control measures, effective communication and improved preparedness.

2.5.2 Joint risk assessment for zoonotic influenza at the animal and human interface

Dr Filip Claes, Regional Office for Asia and the Pacific, Food and Agriculture Organization of the United Nations

Risk assessments conducted independently by the animal and human health sectors often assign different levels of risk to the same event. For example, a subregional technical consultation held on H7N9 in 2014 found the risk to poultry from H7N9 to be moderate to high by the animal health sector and the risk to humans to be low by the human health sector. It was agreed that this discrepancy was due to a lack of routine data sharing and understanding of the other sector and that there was need for joint risk assessment (JRA) by the animal and human health sectors on the risks from avian and other zoonotic influenzas at the human–animal interface. The proposed JRA is a qualitative assessment that incorporates expert knowledge across sectors to systematically evaluate zoonotic public health threats in addition to

the uni-sectoral assessments conducted by the animal and human health sectors at the Member State and tripartite levels. The next steps will be to agree upon a draft methodology and then conduct tabletop scenarios and pilots before finalizing the tool.

2.5.3 Pandemic Influenza Risk Management

Dr Weigong Zhou, WHO headquarters

WHO is in the process of finalizing the updated WHO guidance document for pandemic influenza preparedness and response into the PIRM framework. PIRM provides guidance for a risk-based and integrated approach to influenza pandemic preparedness and response and promotes an all-hazards and whole-of-government approach to risk management for health. Global phases are uncoupled from national action, so WHO assesses and communicates global pandemic risk and Member States assess national risk within the country context. The framework, which is nearly finalized, aligns with other United Nations policies, including the United Nations Crisis Management Policy and the Inter-Agency Standing Committee Level 3 Activation Procedures for Infectious Disease Events. Dr Zhou highlighted the fact that the WHO Global Influenza Programme has many guidelines and tools available to support Member States with influenza preparedness and response. A checklist for pandemic influenza risk management is also under development to ensure that influenza-specific plans are maintained and that capacity requirements presented by the PIRM framework, WHO checklist for influenza pandemic preparedness planning (2005), IHR (2005) core capacities self-assessment questionnaire, and Joint External Evaluation tools are mapped. Efforts to strengthen networks between stakeholders, integrate regional strategies and leverage existing mechanism for national preparedness are also ongoing.

2.5.4 Influenza pandemic risk/severity assessment tools: TIPRA and PISA

Dr Katelijn Vandemaele, WHO headquarters

The Tool for Influenza Pandemic Risk Assessment (TIPRA) was developed to be used during the interpandemic and alert phases of the pandemic continuum. It was developed to support risk assessment for influenza viruses with pandemic potential through a systematic investigation of virus features. TIPRA is conducted by experts and provides a qualitative assessment of pandemic potential based on nine risk elements known to affect transmissibility and spread. The assessment is used to evaluate two components of risk, namely the likelihood of sustained human-to-human transmission and the impact to the human population of sustained human-to-human transmission. Benefits of TIPRA include the ability to compare risk for different viruses and the potential to rapidly mobilize GISRS experts to use TIPRA. Limitations include the use of proxy indicators for risk elements, and potential for experts to disagree with the risk characterization from the model. Version 1 of the tool has been released and outputs from previous assessments are available.

Dr Vandemaele also presented the Pandemic Influenza Severity Assessment (PISA) approach, which can be used to assess the severity of seasonal influenza on a yearly basis to improve capacity for severity assessments. The PISA approach uses transmission, seriousness of disease and impact as severity indicators and is comprised of four steps. The first step is the selection of parameters to assess severity using trusted sources (for example, ILI cases as a proportion of total visits for transmission, cumulative death-to-hospitalization ratio of confirmed influenza cases for seriousness of disease and weekly proportion of influenza-positive SARI cases for impact). The second step is setting thresholds for each parameter through the context of historical data to determine seasonal thresholds. The third step is the weekly application of thresholds to assess severity and the fourth is to report the severity assessment

findings and implement control measures as needed. Pilot testing of PISA has been very successful and eight Member States in the Asia-Pacific region are participating.

2.5.5 PIP Framework partnership contribution: Global update

Mr Paul Rogers, WHO headquarters

Mr Rogers presented the global update of the PIP Framework, a landmark public health arrangement between Member States, industry, WHO and other stakeholders to increase influenza preparedness. The primary objectives of PIP Framework are twofold: first, to improve sharing of influenza viruses and, second, to achieve more predictable, efficient and equitable access to benefits arising for virus sharing, particularly vaccine and antivirals. The High Level Implementation Plan (HLIP) I, which has been in place from 2013 to 2017, set several outcomes and outputs within five areas of work. The majority of PIP funding goes towards laboratory and surveillance capacity. Progress has been made at the global level in many of the indicators, although it is significantly lower than the target when it comes to the introduction of event-based surveillance systems. Progress has also been made in the other areas of work, which are burden of disease studies, regulatory capacity building, planning for deployment and risk communication.

Mr Rogers also presented the key findings from the 2016 PIP Framework review. It found that the PIP Framework has been successful in balancing virus sharing and benefit sharing, that it is a model for meaningful partnership between key stakeholders and that GISRS remains fundamental to the PIP Framework. The review found that global preparedness has improved through enhanced capacity and more widespread access to vaccines and antivirals. Recommendations from the review included possible inclusion of seasonal influenza and other pathogens and adapting to technological progress. HLIP II is being drafted and will be similar to HLIP I but will need to integrate into the broader approach while maintaining focus on pandemic influenza.

2.6 Plenary session 5: hospital-based surveillance to inform vaccine and control policies

Chair: Dr Anja Werno, Institute of Environmental Science and Research, New Zealand

2.6.1 Hospital-based acute respiratory surveillance systems

Dr Erica Dueger, WHO Regional Office for the Western Pacific

Yearly, influenza is estimated to cause between 3 and 5 million severe cases requiring hospitalization. These initial estimates are crude, as global impact is difficult to measure, in part due to hospitalization registration because of complications secondary to influenza infection and a dearth of laboratory-confirmed cases and deaths. To address this knowledge gap, efforts are ongoing to improve global estimates of hospital burden and mortality attributable to influenza. Critical to these estimates are representative data from hospital-based acute respiratory infection (ARI) surveillance systems that report cases by demographic characteristics and help determine high-risk groups. Hospital-based ARI surveillance also provides baseline national surveillance data and viral isolates for severe disease, and builds Member State laboratory and surveillance capacity. For burden of disease estimates, a minimum of one year of ARI data and a defined catchment population is required. The WHO *Manual for Estimating Disease Burden Associated with Seasonal Influenza* provides step-by-step guidance for how to use the data available to estimate influenza burden. Several Member States in the Asia-Pacific region have already completed preliminary burden of disease estimates, and many of these will be published in the upcoming theme issue of *Influenza and Other Respiratory Viruses*.

2.6.2 Southern Hemisphere Influenza and Vaccine Effectiveness Research and Surveillance (SHIVERS)

Dr Sue Huang, Institute of Environmental Science and Research, New Zealand

New Zealand is located in the temperate southern hemisphere and has a well-established influenza season. The country has an excellent public health system, with over 98% of the country registered with a general practitioner. These factors provide for the success of the Southern Hemisphere Influenza and Vaccine Effectiveness Research and Surveillance (SHIVERS) project. It has nine objectives, including to understand severe and non-severe respiratory diseases, influenza vaccine effectiveness, interactions among respiratory pathogens, causes of respiratory mortality and risk factors. The impact of SHIVERS thus far includes the Ministry of Health announcing a new policy to administer influenza vaccines to children who have been hospitalized or have significant cofactors. Data from SHIVERS also encouraged the change in the final WHO case definition for SARI to include cases with onset up to 10 days prior. Influenza vaccine selection has also benefited from SHIVERS, particularly through providing timely estimates of vaccine effectiveness to inform annual seasonal vaccine strain selection. SHIVERS allows for use of PISA to assess pandemic severity (see section 2.5.4 for a detailed description of PISA). SHIVERS has provided data to support vaccination campaigns for high-risk groups, particularly pregnant women, among whom the total incidence per 100 000 women aged 15–45 years was 107.9, compared to 22.1 in non-pregnant women. Also, pregnant women were found to be hospitalized at approximately five times the rate compared to non-pregnant women. A sero-epidemiologic cohort study conducted in 2015 indicated that if neuraminidase inhibition (NAI) is not measured, approximately 30% of cases will be missed. Influenza severity by age group showed a U-shape for SARI, ICU admission and death, with high levels in children younger than 5 years of age, then a decrease for those aged 5–19 years and an increase for older age groups. Studies into seroconversion by age and virus indicated that NAI seroconversion ratios decreased with increasing age and haemagglutination inhibition (HAI) seroconversion ratios were lower for children aged 0–4 years and then increased for school-aged children before decreasing again for older cohorts. Influenza B showed almost twice the NAI/HAI seroconversion ratio than A(H3N2).

