Seventh Meeting of National Influenza Centres and Influenza Surveillance in the Western Pacific and South-East Asia Regions

Beijing, China
12-15 November 2013
REPORT

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

Convened by:

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NOTE

The views expressed in this report are those of the participants in the Seventh 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 Organization.

This report has been prepared by the World Health Organization Regional Offices for the Western Pacific and South-East Asia for governments of Member States in the Regions and for those who participated in the Seventh Meeting of National Influenza Centres and Influenza Surveillance, which was held in Beijing, China from 12 to 15 November 2013.
The Seventh Meeting of the National Influenza Centres (NICs) and Influenza Surveillance in the Western Pacific and South-East Asia Regions was held in Beijing, China, from 12 to 15 November 2013. Fifty-one participants from 22 countries and areas attended the meeting. Participants included directors, epidemiologists, laboratorians, public health officials and researchers from Australia, Cambodia, China, the Democratic People’s Republic of Korea, Fiji, Hong Kong (China), Indonesia, Japan, the Lao People’s Democratic Republic, Malaysia, Mongolia, Myanmar, New Caledonia, New Zealand, Papua New Guinea, the Philippines, the Republic of Korea, Singapore, Sri Lanka, Viet Nam, Thailand and Timor-Leste. Temporary advisers to the meeting included nine experts from three World Health Organization (WHO) Collaborating Centres for Reference and Research on Influenza (i.e. Victorian Infectious Diseases Reference Laboratory, Melbourne, Australia; Chinese NIC, National Institute for Viral Disease Control and Prevention, Beijing, China; and National Institute of Infectious Diseases, Tokyo, Japan), one WHO Collaborating Centre for Surveillance, Epidemiology and Control of Influenza (i.e. United States Centers for Disease Control and Prevention, Atlanta, Georgia, United States of America), one WHO Collaborating Centre for Strengthening Capacity for Emerging Infectious Diseases (i.e. National Institute of Virology, Pune, India), the Thai NIC (Nonthaburi, Thailand) and Canterbury Health Laboratories (Christchurch, New Zealand). The WHO Secretariat consisted of 16 representatives from Headquarters; the Regional Offices for the Western Pacific and South-East Asia; and country offices in China, Indonesia, the Lao People’s Democratic Republic, Mongolia, Myanmar, Nepal and Viet Nam. In addition, 43 physicians and laboratorians from China CDC attended the meeting as observers.

The objectives of the meeting were:

1. To review progress of the NICs and the influenza surveillance systems in the Western Pacific and South-East Asia Regions;

2. To review preparedness and identify actions based on lessons learned from avian influenza A(H7N9) in early 2013 within the Global Influenza Surveillance and Response System framework; and

3. To share experiences of severe acute respiratory infection (SARI) detection in the face of emerging infectious diseases.

The 4-day programme consisted of six plenary sessions. These sessions covered regional and global updates, lessons from avian influenza A(H7N9), surveillance for SARI, influenza vaccine introduction, emerging disease threats and technical updates on influenza research for public health action. There was also a panel discussion on avian influenza A(H7N9) preparedness and a debate on whether SARI surveillance is worthwhile in a resource-limited setting. Additionally, participants were divided into smaller groups to evaluate a proposed annual epidemiology and laboratory survey.
The meeting also included site visits to the Chinese NIC, Peking University People’s Hospital and the Centre for Disease Control and Prevention of Xicheng District.

Meeting recommendations included agreement that Member States should continue to improve sentinel, laboratory-based virological and event-based surveillance; promote surveillance, laboratory confirmation and reporting of hospitalized influenza cases; ensure that updated and appropriate national pandemic preparedness plans and laboratory preparedness and safety plans are in place; and encourage utilization of influenza surveillance data and research to support public health actions. It was also recommended that WHO provide technical guidance and support to ensure the alignment of influenza surveillance programmes with country-specific objectives and global surveillance standards; provide practical guidance for pandemic risk and severity assessments; support prioritization of activities as outlined in the biregional plan developed in 2011; and determine how to best monitor changes in influenza surveillance capacity.
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Key words