2.6.3 Influenza surveillance and influenza disease burden estimates, 2017

Mr Binay Thapa, Ministry of Health, Bhutan

Bhutan is a small, landlocked Himalayan country with a population of approximately 800 000. There are two seasonal influenza peaks in the country: one at the end of winter and another at the end of the monsoon season. Free basic medical care is provided throughout the country and there are 11 sentinel hospitals distributed throughout the country that collect SARI data. These data were used to conduct an influenza burden of disease estimate in 2016 to inform policy decisions regarding the introduction of influenza vaccines and to plan and prioritize SARI surveillance activities. Influenza-associated hospitalization rates were calculated by age group and sentinel hospital, using the methods described in the WHO *Manual for Estimating Disease Burden Associated with Seasonal Influenza*. A sensitivity analysis was conducted to review the SARI case counts reported to the national online system, and it was found that only approximately 30% of SARI cases were reported. Following a review of the International Classification of Diseases (ICD 10) codes for respiratory diseases reported, it was decided that ICD 10 J-coded discharge counts would be used as a proxy for SARI cases. Percent positivity of influenza-confirmed SARI cases were extracted, but the case numbers were quite low, so all 11 sentinel sites were included in the final analysis segregated by month and age group. To estimate the catchment population, the district population was used because there is only one hospital per district and all health centres refer patients to the district hospital. As such, the final formula used was the national proportion of SARI cases

positive for influenza virus multiplied by the number of J-coded hospitalizations divided by the district population. The final estimates were 107.1 cases per 100 000 people for the total population and 375.4 per 100 000 people for those 0–4 years of age. Mr Thapa also highlighted how having physicians be focal points for capturing SARI surveillance was proving difficult but that when nurses became the focal points, surveillance data were reported more regularly.

2.6.4 Pilot hospital admission review, Svay Rieng, Cambodia, 2015: lessons learnt

Dr Seng Heng, Ministry of Health, Cambodia

Cambodia has a complex health-care system with a large network of public and private hospitals. There are eight SARI sentinel surveillance sites throughout the country. A hospital admission review was conducted in Svay Rieng to estimate the burden of hospitalized influenza-associated disease in Cambodia. First, the catchment area was defined and found to include one provincial hospital, three district hospitals and four private hospitals. A sensitivity analysis was conducted at Svay Rieng Provincial Hospital to identify influenza cases that were not reported via the surveillance system through a comprehensive review of admission logbooks. There were 15 possible diagnoses that could be included as a possible SARI case, including pneumonia, bronchitis, asthma and laryngitis. Preliminary analyses showed a total incidence rate of 65 SARI cases per 100 000 people in Svay Rieng and the highest burden was found to be in those aged 65 years and older with 344 cases per 100 000 people. Challenges for this pilot site included concerns about data quality, which was limited by handwriting, reporting language, incomplete and missing records, lack of records and access within private health facilities, population estimates, and unclear diagnosis terminology. The sensitivity analysis found fewer cases in the logbooks compared to the number of cases reported to the national SARI surveillance network. Preliminary recommendations include conducting additional sensitivity analyses at the remaining seven SARI sentinel sites, as well as additional hospital admission reviews for comparison with Health Information System data and eventual national burden estimates.

2.6.5 Hospital admission survey (HAS) for influenza-associated SARI incidence rate estimation in Indonesia

Dr Ririn Ramadhany, Ministry of Health, Indonesia

Indonesia's influenza surveillance system has three components: six hospital-based SARI sentinel sites, 27 public health centres with ILI surveillance, and an event-based surveillance system specifically for avian influenza detection. Seasonal influenza is highest between December and February, although there is activity year-round. There have been no additional human cases of H5N1 in Indonesia since 2016 despite several outbreaks in poultry. A HAS was conducted at three different SARI surveillance sites based on data accessibility from centralized electronic medical records. ICD 10 J-codes were used as a proxy for respiratory illness after a review showed most respiratory inpatients were captured by these. Preliminary results indicated most SARI cases in the age group 0–4 years with between 82 and 114 cases annually per 100 000 people from 2013 to 2016. Limitations of the study include non-representativeness of the Indonesian population as a whole, limited time frame of the study and inclusion of only half of the national SARI surveillance sites.

2.6.6 Respiratory syncytial virus (RSV) surveillance, Mongolia

Dr Oyungerel Darmaa, National Center for Communicable Diseases, Mongolia

Mongolia is the most sparsely populated country and approximately 50% of the population lives in Ulaanbaatar. The influenza surveillance network is made up of category 1 sites that collect samples for

laboratory testing year-round and category 2 sites that collect only during the influenza season. The influenza laboratory surveillance network is well established and in the 2016/17 season, close to 2500 nasopharyngeal samples were tested for influenza and a host of other respiratory viruses. Mongolia is currently participating in the RSV surveillance pilot, which includes eight of the existing SARI surveillance sites. The pilot will include implementation of training for clinicians about RSV signs and symptoms, introduction of sampling strategies and data reporting within the newly established RSV surveillance system. The hope is to make use of the well-established and successful influenza surveillance system as a platform to expand surveillance for other respiratory viruses.

2.6.7 Detection of other respiratory pathogens such as RSV using the influenza platform

Dr Malinee Chittaganpitch, Ministry of Public Health, Thailand

The national influenza laboratory network was strengthened in Thailand in 2004 after a H5 outbreak in 2004 and then expanded in 2009 to process more samples per week per sentinel surveillance site. Although influenza viruses cause a substantial proportion of the ILI and SARI cases, there is growing interest in determining the aetiology of the other cases not caused by influenza. As such, an additional six non-influenza respiratory viruses have been added to the ILI and SARI laboratory testing. Cases or outbreaks of unexplained SARI are investigated first by the NIC and if they are negative for influenza, aliquoted samples are passed on to the central diagnostic unit for further analysis. Thailand is participating in the RSV pilot and will use 2017 data with a sample size of 1000 classified by age group. A primary challenge for multiple pathogen detection is commercial kit sensitivity and specificity.

2.6.8 Longitudinal influenza surveillance network (LISN) and HAS in Viet Nam

Dr Ngu Duy Nghia, National Institute of Hygiene and Epidemiology, Viet Nam

The longitudinal influenza surveillance network (LISN) will coordinate and enhance influenza and respiratory pathogen surveillance at the human–animal interface through monitoring influenza virus and other viral pathogen circulation and evolution and will enhance detection, assessment and response within the animal and human health sectors. The two sites, Quang Ninh in the north and Dong Thap in the south of the country, were selected based on livestock and wildlife migration patterns and live bird markets. Initial epidemiological characteristics of SARI patients enrolled in LISN show no major difference in sex but do show large differences in age distribution. All cases had fever and cough and no patients had been vaccinated for seasonal influenza within the previous year. Laboratory testing of samples collected showed 58% were positive for influenza or other pathogens with 15% testing positive for influenza. No samples tested were positive for avian influenza. The majority of SARI cases were caused by RSV and in 20% of positive cases there were two or more pathogens detected. Discussion highlighted how coinfection with several pathogens requires care when reporting because often the pathogen that causes disease is not known.

Viet Nam has also conducted a preliminary HAS to assess influenza burden in Quang Ninh province. ICD 10 codes were used to construct a SARI line-list. At the time of the presentation, the first 2 of 13 hospitals had been reviewed and showed that between 51% and 63% of charts reviewed met SARI case definitions. The other hospitals will be reviewed and a HAS conducted in three additional provinces for better geographic representation.

2.7 Plenary 6: influenza vaccines: improving national policies and implementation

Co-chairs: Dr Joseph Bresee, United States Centers for Disease Control and Prevention, USA and Dr James Heffelfinger, WHO Regional Office for the Western Pacific

2.7.1 Seasonal influenza vaccination policies, recommendations and practices in the WHO Western Pacific and South-East Asia regions

Dr James Heffelfinger, WHO Regional Office for the Western Pacific

In 2012, WHO conducted a survey on the seasonal influenza immunization policies and recommendations in the Western Pacific Region. Ultimately, 36 of the 37 countries and areas in the Region had data available. Of these, 26 reported that influenza vaccination was available through public or private funding and 25 had influenza vaccine policies or recommendations. The survey revealed that mismatches between disease activity and vaccine formulation were common, which led to months of influenza activity with no access to vaccines.

The WHO/UNICEF Joint Reporting Form (JRF) on immunization is conducted annually and began collecting data on seasonal influenza vaccine use in 2012. This was expanded in 2014 to include collection of data on national policies, recommendations for risk groups, coverage and vaccine formulations. In 2014, 2 of 11 Member States in the South-East Asia Region and 16 of 27 Western Pacific Region reported national influenza policies. The two Member States in South-East Asia reported policies that target children, adults with chronic illness, pregnant women, health-care workers, the elderly and other groups. In the Western Pacific Region, the 15 countries and areas targeted health-care workers and the elderly and 12 targeted adults with chronic illness and pregnant women. A recent multivariate analysis conducted by Ortiz et al. using 2014 JRF data found that countries reporting an influenza vaccine policy were more likely to be wealthier, have introduced more new and underutilized vaccines, and have stronger immunization systems compared to countries without a policy. Importantly, Dr Heffelfinger highlighted how having a policy or recommendation for seasonal influenza vaccination is not assurance of its implementation. Recommendations included increased establishment of formal influenza vaccination policies in both regions, which would be an initial step towards increasing the use of the seasonal influenza vaccine and the collection of more comprehensive data on influenza policies and practices through additional influenza-specific questions on the JRF as well as using a complementary survey to help validate JRF data and point out challenges or gaps.

2.7.2 Partnership for Influenza Vaccine Introduction (PIVI)

Dr Joseph Bresee, United States Centers for Disease Control and Prevention, USA

PIVI is a collaboration to reduce the global burden from influenza and improve pandemic preparedness through development of sustainable influenza vaccination programmes. PIVI grew out of the recent opportunities and challenges for influenza vaccine use and preparedness efforts. Recently, quality data on the value of influenza vaccination have become available through disease and economic burden estimates and investigations into vaccine performance. Additionally, the 2009 H1N1 pandemic, 2012 Strategic Advisory Group of Experts (SAGE) recommendations and increased understanding of the link between pandemic preparedness and seasonal vaccine programmes have increased interest in influenza vaccines. However, vaccines are underused in many lower- and middle-income countries and there has been a decrease in vaccine use in some places. The 2009 pandemic highlighted how the lack of existing public sector influenza vaccine programmes, regulatory pathways, monitoring mechanisms and vaccine distribution systems were barriers to rapid deployment of pandemic vaccines. PIVI is a five-year

programme that starts with providing 100% of influenza vaccines and contributions towards programme and evaluation costs with a gradual increase in country funding and management of the programme. During the five years, additional support activities including sustainability planning and programme evaluation are ongoing. After five years, the country graduates and is fully responsible for influenza vaccination programmes, including acquiring vaccines. Since PIVI began in 2012, over 2 million seasonal influenza vaccines have been distributed to seven partner countries with additional partner countries currently in the preparatory phase. PIVI will continue to expand to include additional partner countries each year, create an evidence base of best practices for vaccine programme delivery and connect programme expansion with pandemic planning.

2.7.3 Influenza vaccines: improving national policies and implementation (Bangladesh)

Dr Meerjady Sabrina Flora, Institute of Epidemiology, Disease Control and Research, Bangladesh

In Bangladesh, the national immunization policy is in draft form and includes a policy commitment, dependent upon availability of resources, to extend opportunities for seasonal influenza vaccination within identified high-risk population groups. At present, the government provides free influenza vaccination to all Hajj pilgrims, of which there are an estimated 100 000 per year. In 2017, the government will purchase 130 000 vaccines for pilgrims. The private sector provides very few vaccines that physicians can prescribe, including to children. There is also a national action plan for a national influenza centre in Bangladesh that includes plans for burden of disease studies and advocates for vaccination in high-risk groups.

2.7.4 Influenza vaccine policies and practices in China

Dr Chen Tao, Chinese Center for Disease Control and Prevention, China

Technical guidelines for the application of the seasonal influenza vaccine were established in China in October 2014. The target population is anyone without contraindications and over the age of 6 months. Priority for vaccination is given to pregnant women, infants and children aged 6 months to 5 years, those over 60 years of age, people with certain chronic conditions, carers of infants less than 6 months and health-care workers. Influenza is a category 2 vaccine, which means the cost is borne by the patient. However, reimbursement policies exist and are variable between provinces. Free influenza vaccination is available annually in several cities and provinces, one-time free vaccination campaigns are often conducted in regions that recently experienced a natural disaster, and other organizations totally or partially cover the costs of influenza vaccination. There are many influenza vaccines approved for marketing in China and an estimated 1.3–3.6% of the population aged 6 months or older are vaccinated annually. Increased uptake of the influenza vaccine has been and will be driven by health-care system reform, A(H1N1)pdm09 response, economic development, promotional campaigns and improved vaccination services.

2.7.5 Influenza vaccines: improving national policies and implementation (Lao People's Democratic Republic)

Dr Anonh Xeuatvongsa, Ministry of Health, Lao People's Democratic Republic

The Lao People's Democratic Republic has a national seasonal influenza vaccination policy that follows the WHO SAGE recommendations to target vaccination efforts for pregnant women, the elderly, health-care workers, and chronically ill people. Pregnant women are the highest priority target. Vaccination campaigns have been conducted with quite variable numbers of vaccines administered. In 2012, for

example, approximately 330 000 people were vaccinated across 23 districts while in 2016 almost 400 000 people were vaccinated across all provinces. No severe adverse events following immunization have been reported and the public generally accepts the seasonal influenza vaccine, with demand often exceeding supply in certain areas. The emphasis placed on vaccination of pregnant women and children has increased tetanus and diphtheria vaccination for pregnant women as well as delivery of vitamin A and deworming for young children. Current challenges for expansion of seasonal influenza vaccination programmes and policies include expiry time, limited availability of vaccines, cost, and variable awareness and demand for vaccination within different populations.

2.7.6 Seasonal influenza vaccination policy in Mongolia

Dr Narangerel Dorj, Ministry of Health, Mongolia

Influenza vaccination in Mongolia could be obtained on a voluntary basis with payment based on the country's 2001 immunization law. Subsequent ministerial orders in 2002, 2010 and 2014 identified high-risk groups at which to target the influenza vaccines, including health-care workers, children below 5 years of age, pregnant women, those 65 years and older and people with certain underlying conditions. In late 2016, Mongolia signed a memorandum of understanding introducing and expanding influenza vaccination within the PIVI programme. The government in the past has purchased vaccines and received vaccines through donations. Collaboration between different sectors has increased over the past years and public awareness continues to increase. Current challenges include increasing public acceptance and demand, updating priority risk groups, determining vaccine effectives and obtaining funding.

2.7.7 Exploring the possibility of introducing seasonal influenza vaccine

Dr Manjula Kariyawasam, Ministry of Health, Nutrition and Indigenous Medicine, Sri Lanka

Sri Lanka has not yet introduced a national seasonal influenza vaccine policy. There are, however, several documents that encourage continued evaluation of potential introduction. Before that, the burden of disease must be assessed, a technical aspects and needs assessment must be conducted, and vaccine introduction plans and strategies must be developed. Estimates of the burden are ongoing through a national registry of influenza-related deaths, a planned disease burden study to begin in June 2017 and a retrospective analysis of five years of influenza surveillance data. It was determined recently that influenza vaccines should be provided to pregnant women to prevent maternal deaths due to pneumonia. An initial grant was provided by the United States Centers for Disease Control and Prevention for three years, which will be evaluated for the sustainability of influenza vaccination programmes after this period. Given the priority groups in Sri Lanka, an estimated US$ 11 million would be required in direct costs annually to purchase vaccines for pregnant women, health-care workers and the elderly – a sum significantly higher than the annual total vaccine budget for the entire country. Additional challenges for vaccine introduction include unpredictable seasonality, mistiming of vaccine availability, and competing priorities for policy and budgeting.