/Communicable diseases, Emerging – prevention and control/
/Influenza A virus, H7N9 subtypes/Influenza in birds – epidemiology, prevention and control/Influenza vaccines/Pandemics-prevention and control
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<thead>
<tr>
<th>ACRONYMS</th>
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<tr>
<td>ADHB</td>
<td>Auckland District Health Board</td>
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<tr>
<td>APACI</td>
<td>Asia-Pacific Alliance for the Control of Influenza</td>
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<tr>
<td>APSED</td>
<td>Asia Pacific Strategy for Emerging Diseases 2010</td>
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<td>China CDC</td>
<td>China Centre for Disease Control and Prevention</td>
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<tr>
<td>CMDHB</td>
<td>Counties Manukau District Health Board</td>
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<tr>
<td>EOC</td>
<td>emergency operation centre</td>
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<tr>
<td>GFP</td>
<td>general family practitioner</td>
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<tr>
<td>GISRS</td>
<td>Global Influenza Surveillance and Response System</td>
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<tr>
<td>HI</td>
<td>haemagglutination inhibition</td>
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<tr>
<td>ICMR</td>
<td>Indian Council of Medical Research</td>
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<td>IEIP</td>
<td>International Emerging Infections Programme</td>
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<td>IHR</td>
<td>International Health Regulations</td>
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<td>ILI</td>
<td>influenza-like illness</td>
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<td>MERS-CoV</td>
<td>Middle East respiratory syndrome coronavirus</td>
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<td>NCCD</td>
<td>National Centre of Communicable Diseases</td>
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<td>NIC</td>
<td>National Influenza Centre</td>
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<td>NIH</td>
<td>National Institute of Health</td>
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<td>National Institute of Infectious Diseases</td>
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<td>NIV</td>
<td>National Institute of Virology</td>
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<tr>
<td>NMFI</td>
<td>nonmalaria febrile illness</td>
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<tr>
<td>PCR</td>
<td>polymerase chain reaction</td>
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<td>PIP</td>
<td>Pandemic Influenza Preparedness</td>
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<td>PIRM</td>
<td>Pandemic Influenza Risk Management</td>
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<td>RT-PCR</td>
<td>reverse transcription polymerase chain reaction</td>
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<td>SARI</td>
<td>severe acute respiratory infection</td>
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<td>SARS</td>
<td>severe acute respiratory syndrome</td>
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<td>SEARO</td>
<td>Regional Office for South-East Asia</td>
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<td>SHIVERS</td>
<td>Southern Hemisphere Influenza and Vaccine Effectiveness Research and</td>
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<td></td>
<td>Surveillance</td>
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<td>US CDC</td>
<td>United States Centers for Disease Control and Prevention</td>
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<td>VIDRL</td>
<td>Victorian Infectious Diseases Reference Laboratory</td>
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<td>WHO</td>
<td>World Health Organization</td>
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<td>WPRO</td>
<td>Regional Office for the Western Pacific</td>
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1. INTRODUCTION

The World Health Organization (WHO) Global Influenza Surveillance and Response System (GISRS) is a network of 6 WHO Collaborating Centres, 4 WHO Essential Regulatory Laboratories, 141 institutions in 111 WHO Member States recognized by WHO as National Influenza Centres (NICs), and ad hoc groups established to address specific emerging issues. GISRS gathers and analyses information on the appearance of novel strains of influenza viruses. It also collects and collates data on circulating strains of influenza viruses, which enables WHO to make biannual recommendations for the content of the influenza vaccine for the northern and southern influenza seasons.

The Asia-Pacific region, which includes the Western Pacific Region and South-East Asia Region under WHO, is considered one of the world's epicentres for the emergence of novel influenza strains and hence has a substantial impact on the global influenza public health agenda. The high density of human populations and swine and avian species is a core reason that Asia and the Pacific remains a hot spot of interspecies influenza transmission. Over 300 cases of human influenza A(H5N1) have been reported from this region over the past decade. Most recently, avian influenza A(H7N9) emerged in China, resulting in 132 human cases and 39 deaths between February and June 2013. For H7N9, GISRS was crucial in providing technical guidance and support, aiding virus sharing and characterization, and supporting preparedness and response.

Influenza surveillance has been established in many countries and areas in Asia and the Pacific to support global surveillance efforts, as well as national response and control efforts. Laboratory support through GISRS in the region currently includes 21 NICs in 15 countries in the Western Pacific Region, 10 NICs in 8 countries in the South-East Asia Region, and 3 WHO Collaborating Centres for Reference and Research on Influenza (1 each in Australia, China and Japan). This system has been invaluable for sharing viruses for further characterization and potential vaccine production as well as in rapidly developing and sharing laboratory protocols. In fact, the majority of the seed strains used in the production of the seasonal and pandemic influenza vaccines in the last 20 years originated from the Asia-Pacific region.

GISRS has been further strengthened by annual meetings, which have been held since 2007 to provide an opportunity for ministries of health, NICs, WHO and other partners to share experiences, successes and challenges.

(1) The First Meeting of NICs in the Western Pacific and South-East Asia Regions was held in Melbourne, Australia, from 1 to 4 May 2007. A biregional, 4-year work plan for strengthening national influenza surveillance capacity was formulated during the meeting.
The Second Meeting of NICs in the Western Pacific and South-East Asia Regions was held in Tokyo, Japan, from 21 to 24 April 2008. Guidelines on comprehensive influenza surveillance and influenza disease burden studies were introduced. A software database for NICs was also presented.