2.7.8 Seasonal influenza vaccination programme in Thailand

Ms Suthanun Suthachana, Ministry of Public Health, Thailand

Prior to 2004, influenza was not regarded as a major public health threat in Thailand. Following outbreaks of avian influenza, however, a national strategic plan on avian influenza and pandemic influenza preparedness, which included introduction of influenza vaccination, was developed. This strategic plan supported development of national capacity to produce influenza vaccines and initiate an influenza vaccine programme. Priority target groups were identified through evaluation of burden of

disease estimates and WHO guidance. Since initiation in 2004, recommended target groups have expanded to include health-care workers, pregnant women, children aged 6–35 months, those 65 years and older, and persons with certain cofactors. The numbers of vaccines available for different risk groups have remained relatively constant over the past four years. In 2016, 3.5 million doses were available, allowing vaccination of a third of targeted recipients on a first come, first served basis. Current challenges include the need to increase vaccine supply to meet demand, reassure health-care workers about vaccine safety and benefits, and improve data reporting systems. One of the top priority actions moving forward is to increase vaccine uptake in pregnant women and children aged 6–35 months.

2.7.9 Panel discussion: improving national policies and implementation

Panel members: Plenary session 6 presenters

Dr Heffelfinger posed the question about what it means to have a formal seasonal influenza vaccine policy. The panel members discussed the differences in their country contexts and how in many having an official policy does often lead to implementation. Although it was clear that the requirements for introduction of an influenza vaccine policy varied substantially by Member State, additional guidance regarding how to improve acceptance of vaccination by policy-makers and the public was desired. Dr Heffelfinger then asked about the vaccine introduction decision-making process, and most panellists agreed that high on the criteria is burden of influenza and cost of introducing a new vaccine.

As SAGE recommends many priority risk groups, the chairs deliberated if this could be overwhelming and have a negative impact on vaccine uptake. Dr Xeuatvongsa explained that the Lao People's Democratic Republic has decided to prioritize all groups recommended by SAGE in an effort to protect as many people as possible but particularly pregnant women, as they are present in almost all households. Dr Narangerel mentioned that Mongolia had decided to target three groups instead, as the SAGE recommendations were felt to be overwhelming. However, vaccine demand is high throughout the country and often supply is not able to meet demand. In Bangladesh, Dr Flora mentioned that vaccination of pregnant women and children is relatively easy because of more frequent visits to health-care facilities while vaccination of the elderly population is very difficult because they do not frequently access medical services. Several panellists mentioned that a cost analysis was on the horizon, which would help policy-makers decide about prioritization of influenza vaccination.

2.8 Global Initiative on Sharing All Influenza Data (GISAID) Tutorial

Dr Naomi Komadina, Victorian Infectious Diseases Reference Laboratory, Australia

GISAID provides public access to influenza information that helps understand how viruses evolve, spread and increase in virulence. As laboratory capacity continues to increase within the Asia-Pacific region, NICs are increasingly conducting their own sequencing instead of sharing specimens with WHO collaborating centres. Therefore, NICs must have the skills to load their data to GISAID. Dr Komadina provided a demonstration session, highlighting in particular the data upload process, to support NICs and troubleshoot any particular problems that collaborators were experiencing.

2.9 Plenary session 7: influenza priorities for 2017 and beyond

Chair: Dr Erica Dueger, WHO Regional Office for the Western Pacific

2.9.1 2017 and beyond: epidemiology priorities

Dr Wan Noraini Wan Mohamed Noor, Ministry of Health, Malaysia
Dr Alethea de Guzman, Ministry of Health, Philippines
Dr Sheena Sullivan, Victorian Infectious Diseases Reference Laboratory, Australia

The epidemiology priorities were divided into two topics: the first was event-based surveillance and improving multisectoral communication for rapid and joint risk assessment and the second was indicator-based surveillance, information sharing and burden of disease estimates.

Dr Wan Noraini highlighted timely and voluntary information across sectors for mutual benefit as a critical factor for rapid and joint risk assessments. Member States have addressed these needs differently; some have established special commissions or interministerial committees to allow for formal sharing of information, while others have no official mechanism for information sharing. Information could be shared formally or informally, with strict requirements for confidentiality. Most Member States reported information available upon request and it was rarely available voluntarily, unless the various departments are responding jointly to an outbreak. Most Member States reported risk assessments done in isolation instead of jointly, possibly because JRAs expose strengths and weaknesses of involved partners and information sharing may have unwanted economic consequences. Bangladesh reported having a dedicated One Health secretariat that involved the Ministry of Health and Family Welfare, the animal health sector and the forestry department to facilitate JRA and information sharing. Recommendations arising from the discussion included the need for Member States to facilitate continuous multisectoral information-sharing platforms best suited to the country context, for WHO to make relevant tools (JRA, PIRM, TIPRA, PISA, etc.) accessible and provide guidance on when to use what, and for WHO to consider an electronic app dedicated to influenza to share information and updated guidance.

Dr de Guzman highlighted how many Member States operate in silos, which prevents efficient sharing of information, although some, including Indonesia, have established national committees specifically for zoonotic diseases. Some Member States reported successful investigations and response through rapid response teams that incorporate multiple sectors and collaborations on risk assessments for certain zoonotic threats, including the Nipah, Zika, and Ebola viruses. Recommendations included efforts to engage multiple sectors including the military, and animal and wildlife health when conducting risk assessments through platforms and networks for national coordination groups. Priorities for effective zoonotic disease control were the importance of continued training, advocacy and exercises for risk assessment and response as well as enhancement of animal surveillance data. Continued strengthening of animal and human health laboratory and epidemiology capacity through field epidemiology training programmes, short courses and training sessions was also prioritized. Finally, Dr de Guzman highlighted the potential for establishing links between public health risk assessments and natural disaster frameworks.

Dr Sullivan provided an overview of the current status of burden of disease estimates in various Member States in the Asia-Pacific region and highlighted the wide variety of approaches taken to arrive at these estimates. Many high-income countries are not conducting burden of disease analyses as per the WHO manual and therefore a method to translate these data into a form that can be reported to WHO should be investigated. Clarification was provided about the purpose of SARI surveillance as an indicator-based surveillance system and not as a method to identify unusual events. Recurring problems with burden of

disease estimates included trouble gathering data from the private sector, sustainable funding, and securing government support for the HAS as it is often perceived as research and therefore often given a lower priority. Rather than research, burden of disease studies were seen as useful for lobbying for vaccination policy, although not all Member States agreed with this. Additionally, some Member States pointed out that SARI might not always be the most effective way to encourage vaccination, particularly if only a small percentage of SARI cases are influenza positive and because the case definition is very non-specific. Next steps for Member States that have already conducted burden of disease studies are to estimate economic burden, address communication barriers regarding benefits of vaccination, and continue information sharing of FluMart data as well as successes and innovative solutions, for example the potential to pool data across countries if case numbers are too small to estimate burden of disease.

2.9.2 2017 and beyond: laboratory priorities

Dr Ravindran Thayan, Ministry of Health, Malaysia

The purpose of the laboratory breakout session was to discuss the introduction of new laboratory technologies, including experiences related to selection, roll-out, performance, maintenance and sustainability. Almost all laboratories had conventional PCR, real-time PCR, cell culture and virus isolation, HA, and immunofluorescence assay capabilities, while fewer had more advanced capacities including multiplex PCR, Sanger and next-generation sequencing, and antiviral susceptibility testing. Common areas for improvement included reagent supply and quality, equipment maintenance, guidance for protocol selection and standard operating procedures. Regarding new technologies that laboratories were considering acquiring in the near future, some Member States reported no immediate needs due to sufficient capacity with real-time PCR given the number of samples received and current laboratory development. Some Member States with high sample volumes or specific needs were considering new technologies such as multiplex PCR and automated extraction systems. Highly advanced laboratories are considering second-generation sequencing and digital PCR. Improvements in laboratory capacity from introducing automated extraction and multiplex PCR included cost reduction, time saving and increased number of pathogens tested. Loop-mediated isothermal amplification (LAMP) has widened coverage of testing, can be multiplexed, and is cost-effective and simple. However, new technologies sometimes lock laboratories into a specific reagent supplier, laboratories with low sample volumes may not have enough to fully utilize the machinery, and new technologies can produce large datasets that require data management expertise. There are many factors to consider when deciding on introducing novel technologies, including cost, sensitivity and specificity, maintenance, reliability of reagent supply and many more. Thus, it would be very helpful for WHO and other stakeholders to produce a practical guidance document to help facilitate selection and roll-out of new technologies. The discussion also highlighted how the needs for clinical diagnostics versus surveillance are likely to be different and should be taken into consideration when determining appropriate new technology to introduce.