The Third Meeting of NICs in the Western Pacific and South-East Asia Regions was hosted by the Chinese NIC in Beijing, China, from 18 to 20 August 2009. Lessons learned from the influenza A(H1N1)pdm09 response were reviewed, and appropriate measures for mitigating the impact of the pandemic were determined.

The Fourth Meeting of NICs in the Western Pacific Region was held in Manila, Philippines, from 3 to 6 May 2010. Participants were encouraged to share their experiences during the influenza A(H1N1)pdm09 pandemic to assist countries and areas in developing preparedness plans and laboratory contingency plans.

The Fifth Meeting of NICs in the Western Pacific and South-East Asia Regions was held in Vientiane, Lao People's Democratic Republic, from 7 to 10 June 2011. The capacity of the network in the Regions was reviewed, and the next 5-year plan for national influenza surveillance, Biregional plan for further strengthening national influenza surveillance, was developed.

The Sixth Meeting of NICs and Influenza Surveillance in the Western Pacific and South-East Asia Regions was held in Ha Noi, Viet Nam, from 29 to 31 May 2012. It was agreed that countries and areas should explore opportunities for multicountry collaborations to maximize efforts and resource utilization within the internationally accepted Pandemic Influenza Preparedness (PIP) Framework endorsed by WHO.

The WHO Regional Office for the Western Pacific (WPRO) and the WHO Regional Office for South-East Asia (SEARO), in partnership with the Chinese Centre for Disease Control and Prevention (China CDC), organized the Seventh Meeting of NICs and Influenza Surveillance in the Western Pacific and South-East Asia Regions, which was held in Beijing, China, from 12 to 15 November 2013.
1.1 Objectives

(1) To review progress of the NICs and influenza surveillance systems in the Western Pacific and South-East Asia Regions.

(2) To review preparedness and identify actions based on lessons learned from avian influenza A(H7N9) in early 2013 within the GISRS framework.

(3) To share experiences of severe acute respiratory infection (SARI) detection in the face of emerging infectious diseases.

1.2 Welcome and Opening Remarks

Dr Bernhard Schwartlander, WHO Representative, China, opened the meeting on behalf of WHO and Dr Shin Young-soo, WHO Regional Director for the Western Pacific. He conveyed appreciation to the Government of China for hosting this meeting. Dr Schwartlander emphasized that China remains at the forefront in the battle against influenza with pandemic potential, and has already made exceptional contributions to the global fight against emerging diseases. He pointed out that China's discovery of the first cases of influenza A(H7N9) in humans aptly demonstrated the value of investing in core capacity under the International Health Regulations, known as IHR (2005). Furthermore, China's swift response highlighted strong, collaborative leadership with a robust commitment to the global public health community. China's exemplary response to H7N9 reminds us of the importance of continuing to invest in and work towards strengthening national and global systems to detect, diagnose and respond to influenza and other emerging diseases.

Dr Schwartlander stated that influenza viruses like H5N1 and H7N9 still threaten our health security, and new respiratory pathogens continue to emerge, such as Middle East respiratory syndrome coronavirus (MERS-CoV). He emphasized the
importance of surveillance systems being able to quickly document the existence and severity of these emergent viruses as well as to provide decision-makers with the data required to develop or fine-tune national influenza control policies. He encouraged utilizing the excellent foundations of influenza surveillance in the Regions to further develop the NIC network into an acute respiratory illness surveillance platform that will not only meet, but stay ahead of, these emerging disease challenges.

Dr Schwartlander welcomed influenza experts from multiple national influenza centres and national epidemiological surveillance departments in both Regions. He expressed great appreciation for the participants' dedication to strengthening the Regions' core capacities to address influenza, emerging diseases and other public health events under the biregional Asia Pacific Strategy for Emerging Diseases (APSED 2010) and within the context of IHR (2005). Finally, he encouraged participants to think strategically, to focus on sustainable opportunities and to develop innovative ways to improve collaboration and information-sharing among organizations, both nationally and within the Regions.

Dr Xiao Donglou, Director-General of Public Health, Bureau of Disease Prevention and Control, National Health and Family Planning Commission, China

Director-General Xia Donglou welcomed participants and influenza experts. He described China’s exemplary response to H7N9 and recognized the importance of the global influenza systems in early detection. The Director-General looked forward to sharing with the international community the research data and outbreak experiences gained through response efforts. He also recognized the importance of international transmission of influenza and other emerging infectious diseases. Finally he thanked WHO and other partners for their long standing support to China influenza prevention and control.