2.9.3 2017 and beyond: vaccine priorities

Dr James Heffelfinger, WHO Regional Office for the Western Pacific

During the breakout session for advancing vaccine policies and updates, the group discussed differences in what it means to have a national influenza policy. For example, some countries have national health laws that include specific vaccination policies while others have immunization policies. Two factors imperative to making decisions about vaccine introduction were highlighted, namely burden of disease and cost of vaccination. Importantly, effectiveness for many vaccines must only be proven once. Due to changes in vaccine formulation and circulating viruses, however, effectiveness and cost-effectiveness are moving targets.

SAGE currently has five recommended priority groups, but the group considered if this was too ambitious and overwhelming as an initial goal and whether fewer groups should be recommended. The group also discussed if vaccination of pregnant women, persons with chronic disease or health-care workers should be prioritized because vaccination could be facilitated by their access of health-care services. The discussion highlighted the importance of National Immunization Technical Advisory Groups (NITAGs) to review the SAGE recommendations and propose priority groups. It is important to tie seasonal influenza vaccine programmes to pandemic preparedness, although pandemic preparedness is unlikely to be enough to get political backing for seasonal influenza vaccine policies and programmes. To increase uptake, it is important to have champions and robust communication and advocacy strategies.

The group had five primary recommendations: (1) standardized definition of national vaccination policies; (2) NITAGs and other immunization coordinating bodies should be encouraged to consider seasonal influenza vaccine introduction; (3) communication regarding safety, efficacy and impact is important for decision-makers, health-care workers and the public; (4) decisions about seasonal influenza vaccine use should be closely aligned with pandemic influenza policies and preparedness activities; and (5) consideration should be given to introduce seasonal influenza vaccination in one or more target groups to jump-start pandemic preparedness. During the subsequent discussion it was mentioned that there is a real need to improve the influenza vaccine itself to improve the chances of increasing immunization uptake. Additionally, information must be presented to policy-makers in a way that will help them understand and make informed decisions about public health priorities.

2.10 Plenary session 8: public health research and development – influenza vaccines

Chair: Ms Soafy Mohamed, Ministry of Health, Maldives

2.10.1 Updating WHO public health research agenda for influenza

Dr Weigong Zhou, WHO headquarters

The WHO influenza research agenda was first developed in 2009 and focused on five distinct streams: reducing risk, limiting spread, minimizing impact, optimizing treatment and modern tools. Since then, there have been periodic reviews and both the South-East Asia and Western Pacific regions have identified regional research priorities. In 2011, discussions were held at the fifth biregional NIC meeting in the Lao People's Democratic Republic and priorities were realigned to include disease burden, vaccine targets and effectiveness, vaccine selection, deployment and regulations, and design of research on disease burden, vaccine targets and effectiveness. It was decided that the research priorities should be updated because much progress has been made on the priorities set in 2009 and unmet public health needs and knowledge gaps have been identified. The objectives for the 2016 update were to identify the priorities in influenza research for the next 5–10 years that may be effective at reducing the burden of seasonal influenza and the risk and impact of pandemic influenza. Key stakeholders divided into six technical working groups to individually and collectively contribute to reaching a consensus for the research agenda with a focus on: identifying unmet public health needs, developing and prioritizing specific research recommendations, and identifying potential measurable indicators for monitoring and evaluation of public health impact. Dr Zhou focused primarily on the third stream, which looks at minimizing the impact of influenza through vaccines and vaccination. Priorities determined included estimating disease burden and social impact as well as improving immunogenicity, availability and delivery of influenza vaccines.

2.10.2 Influenza H7N9 vaccine development

Dr Shu Yuelong, Chinese Center for Disease Control and Prevention, China

Dr Shu presented an overview of the current H7N9 situation in China and discussed the development of a H7N9 vaccine. The epidemic curve of human infections with H7N9 shows that the fifth wave starting in late 2016 through early 2017 has been the largest epidemic to date with cases in 17 provinces. The epidemiological comparison between waves shows similar sex and age distribution among waves and fairly consistent proportion of cases with chronic disease. The estimated case fatality ratio for all cases reported is 39.3% and over 90% of cases have had exposure to live poultry or contaminated environments. At the time of the presentation, 33 clusters of two or three people had been reported and there was no indication of any sustained human-to-human transmission. The HA gene of H7N9 has evolved into two distinct genotypes: the Yangtze River Delta and the Pearl River Delta. The virus is typically low pathogenic in poultry, but in 2017 the first few virus mutations indicating it could be highly pathogenic in poultry were identified. These and other mutations led to the recommendation of two new CVVs by WHO in early 2017. Dr Shu discussed how current evidence suggests that H7 viruses may pose a higher pandemic risk than do H5 viruses as assessed by TIPRA.

Different companies are working on different types of the H7N9 vaccine using different methods, including inactivated whole virus vaccines, split vaccines, live attenuated vaccines, adjuvant vaccines, and egg-based and cell-based vaccines. Overall, trials suggest that the vaccines developed are generally safe but offer poor immunogenicity except for the live attenuated vaccines, which seem to elicit robust immunogenicity. In general, two doses are needed and the adjuvant vaccines perform better.

China is in the process of developing two types of the H7N9 vaccine. Hualan Bio is using an A/Anhui virus for use in an inactivated H7N9 vaccine. Phase 1 of clinical trials was approved in October 2015 and the vaccine was cleared for phase 2 in March 2017. Dr Shu presented data that suggest that the Hualan Bio H7N9 vaccine meets safety criteria and that the seroconversion rate is more than 80%. The other vaccine is being developed by Tiantan Bio and is also an A/Anhui inactivated virus vaccine. A clinical trial phase was approved in February 2017. Ongoing challenges persist in the development of vaccines for emerging disease. Dr Shu highlighted how human infection with H7N9 and virus evolution will continue. Given this, surveillance systems within the animal and human health sectors must be strengthened and development of an effective vaccine could have huge impacts on public health.

2.10.3 Influenza vaccines: present and future

Dr Kanta Subbarao, Victorian Infectious Diseases Reference Laboratory, Australia

Dr Subbarao first provided background information on influenza viruses and how, as the virus level increases, there is a rapid increase in T-cell antibody response before falling again. The point of the influenza vaccine then is to increase serum antibody levels rapidly so as to modify the illness and make it less severe. Current influenza viruses are offered as trivalent or quadrivalent formulation and can be inactive subunit or split-virion vaccines, live attenuated vaccines or recombinant haemagglutinin vaccines. Human influenza vaccines can be generated by reassortment of vaccine donor virus that has high growth in eggs with circulating wild type virus to produce reassortant vaccine virus that has high growth in eggs. Another method is through plasmid-based reverse genetics, but this is not yet under intellectual property for seasonal influenza vaccines. The current inactivated influenza vaccines usually contain 15 micrograms of HA antigen although they may have 60 micrograms of each HA antigen in certain countries for use in people over 65 years of age. The data for influenza vaccine strain selection come from the WHO GISRS network and the WHO collaborating centres conduct sample processing and

give feedback to WHO to determine appropriate vaccine strains based on multiple factors including antiviral drug resistance, vaccine effectiveness and availability of strains. A vaccine strain change is only recommended if antigenic, sequence and serology changes are widely observed among circulating viruses. National authorities ultimately make the decision on what vaccines will be used in their countries. Limitations of the current influenza vaccines include suboptimal efficacy in the elderly, short duration of protection due to antigenic drift and shift, reduced effectiveness when vaccines and epidemic strains are antigenically mismatched, and the long manufacturing time required for vaccines generated in embryonated eggs, as most influenza vaccines are.

The goal of pandemic influenza vaccines is to prevent severe illness and death from pandemic influenza. The ideal influenza vaccine will induce an immune response directed at all parts of the virus and protect against a broad range of influenza viruses. Challenges facing the development of pandemic influenza vaccines are, among others, the diversity of avian influenza viruses, the uncertainty surrounding the relevance of available animal models to humans and the lack of evaluation of the efficacy of candidate vaccines. The assessment of efficacy of pandemic influenza virus vaccines is difficult due to poor sensitivity of the standard HI assay, challenges with reproducibility of neutralization assays and problems with animal models.