Dr Yang Weizhong, Deputy Director General, China CDC, China

Dr. Yang Weizhong welcomed influenza experts. He commented on the similar theme but obvious differences between the 2009 NIC meeting during the response to pandemic H1N1 compared to this meeting in response to H7N9, both held in the same location in Beijing. He pointed out the importance of remaining vigilant and prepared for response to pandemic influenza and used China’s detection and response of H7N9 as an example. He also recognized the importance of China’s WHO Collaborating Center and the significant support to the GISRS network and other contributions made to date.
2. PROCEEDINGS

2.1 Plenary session 1: Regional and global updates

_Chairs: Dr Xiao Donglou, National Health and Family Planning Commission, China, and Ms Ann Moen, United States Centers for Disease Control and Prevention (US CDC), United States of America_

As an epicentre for the emergence of novel influenza strains, the Asia-Pacific region has a strong impact on the global influenza public health agenda. It is therefore important to understand circulating strains of influenza viruses in the northern and southern hemispheres of the region, which enables WHO to recommend biannually the content of the influenza vaccine for the subsequent influenza season.

Member States need to be able to detect and rapidly respond to public health emergencies at national and international levels, the latter being a core capacity for Member States to meet IHR (2005) requirements. For Asia and the Pacific, WPRO and SEARO have developed APSED (2010), which functions as a guide for Member States to achieve IHR core capacities, including those related to laboratory capacity. The PIP Framework provides further guidance for pandemic preparedness.

2.1.1 Implementation of International Health Regulations 2005 through the Asia Pacific Strategy for Emerging Diseases 2010

Dr Frank Konings, on behalf of Dr Li Ailan, WPRO, stated that 2013 was an unusual year for emerging infectious diseases, with the world experiencing and managing two novel virus infections, avian influenza A(H7N9) and MERS-CoV. As the epidemiology of both agents is still evolving, there is a need to manage such situations in a time of uncertainty and to be prepared for different scenarios. These events emphasize the value of APSED (2010) and IHR (2005).

Based on self-assessment by 26 countries, Member States reported that all IHR (2005) regional core capacity scores increased, on average, in 2013 compared to 2012. For example, WHO assisted Member States with the establishment of functional emergency operation centres (EOCs) within their ministries of health, and WPRO upgraded its own EOC. Additionally, there has been enhanced IHR (2005) communication and increased posting on the event information site. WHO contributed to building laboratory capacity for sequencing and phylogenetic analysis of influenza, shipping of infectious substances and external quality assessment for influenza.

While making progress, many challenges remain. We are tested by real-world outbreaks, such as an initially unknown disease and avian influenza A(H5N1) in Cambodia, a dengue epidemic in the Lao People's Democratic Republic, avian influenza A(H7N9) in China and MERS-CoV. With respect to avian influenza A(H7N9), China notified WHO of its first cases on 31 March 2013. Within 24 hours after notification, a “One WHO” event management system was activated, and WPRO activated its EOC.
using a coordinated management approach. All actions and the course of events are summarized in the WPRO publication, *Avian influenza A(H7N9) response: an investment in public health preparedness.*

In conclusion, progress has been made, and challenges have been identified in strengthening and sustaining national and regional capacities. We continue to face emerging infectious disease threats, and a central role remains for IHR (2005) globally and APSED (2010) in both Regions. GISRS serves as a good example of collectively managing shared risk. The influenza work provides a foundation for influenza and beyond, e.g. SARI surveillance.

2.1.2 Influenza activity in the southern hemisphere

Dr Ian Barr, Victorian Infectious Diseases Reference Laboratory (VIDRL), Australia, noted that at the time of this presentation, the influenza season was coming to an end in the temperate regions of the southern hemisphere, while some of the more tropical regions were moving into their wet seasons, a time of increased influenza activity. The 2013 influenza season in Australia, New Zealand and the surrounding regions has been a relatively mild one, after the more intense 2012 season. This year, both influenza A subtypes, A(H3N2) and A(H1N1)pdm09, and influenza B viruses circulated widely, unlike in 2012 when A(H3N2) viruses predominated. The impact of the 2013 season on hospital and intensive care unit admissions and deaths was also lower than 2012. A good source of up-to-date information on influenza activity is available from Google Flu Trends,¹ which maps the use of key terms such as “flu” or “influenza” by its search engine users in some 29 countries (including 9 from the southern hemisphere), although few are from SEARO tropical or subtropical regions. Another source is the WHO website, which tracks influenza cases as well as type and subtype data that has been entered by the NICs into FluNet.²

In terms of the influenza vaccine match against influenza viruses circulating in 2013, there was an excellent match with the A(H1N1)pdm09 viruses and a reasonable match with the A(H3N2) and B viruses. Like the vaccine B component, most of the B viruses circulating were of the B/Yamagata lineage in Australia and New Zealand, while the proportion of circulating B/Victoria lineage viruses was higher in Singapore, Cambodia and the Philippines. The number of NICs sending samples to VIDRL in 2013 (14) was the same as in 2012, with a majority of samples being clinical samples (55%) and the rest (45%) being viral isolates. Samples received at VIDRL during 2013 were reasonably recent, with a median of a 22.7-day delay from the time of sampling to the time the samples were received, with only 2% of samples received being more than 6 months old. Resistance to neuraminidase inhibitors, such as Tamiflu or Relenza, was very low in 2013, while high levels of resistance remain to the adamantanes such as amantadine and rimantadine.