Manufacturers of pandemic vaccines can learn from the H5N1 and H1N1 vaccine development processes. H5-containing vaccines are only modestly immunogenic but the magnitude and quality of antibody response can be influenced by adjuvants. Titres decrease over approximately 6–12 months but can be boosted with additional doses of the vaccine. The H1N1 pandemic highlighted some of the difficulties with the distribution and uptake of influenza vaccines during a pandemic event. Options are available for improving influenza vaccines, including use of adjuvants to improve breadth of protection, use of prime-boost strategies with different vaccines, multivalent vaccines and combinations of antigens. The most exciting development in the field at the moment is the HA stem epitopes, which are sequential immunizations with chimeric HAs with novel heads on a conserved stem that may produce a universal influenza vaccine. This is feasible in theory because stem epitopes are shared by many viruses. Universal influenza vaccine development has technical challenges such as identifying targets that are conserved across a wide range of influenza viruses and developing a vaccine that elicits an appropriate immune response, as well as regulatory and implementation challenges. Progress has been made through the use of adjuvants to enhance the magnitude and breadth of immune response. Current gaps include standardization of assays, understanding of the importance of anti-neuraminidase (NA) antibodies and cross-subtype immunity. Dr Subbarao highlighted, however, that the future of influenza vaccines would include a universal vaccine as well as improved vaccines for the elderly population.

2.11 Site visit to the Institute for Medical Research, Malaysia

The afternoon visit to the Institute for Medical Research was hosted by Dr Ravindran Thayan and the Ministry of Health of Malaysia. The visit began with an introduction and background of the Institute, its long history since its establishment in 1900, its latest reference and diagnostic capacity, surveillance, research programmes, and its scientific and technical training programmes in health-related disciplines. The Institute conducts various activities and is currently a WHO Regional Centre for Research and Training in Tropical Diseases and Nutrition and also a WHO Collaborating Centre for Ecology, Taxonomy and Control of Vectors of Malaria, Filariasis and Dengue. Additional presentations covered molecular testing for influenza and other respiratory viruses, as well as the capacity for isolation of influenza virus using cell culture, the recently initiated ILI and SARI sentinel surveillance system in Malaysia and subsequent findings. Visitors then toured the facilities in the molecular testing and virus isolation laboratories at the Malaysian NIC.

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

- With support from WHO collaborating centres and other partners, national and regional influenza surveillance systems have been gradually strengthened over the last 10 years. This includes strengthening of the NICs, which are part of the GISRS.
- Detection of zoonotic influenza viruses and influenza viruses with human pandemic potential, such as H7N9 and H5N1, continues to highlight the importance of remaining vigilant to the threats posed by influenza.
- Influenza surveillance and response remains a priority for the WHO Health Emergencies Programme and is embedded within all focus areas of APSED III, an action framework for implementation of IHR (2005).
- EQA programmes, one component of a broader laboratory quality management system, are considered a valuable mechanism for monitoring and improving laboratory proficiency of molecular diagnosis and isolation of influenza viruses. It is therefore imperative that all NICs participate in such programmes.
- New laboratory technologies for the detection and characterization of emerging infectious diseases, including influenza, offer opportunities but also pose challenges in terms of Member States' needs and sustainability. Periodic review of new technologies and guidance on their introduction are needed.
- Using multiple sources of information, including at the human–animal interface, is critical for detecting unusual influenza events with pandemic potential and for feeding into risk assessment and decision-making.
- Indicator-based surveillance data, including from high-quality hospital surveillance sites, provide critical evidence for burden of disease estimates to support policy decisions.
- The PIRM guidance document, the PIP Framework, as well as pandemic preparedness tools for risk and severity assessment (e.g. TIPRA and PISA) continue to help Member States strengthen and coordinate influenza surveillance, risk assessment and preparedness.
- Seasonal and pandemic influenza vaccine research to enable improved vaccines is an important part of influenza pandemic preparedness, prevention and control strategies.

3.2 Recommendations

3.2.1 Recommendations for Member States

Member States are encouraged:

1) to ensure the inclusion of influenza work in national action plans for health security, as guided by APSED III, including strengthening surveillance, risk assessment and pandemic preparedness;
2) to continue to strengthen event-based influenza surveillance systems that utilize multiple information sources across different sectors, including animal health, to provide data when using severity and risk assessments to inform public health;

3) to enhance timely sharing of (a) seasonal influenza viruses and genetic sequence data with WHO collaborating centres or sequence databases, and (b) national virological and epidemiological surveillance data with FluNet and FluID;
4) to ensure influenza viruses with human pandemic potential as well as viruses not classified as "human seasonal influenza viruses" and related sequences are shared in a timely manner with WHO collaborating centres and reference centres for confirmation and further characterization;
5) to sustain and use indicator-based surveillance, including data from hospital surveillance sites, to provide critical evidence for burden of disease and severity assessments to support policy decisions;
6) to continue to participate in EQA programmes for influenza diagnostics and use their findings to optimize laboratory performance.
7) to encourage collaborations between influenza surveillance networks, policy-makers and immunization programmes to ensure evidence-based vaccination strategies are developed and implemented; and
8) to review and update, if necessary, national pandemic preparedness plans to align with the PIRM framework and other WHO tools.

3.2.2 Recommendations for WHO

WHO is requested:

1) to support Member States to strengthen mechanisms for multisource information and risk assessment, especially at the human–animal interface, for timely public health action and pandemic influenza preparedness;
2) to provide technical support to strengthen laboratory quality, including through organizing EQA programmes;
3) to provide guidance to Member States on the principles supporting the introduction of new laboratory technologies;
4) to encourage and facilitate the sharing of viruses and sequences globally and the regular reporting of influenza surveillance data to improve severity and rapid risk assessments, and to improve the detection of unusual events and viral characterization;
5) to support Member States to share and utilize data, including data from hospitalized acute respiratory infections, to facilitate introduction of influenza vaccines and to encourage their use in at-risk populations in the Asia-Pacific region;
6) to encourage Member States to participate in research on improving seasonal and pandemic influenza vaccines according to the updated WHO research agenda; and
7) to develop and provide guidance for appropriate use of influenza tools, including PISA and TIPRA.

ANNEXES

1. Information Bulletin 2 (list of participants)
2. Programme of activities
3. PIP Forum report

Annex 1: Information Bulletin 2 (list of participants)

W O R L D H E A L T H ORGANIZATION | **ORGANISATION MONDIALE DE LA SANTE**

ELEVENTH BIREGIONAL MEETING OF NATIONAL INFLUENZA CENTRES AND INFLUENZA SURVEILLANCE IN THE WESTERN PACIFIC AND SOUTH-EAST ASIA REGIONS

WPR/DSE/ESR(01)/2017/IB/2
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Annex 2: Programme of activities

W O R L D H E A L T H ORGANIZATION | **ORGANISATION MONDIALE DE LA SANTE**

ELEVENTH BIREGIONAL MEETING OF NATIONAL INFLUENZA CENTRES AND INFLUENZA SURVEILLANCE IN THE WESTERN PACIFIC AND SOUTH-EAST ASIA REGIONS

WPR/DSE/ESR(01)/2017.1a
30 June 2017

Kuala Lumpur, Malaysia
25 - 27 April 2017

ENGLISH ONLY

PROGRAMME OF ACTIVITIES

Day 1 – Tuesday, 25 April 2017

08:00 – 08:30 **Registration**

08:30 – 09:30 **Opening Ceremony**

Welcome and opening remarks
- *Dr Graham Harrison, WHO Representative in Malaysia, Brunei Darussalam and Singapore*
- *Dr Chong Chee Kheong, Director of Disease Control, Ministry of Health, Malaysia*
- *Dr Fadzilah Kamaludin, Director, Institute for Medical Research (IMR), Malaysia*

Introductions
Nomination of meeting chairs and rapporteur
Objectives and agenda
Administrative announcements
Group photo

09:30 – 10:00 *Coffee Break*

10:00 – 11:00 **Plenary 1: Positioning influenza in a changing global context**

10:00 – 10:10 Fighting influenza in a changing world
- *Dr Li Ailan, WHO Regional Office for the Western Pacific (WHO/WPRO)*