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¹ [http://www.google.org/flutrends](http://www.google.org/flutrends)
### 2.1.3 Influenza activity in the northern hemisphere

Dr Masato Tashiro, National Institute of Infectious Diseases (NIID), Japan, noted that influenza A(H1N1)pdm09, A(H3N2) and B viruses co-circulated in many countries in the northern hemisphere. Regional and widespread outbreaks occurred in Europe and part of northern Africa in February and March. Thereafter, activity generally ranged from sporadic to local in Asia and North America.

Recent A(H1N1)pdm09 viruses, which belonged to genetic clade 6 and 7, were antigenically similar to the recommended vaccine virus A/California/7/2009. The majority of A(H1N1)pdm09 viruses were sensitive to oseltamivir. A small number of viruses showed highly reduced inhibition by oseltamivir (and peramivir where tested) due to the H275Y mutation. All viruses tested were sensitive to zanamivir and laninamivir. Antigenic characteristics of A(H3N2) viruses collected from February to August 2013 were assessed with panels of post-infection ferret antisera in haemagglutination inhibition (HI) and virus neutralization assays. The majority of recent A(H3N2) viruses were antigenically similar to cell-propagated reference viruses (e.g. A/Texas/50/2012 and A/Victoria/316/2011) but distinguishable from those adapted to eggs. Both Yamagata-lineage and Victoria-lineage B viruses co-circulated, but the former relatively predominated. The majority of Yamagata-lineage was represented by B/Massachusetts/2/2012.

It is recommended that the following viruses be used for influenza vaccines for the northern hemisphere in the 2013–2014 influenza season:

1. an A/California/7/2009 (H1N1)pdm09-like virus;
2. an A(H3N2) virus antigenically like the cell-propagated prototype virus A/Victoria/361/2011 (e.g. egg-grown A/Texas/50/2012); and
3. a B/Massachusetts/2/2012-like virus.

### 2.1.4 Pandemic preparedness and the Pandemic Influenza Preparedness Framework

Dr Zhang Wenqing, WHO Headquarters, stated that the Pandemic Influenza Risk Management (PIRM) guidance is under revision based on lessons learned from pandemic influenza A(H1N1)pdm09 and current needs, and an interim version should be available shortly. The main differences in the 2013 PIRM guidance are recommended actions based on risk assessment, resources and needs rather than global phases; recognition that phases represent a “global average” rather than being applicable to each country simultaneously; guidance based on principles of all-hazard emergency risk management rather than just influenza-specific risk; and a flexible approach that allows decisions to be made at a national level commensurate with risk rather than a rigid approach.

The PIP Framework is meant to improve influenza pandemic preparedness and response and to strengthen the protections against an influenza pandemic. The main focus of the PIP Framework is on sharing of avian influenza A(H5N1) and influenza
viruses with human pandemic potential with WHO Collaborating Centres or H5N1 reference laboratories, as well as sharing benefits such as access to vaccines. The framework does not apply to seasonal influenza viruses or other noninfluenza pathogens or biological substances that may be contained in clinical specimens shared under the framework.

2.2 Plenary session 2: Learning from the newly emerging influenza threat, H7N9

Chair: Dr Yuelong Shu, China CDC, China

The recent outbreak of avian influenza A(H7N9) in China serves as a reminder of the importance of preparedness and capacity for response to emerging influenza viruses. Lessons from this outbreak are relevant to laboratory preparedness and response as well as to epidemiological investigation to support response efforts. It is also important to understand how preparations for the upcoming influenza season should be designed based on lessons from this outbreak.

2.2.1 Laboratory preparedness and response to H7N9 outbreak

Dr Wang Dayan, China CDC, described that a novel avian influenza A(H7N9) virus causing severe human infection was first identified in China, triggering great global public health concern. The discovery and identification of the H7N9 virus was in large part due to capacity developed in recent years at the Chinese NIC, which is one of six WHO Collaborating Centres for Reference and Research on Influenza. The H7N9 virus is an avian-origin reassortant strain containing haemagglutinin derived from the avian influenza A(H7N3-like) virus, neuraminidase from avian influenza A(H7N9-like) virus and six internal gene segments from avian influenza A(H9N2) virus. Genetic evidence indicates that poultry are the reservoir of the virus, and studies have suggested that several mutations in the influenza haemagglutinin may be involved in the ability of the avian influenza A(H7N9) virus to infect humans. Additionally, the special dual-receptor binding profile of the H7N9 virus indicates that the virus could infect humans easier than H5N1 and that the cytokine storm contributes to the clinical severity of human infection with the virus. Studies of animal models demonstrated that the H7N9 virus was efficiently transmitted via direct contact, but less efficiently by airborne exposure in a ferret model, which highlights the pandemic potential of the novel H7N9 influenza virus. These findings provided scientific insights into the infectivity, transmissibility and pathogenesis of the novel H7N9 virus and were essential for global risk assessment and development of response strategies. Thus, the influenza surveillance network in China was strengthened not only for influenza but also for other infectious respiratory diseases.

2.2.2 Epidemiological investigation to support the H7N9 response

Dr Zhou Lei, China CDC, stated that an outbreak of human infections with a novel avian influenza A(H7N9) virus began in February 2013, primarily in eastern China. This outbreak resulted in 138 confirmed cases with 45 deaths, identified from 12 provinces, as of 12 November 2013.

Epidemiological investigation played an important role throughout the H7N9 emergency response. When the outbreak was detected, a systematic description of the clinical and epidemiological characteristics of H7N9 cases and a comparison of clinical, epidemiological and laboratory characteristics between H5N1 and H7N9 cases were done to support decision-making about the H7N9 response strategy by identifying the similarities and differences between the two subtypes of the avian influenza viruses. Epidemiological field investigations on exposure history and risk factors for infection were especially important to providing clues and evidence for the hypothesis of a poultry and poultry-related environmental transmission route and to supporting control measures. Investigation and analysis of the incubation period also provided evidence to support investigation of close contacts and duration of medical observation. The in-depth epidemiological investigations of four family clusters provided important information to evaluate and determine the risk of human-to-human transmission. Finally, epidemiological investigations provided data for observational and modelling studies of the effectiveness of control measures such as live poultry market closure.

There were some challenges to the epidemiological investigations of H7N9. The most prominent challenge was the collection of detailed information, which was especially difficult because (1) patients were often critically ill or had died at the time of interview; (2) no standard investigation protocol or questionnaire was available; and (3) data-sharing was often delayed and inefficient. Thus, the incomplete spectrum of H7N9 infections due to surveillance limitations may have oriented the epidemiological investigations in the wrong direction.

2.2.3 Preparing for upcoming influenza season based on lessons learned in China

Dr Zhang Yanping, China CDC, detailed that after the pandemic of severe acute respiratory syndrome (SARS), which caused huge losses in both human health and the economy in 2002 and 2003, authorities established new laws and regulations and took prompt actions. These actions included the establishment of a public health emergency response system, infectious disease surveillance mechanisms and early warning systems, while developing the capacity of influenza network laboratories and promoting international cooperation to strengthen emergency response and preparedness capacity in China. The emergence of additional infectious diseases has become a great challenge for China, but successful responses to several emerging infectious disease events has shown the effectiveness of capacity building. Preparedness and capacity for emergency response is improving through practice.

In early 2013, a new kind of influenza virus, avian influenza A(H7N9), was identified in China. Upon that identification, public health agencies undertook rapid and comprehensive responses, such as isolating and identifying the virus at the beginning of
the outbreak, improving surveillance systems to identify patients, making policies based on evidence from outbreak investigation and research, and sharing information about the outbreak. These actions successfully prevented the virus from spreading for a few months. However, risk factors for H7N9 still exist in China. For example, the poultry breed/trade/slaughter pattern and human habits, which lead to direct exposure, have not changed. Thus, the China CDC will continue to enhance epidemiological investigation and virological surveillance and improve the laboratory diagnosis capacity for avian influenza in health care facilities.

2.3 Discussion: H7N9–Are we prepared?

Chair: Anne Kelso, VIDRL, Australia

Panel members: Dr Zainah Saat, Institute of Medical Research, Malaysia; Dr Le Thi Quynh Mai, National Institute of Health, Viet Nam; Dr Ly Sovann, Ministry of Health, Cambodia; Dr Krisna Nur Andriana Pangesti, Ministry of Health, Indonesia; Dr Masato Tashiro, NIID, Japan; Dr Chun Kang, Korea Centers for Disease Control and Prevention, Republic of Korea; Dr Malinee Chittaganpitch, Thai NIC, Thailand; Dr Xiyan Xu, US CDC, United States of America; Dr Yuelong Shu, China CDC, China

This session focused on laboratory preparedness for H7N9, a primary concern for the NICs. The panel included representatives from China who have had experience with H7N9, countries that have not yet experienced H7N9 but are preparing for possible human cases, and WHO Collaborating Centres that are able to support countries and areas in their preparedness.