10:10 – 10:20 Global developments and NICs: Connecting the dots
- *Dr Philip Gould on behalf of Dr Roderico Ofrin, WHO Regional Office for South-East Asia (WHO/SEARO)*

10:20 – 10:30 Influenza activity in the Northern Hemisphere
- *Dr Takato Odagiri, National Institute of Infectious Diseases (NIID), Japan*

10:30 – 10:40	Influenza activity in the Southern Hemisphere in 2017 *- Dr Ian Barr, Victorian Infectious Diseases Reference Laboratory (VIDRL)*
10:40 – 10:50	Global update *- Dr Katelijn Vandemaele, WHO Headquarters (WHO/HQ)*
10:50 – 11:00	Discussion
11:00 – 12:30	**Plenary 2: Ensuring laboratory quality for influenza detection and characterization**
11:00 – 11:10	Laboratories under the Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies (APSED III) *- Dr Frank Konings, WHO/WPRO*
11:10 – 11:30	Global External Quality Assessment Programme – Molecular detection of influenza *- Dr Janice Lo, Public Health Laboratory Centre (PHLC), Hong Kong SAR (China)*
11:30 – 11:50	Initial external quality assessment of isolation and characterization of influenza viruses in cell culture in the Asia Pacific region, 2016 *- Dr Patrick Reading, VIDRL*
11:50 – 12:30	Panel discussion: EQA experiences from the perspectives of the provider and participant - *Philippines, Dr Socorro Lupisan, Research Institute of Tropical Medicine* - *Thailand, Dr Malinee Chittaganpitch, National Institute of Health (NIH)* - *Dr Patrick Reading, VIDRL* - *Dr Janice Lo, PHLC*
12:30 – 13:30	*Lunch*
13:30 – 15:10	**Plenary 3: Multi-source information to inform novel influenza risk assessments**
13:30 – 13:45	HxNy: Event-based surveillance *- Dr Erica Dueger, WHO/WPRO*
13:45 – 13:55	Influenza A(H1N1)pdm09 in Fiji *- Dr Viema Biakula, WHO South Pacific, Fiji*
13:55 – 14:05	Bangladesh situation: H5N1 *- Dr Meerjady Sabrina Flora, Institute of Epidemiology, Disease Control and Research (IEDCR), Bangladesh*
14:05 – 14:15	Avian influenza in India *- Dr Varsha Potdar, National Institute of Virology (NIV), India*
14:15 – 14:25	*Experience in handling A*(H5N1) outbreak among poultry in Kelantan, Malaysia *- Dr Norizah binti Ismail, Ministry of Health, Malaysia*
14:25 – 14:35	Human infection with avian influenza H7N9 virus in China *- Dr Wang Dayan, Chinese Center for Disease Control and Prevention (China CDC)*

14:35 – 15:10 Panel discussion: HxNy
- *Bangladesh, Dr Meerjady Sabrina Flora, IEDCR*
- *China, Dr Wang Dayan, CDC*
- *Fiji, Dr Viema Biakula, WHO/South Pacific*
- *India, Dr Varsha Potdar, NIV*
- *Malaysia, Dr Norizah binti Ismail, Ministry of Health*

15:10 – 15:30 *Coffee Break*

15:30 – 17:30 Plenary 4: Data for action

15:30 – 15:45 Information for action
- Dr Philip Gould, WHO/SEARO

15:45 – 16:05 Joint risk assessment for zoonotic influenza at the animal and human interface
- Dr Filip Claes, FAO Regional Office for Asia and the Pacific

16:05 – 16:25 Pandemic influenza risk management (PIRM)
- Dr Weigong Zhou, WHO/HQ

16:25 – 16:45 Influenza pandemic risk/severity assessment tools: TIPRA and PISA
- Dr Katelijn Vandemaele, WHO/HQ

16:45 – 17:05 Pandemic Influenza Preparedness framework Partnership Contribution: global update
- Mr Paul Rogers, WHO/HQ

17:05 – 17:30 Discussion

20:00 *Welcome dinner*
- Hosted by Ministry of Health, Malaysia

Day 2 – Wednesday, 26 April 2017

08:30 – 08:40 Recap of Day 1

08:40 – 12:00 Plenary 5: Hospital-based surveillance to inform vaccine and control policies

08:40 – 09:00 Hospital-based acute respiratory surveillance systems
- Dr Erica Dueger, WHO/WPRO

09:00 – 09:15 Southern Hemisphere Influenza and Vaccine Effectiveness, Research and Surveillance (SHIVERS)
- Dr Sue Huang, Institute of Environmental Science and Research (ESR), New Zealand

09:15 – 09:30 Influenza surveillance and influenza disease burden estimates, 2017
- Mr Binay Thapa, Ministry of Health, Bhutan

09:30 – 09:45 Pilot hospital admission review, Svay Rieng, Cambodia, 2015, Lessons learned
- Dr Seng Heng, Ministry of Health, Cambodia

09:45 – 10:00 Hospital Admission Survey (HAS) for influenza-associated severe acute respiratory infection (SARI) incidence rate estimation in Indonesia
- Dr Ririn Ramadhany, Ministry of Health, Indonesia

10:00 – 10:20 *Coffee Break*

10:20 – 10:35 RSV surveillance, Mongolia
- Dr Oyungerel Darmaa, National Center for Communicable Diseases (NCCD), Mongolia

10:35 – 10:50 Detection of other respiratory pathogens such as RSV using the influenza platform
- Dr Malinee Chittaganpitch, NIH, Thailand

10:50 – 11:05 Longitudinal Influenza Surveillance Network (LISN) and hospital admission survey (HAS) in Viet Nam
- Dr Nguyen Vu Thuong, Pasteur Institute in Ho Chi Minh City (PI HCMC) and Dr Ngu Duy Nghia, National Institute of Hygiene and Epidemiology (NIHE)

11:05 – 12:00 Panel discussion: Hospital-based influenza surveillance—determining denominators and use as a platform for other respiratory pathogens
- *Bhutan, Mr Binay Thapa, Ministry of Health*
- *Cambodia, Dr Seng Heng, Ministry of Health*
- *Indonesia*
- *Mongolia, Dr Oyungerel Darmaa, NCCD*
- *Thailand, Dr Malinee Chittaganpitch, NIH*
- *Viet Nam, Dr Nguyen Vu Thuong, PI HCMC and Dr Ngu Duy Nghia, NIHE*

12:00 – 13:00 *Lunch*

13:00 – 15:00 Plenary 6: Influenza vaccines: improving national policies and implementation

13:00 – 13:30 Seasonal influenza vaccination policies, recommendations and practices in the World Health Organization's Western Pacific and South-East Asia Regions
- Dr James D. Heffelfinger, WHO/WPRO

13:30 – 13:50 Partnership for Influenza Vaccine Introduction (PIVI)
- Dr Joseph Bresee, United States Centers for Disease Control and Prevention, USA

13:50 – 14:15 National influenza vaccine policies and practices
- *Bangladesh*
- *China*
- *Lao PDR*
- *Mongolia*
- *Sri Lanka*
- *Thailand*

14:15 – 14:55 Panel discussion: Advancing vaccine policies and uptake
- *Bangladesh, Dr Meerjady Sabrina Flora, IEDCR*
- *China, Dr Chen Tao, China CDC*
- *Lao PDR, Dr Anonh Xeuatvongsa, Ministry of Health*
- *Mongolia, Dr Narangerel Dorj, Ministry of Health*
- *Sri Lanka, Dr Manjula Kariyawasam, Ministry of Health*
- *Thailand, Ms Suthanun Suthachana, Ministry of Public Health*

14:55 – 15:00 Introduction to breakout sessions
- Dr Edna Moturi, WHO/WPRO

15:00 – 15:20	*Coffee Break*
15:20 – 17:00	**Plenary 7: Influenza priorities for 2017 and beyond: Breakout sessions**
	Session 1: Data for action
	Session 2: Advancing vaccine policies and uptake
	Session 3: New laboratory technologies
17:00 – 17:20	*Coffee Break*
17:20 – 19:00	Global Initiative on Sharing All Influenza Data (GISAID) Tutorial *- Dr Naomi Komadina, VIDRL*