The China CDC, US CDC, NIID and VIDRL discussed support that is available to individual countries and areas, and each Collaborating Centre welcomed requests from countries and areas for reagents and positive control. NIID reported that their positive control contains one introduced mutation to differentiate possible contamination. Several countries reported having successfully received and used kits from WHO Collaborating Centres and utilizing surveillance and response units for H7N9 preparedness. Many countries and areas felt that their preparedness had improved from H5N1 preparedness activities.

Discussions emphasized the importance of sending samples to WHO Collaborating Centres in a timely manner, even if samples are identified as H7 but not N9. A question was also raised regarding cross-reactivity, which is an important issue because of seasonal circulation of H3N2. The China CDC has not detected cross-reactivity with H3N2, and the US CDC was not aware of any cross-reaction, although at least one co-infection of H7N9 and H3N2 has been detected. Co-infections present a challenge since cultures can be difficult for co-infections.

The importance of biosafety was also emphasized, that countries should err on the side of caution when dealing with influenza samples in light of H7N9. Any samples that are H7-positive should not be cultured outside biosafety level 3 facilities, and several countries report using biosafety level 3 procedures in biosafety level 2 facilities to handle possible H7N9 specimens for reverse transcription polymerase chain reaction (RT-PCR).
Biosafety and biosecurity for veterinary samples were also discussed, and it was emphasized that human and animal samples should always be handled in separate facilities.

Antiviral sensitivity will also be an important question if H7N9 continues to spread. NIID has analysed strains and found some resistance to oseltamivir. The H275Y mutation appears irrelevant for H7N9; however, the R292K mutation has been seen in H7N9, but only in viruses from treated patients, so there is no evidence of resistance circulating between poultry and humans or between humans. Still, it cannot be assumed that known mutations are the only causes of resistance in this virus, so phenotypic assays are important to identify resistance.

Serological screening is limited for H7N9, so countries should not begin large-scale serology studies at this stage.

2.4 Plenary session 3: Strengthening severe acute respiratory infection surveillance to enhance the Asia-Pacific influenza virological platform

Chair: Dr Pushpa Wijesinghe, SEARO

Strengthening capacity for surveillance, diagnosis and reporting of hospitalized cases of acute respiratory infection, normally implemented as SARI surveillance, is an important complement to the influenza-like illness (ILI) surveillance platform. There is regional and global evidence to support the use of SARI surveillance, and several countries and areas have already implemented successful SARI programmes. The importance of strengthening SARI surveillance is highlighted by recommendations from both the 2013 APSED Topic Advisory Group meeting and the Biregional plan for further strengthening national influenza surveillance, drafted following the Fifth Meeting in 2011 and discussed further at last year’s Sixth Meeting in Viet Nam.

2.4.1 SARI surveillance: Improving country capacity to detect and characterize outbreaks of severe respiratory disease

Dr Erica Dueger, WPRO, outlined that influenza surveillance has two primary goals: (1) the early detection of events with pandemic potential due to pathogens causing severe respiratory disease; and (2) monitoring influenza activity for trends and patterns. To accomplish these objectives, two complementary systems are required: an early warning, or event-based, surveillance system and a routine respiratory disease surveillance system for ILI and/or SARI.

Sentinel surveillance for SARI cases is the recommended approach for collecting data and specimens from severe cases of respiratory disease, although other options exist. Both ILI and SARI sentinel surveillance can be used to build and maintain capacity for influenza and to provide isolates for vaccine selection. Sentinel SARI surveillance has additional benefits over ILI surveillance in that quality data can be used to (1) add a severity profile as a gauge for pandemic risk assessments; and (2) estimate the burden of disease to support vaccine policy decisions. In addition, samples from sentinel SARI surveillance sites can provide a more robust spectrum of samples for vaccine selection decisions, as well as open the opportunity for supporting additional
diagnostics (e.g. bacterial, other viruses) and emerging pathogen detection (e.g. MERS-CoV). Finally, the surveillance, diagnostic and reporting systems set up for sentinel SARI surveillance can serve as a platform for additional syndromic surveillance such as acute febrile illness surveillance.