Day 3 – Thursday, 27 April 2017

08:30 – 08:40	Recap of Day 2
08:40 – 10:20	**Plenary 7: Influenza priorities for 2017 and beyond (continued)**
08:40 – 08:55	2017 and beyond: Epidemiology priorities
08:55 – 09:10	2017 and beyond: Laboratory priorities
09:10 – 09:25	2017 and beyond: Vaccine priorities
09:25 – 10:20	Discussion
10:20 – 10:40	*Coffee Break*
10:40 – 11:50	**Plenary 8: Public Health Research and Development: Influenza vaccines**
10:40 – 11:00	Updating WHO public health research agenda for influenza *- Dr Weigong Zhou, WHO/HQ*
11:00 – 11:20	H7N9 vaccine development *- Dr Shu Yuelong, National Institute for Viral Disease Control and Prevention, China*
11:20 – 11:50	Influenza vaccines: Present and future *- Dr Kanta Subbarao, VIDRL*
11:50 – 13:00	*Lunch*
13:00 – 13:45	**Conclusions and Recommendations**
	Closing ceremony
14:00 – 17:30	**Site visit to the Institute for Medical Research (IMR) Malaysia**
14:00 – 17:45	**Western Pacific Region PIP Forum** *-Mr Paul Rogers, WHO/HQ*

Annex 3: PIP Forum report

1. Introduction

A side meeting on the *Pandemic Influenza Preparedness (PIP) Framework in the WHO Western Pacific Region* was held on 27 April in Kuala Lumpur, Malaysia. The meeting was coordinated by the WHO Regional Office for the Western Pacific.

This session was attended by participants from the five Member States in the WHO Western Pacific Regions that are funded by the PIP framework and participants from WHO Collaborating Centres, WHO country offices, WPRO, and WHO Headquarters.

2. Objectives and expected outcomes

The aim of the meeting was to review the implementation of the PIP framework to date and plan steps forward for the remainder of 2017 and 2018

The objectives of this meeting were to:

1) Brief MS and NICs on developments in the PIP Framework review and implications for PC Implementation in 2018 and beyond;
2) Provide an update on PIP Implementation at global level and in the Western Pacific Region as a whole and within PIP priority countries in 2016 and in 2017 to date; and
3) Prioritize actions for the remainder of 2017 in the Western Pacific Region as a whole and within PIP priority countries.

3. Proceedings

The meeting was inaugurated by the Regional Emergency Director and Director of Health Security and Emergencies of the WHO Regional Office for the Western Pacific, Dr Li Ailan.

3.1 PC Implementation Overview: WPRO countries

Mr Paul Rogers, WHO Headquarters

Mr Rogers discussed how WHO and partners are preparing for a second phase of PIP implementation based upon the High Level Implementation Plan (HLIP) I that provided several objectives, including 1) all countries should have in place well established core capacities for surveillance, risk assessment, and response at the local, intermediate and national level, as required by the IHR; 2) all countries should have access to a National Influenza Centre (NIC) laboratory – the backbone of the GISRS; 3) a clearer picture of the influenza health burden on different populations should be established; 4) all countries should have access to pandemic influenza vaccines and antiviral medicines to help reduce pandemic-related morbidity and mortality; 5) all countries should have improved capacities to carry out effective risk communications at the time of a pandemic. Although much progress has been made on these objectives, Mr Rogers highlighted how a recent review and rigorous requirements from industry partners,

to major funders of the PIP Framework, have helped to highlight necessary changes to the HLIP, which will be reflected in the HLIP II.

Mr Rogers then discussed the progress PIP priority countries in the WPR have made under the current HLIP. He also stressed the importance of completing the September 2017 questionnaire that will assess progress in these capacity indicators under HLIP 1 in close collaboration with MS stakeholders, WHO country offices and WHO regional offices. These questionnaires are useful not only for industry and other stakeholders but also for MS to see what capacities have been enhances and where gaps may still remain.

In March 2017 the PIP advisory group met to reformulate the HLIP to build upon the 10-year horizon of HLIP I. New directions for HLIP II may include building on cross-sectoral collaborations within the One Health framework, greater emphasis on making use of burden of disease estimates to inform policy decisions, technical assistance to increase vaccine production capacity through building upon the Global Action Plan for Influenza Vaccines, make better use of social science approaches, and increased clarity within the PIP Framework.

3.2 PIP Partnership contribution: regional achievements and challenges

Dr Li Ailan, WHO Regional Office for the Western Pacific

PIP is embedded within the Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies (APSED III) along with several other initiatives including Universal Health Coverage and the Sustainable Development Goals.

Dr Frank Konings provided an update on the laboratory capacity building at the regional office level. Recent advances see almost all NICs in the region able to conduct real time PCR and have high capacity for molecular diagnostics as per the EQA programme and capacity for virus isolation is now also being document through an EQA programme run by the WHO collaboration centre in Melbourne, Australia. Several Member States have capacity on site for sequencing of influenza viruses and 22 Member States have been certified in Infectious Substances Shipping.

Dr Li discussed the impact of trainings funded through PIP on capacity building and pandemic preparedness. Trainings include field epidemiology, infection prevention and control, bio-informatics, and many others. Regional surveillance capacity has increased and 35 MSs have contributed to regional dashboards, 28 countries and areas are contributing epidemiologic data to FluID in 2017 compared to zero in 2014. In addition, preliminary estimates of disease burden have been conducted in four MSs (Cambodia, Lao PDR, Mongolia, Viet Nam) and several estimates have been submitted for publication.

Challenges and gaps identified at the regional level include omission of pandemic plans from HLIP I, continued need to enhance collaboration at the human-animal interface, using burden data for policy development, linkage of risk communication and laboratory capacity strengthening to surveillance and risk assessments, and challenges with monitoring and evaluation.

3.3 PIP country updates

1) Cambodia: In 2016 several trainings were held to increase pandemic preparedness under the PIP Framework. Examples included training on molecular testing, virus isolation, and sequencing, sample collecting and management, protocol development for event-based surveillance systems, and applied epidemiology training sessions. There are seven ILI and eight SARI surveillance sites in Cambodia. During 2016, data from these were uploaded weekly with quality assurance

visits to several of these and trainings on reporting and collection. Influenza outbreaks in poultry (H5N1 and H7N3) and humans (H1N1) resulted in enhanced surveillance by activating rapid response teams and applied epidemiology trainees. Risk communication improved through health education and hospital based training for identification of ILI and SARI cases. A pilot Hospital Admission Survey (called Hospital Admission Review in Cambodia) was conducted following WHO methodology and an estimated influenza-associated SARI hospitalization rate was determined. Ongoing efforts for risk communication about avian influenza were conducted via radio, media briefings, manuals and lectures.

2) Lao PDR: Activity support in 2016 focused mainly on SARI surveillance and event-based surveillance, outbreak response including trainings to test response capacity, and multisectoral coordination through regular meetings between animal and human health sectors. Moving forward, the priority is to sustain current capacity and continue supporting SARI surveillance as well as better understand supply chain dynamics in border areas, outbreak response and supply of laboratory reagents. There is a goal to update the pandemic preparedness plans and address indicators that are scoring low. The growing detection of avian influenza in the last year highlights the need to remain vigilant about pandemic influenza preparedness.

3) Pacific Island Countries: Activities and achievement to date include success of most planned deliverables for 2016. Although tropical cyclone Winston and other health emergencies postponed some of the activities they also led to capacity development in key areas such as expansion of ILI and SARI surveillance on the EWARS platform and improved detection, investigation, reporting and management of SARI cases and clusters. Laboratory capacity was strengthened and the number of influenza PCR tests doubled since 2014. The 2017 PanStop exercise was held in Fiji to facilitate multi—sectoral collaboration and identify gaps and surveillance as well as many other activities and achievements, including monthly surveillance bulletin in Fiji, integrated epidemiology and laboratory capacity building approach in Solomon Island through use of a new rapid kit and integrated epidemiology-laboratory-rapid responder trainings for outbreak teams.

4) Viet Nam: In 2016, surveillance and laboratory systems were enhanced through access to laboratory consumables, surveillance system reviews and development of an ILI, SARI and hand, foot and mouth disease action plan for 2017-2020. SARI case management was strengthened though trainings and NIC capacities were strengthened for viral isolation, sequencing, and bioinformatics. Coordination and collaboration between human and animal laboratories were also strengthened using the One Health approach. The current work plan focuses on piloting a hospital-based event-based surveillance system, SARI case management trainings, and enhancing SARI surveillance in Dien Bien province. Challenges include limited human resources, funding with different priorities which can overwhelm government counterparts and limited SARI capacities at subnational levels.

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