Challenges in implementation and sustainability of sentinel SARI surveillance sites are recognized, so country-specific objectives of sentinel SARI surveillance should be clearly defined and regularly re-evaluated. Strengthening of diagnostics, surveillance and reporting of hospitalized acute respiratory infections is recommended by both the 2013 APSED Technical Advisory Group meeting and the draft *Biregional plan for further strengthening national influenza surveillance*. The Regions have established sentinel SARI surveillance sites in at least 12 countries, and some form of hospitalized pneumonia or acute respiratory illness surveillance in at least 4 additional countries. We now need to ensure that we are maximizing the use of these data to support the burden of disease and severity estimates, vaccine policies and regional and global reporting platforms, as well as to lobby for increased resources to move forward national and regional influenza agendas.

2.4.2 SARI surveillance: A global perspective

Dr Katelijn Vandemaele, WHO Headquarters, noted that there are several objectives for global surveillance, including to monitor circulating influenza virus types globally to facilitate vaccine strain selection and monitor antiviral resistance, describe the seasonality of influenza, identify and monitor groups at high risk for severe disease and mortality, understand the disease burden, and detect unusual and unexpected events that may herald novel influenza viruses. This will allow a risk assessment at a global level and provide the right guidance for prevention and control strategies.

Until 2007, global surveillance focused on the monitoring of circulating influenza virus types for vaccine strain selection. However, the influenza A(H1N1)pdm09 pandemic revealed many challenges, especially the early assessment of severity. This was mainly due to the lack of surveillance systems to monitor the severe end of influenza activity and the lack of global reporting standards and systems. WHO, therefore, provided standard guidance for influenza surveillance, specifically for efficient sentinel surveillance of SARI and ILI and for global reporting platforms such as FluID, in addition to the existing FluNet. Sentinel surveillance systems can provide baseline information on the severe end of influenza, and they can also provide information to define groups at risk for severe disease and serve as basis for burden of disease studies.

Yet sentinel surveillance is not designed to detect unusual events. Therefore, each country needs to invest in national event-based surveillance to detect early unusual events. Key components of event-based surveillance are the ability of clinicians to report quickly, triggers for clinicians to report, mechanisms for reporting and rapid response mechanisms. Although sentinel SARI surveillance is not designed for early warning, it can provide an excellent platform when new respiratory pathogens are detected and allow rapid assessment of the historical and geographic extent of a new respiratory disease.
There are a lot of challenges remaining, such as sustainability, standardization, exchange of information between disciplines and levels, and political commitment. Therefore, we will need to evaluate existing systems to understand how we can make them more efficient when resources are diminishing, develop guidance to obtain the needed information, try to integrate other diseases into the existing platform, and look at how we can better use existing data.

2.4.3 Mongolia country presentation

Dr Nyamkhuu Dulmaa, National Centre of Communicable Diseases (NCCD), Mongolia, described how Mongolia is one of the largest landlocked countries in the world, with a harsh continental climate and four distinctive seasons. Epidemiological and virological surveillance of influenza is performed by a national network coordinated by NCCD in collaboration with district and provincial health centres. The sentinel surveillance network consists of 129 general family practitioner (GFP) and outpatient clinics and 38 hospitals in different parts of the country.

Epidemiological surveillance includes passive weekly online reporting of ILI events among outpatient visits in Ulaanbaatar City and all province centres; active daily online reporting of ILI events by the sentinel sites based on the 129 GFPs, 2 national reference centres (i.e. NCCD and MCRC) in Ulaanbaatar City and 106 sentinel sites in the country; and weekly reporting of morbidity and mortality of patients hospitalized due to pneumonia and SARI in 138 hospitals in Ulaanbaatar City and the provinces.

Virological surveillance also has several components: (1) collection of ILI and pneumonia specimens at the sentinel sites; (2) detection of influenza and other respiratory viruses by real-time RT-PCR and isolation of influenza viruses on Madin-Darby canine kidney cell culture; and (3) characterization of the isolated strains using HI and DNA sequencing for antigenicity and drug-resistance testing. The virology laboratory sends representative viruses isolated each season to a WHO Collaborating Centre, either NIID or the US CDC. The NIC at NCCD analyses surveillance data and sends feedback reports to related units, including the Ministry of Health, WHO and FluNet.

Challenges facing the NIC in Mongolia include a huge territory with a scattered population, which creates difficulties for timely collection of specimens and transport; the high cost of running surveillance throughout the year; and lack of financial encouragement for medical personnel for the “additional” duties connected with influenza surveillance and specimen collection for laboratory analysis.

2.4.4 India country presentation

Dr Devendra Mourya, National Institute of Virology (NIV), India, described that two surveillance systems exist in India. The first is the Indian Council of Medical Research (ICMR) network, which was established in 2003 with the apex laboratory at NIV. This network initially carried out ILI surveillance with five centres in different geographical areas of the country. In 2006, after an outbreak of avian influenza A(H5N1), three centres introduced SARI surveillance. Currently, 10 centres are conducting sentinel ILI surveillance, including 5 that also carry out SARI surveillance.
The other system is the Integrated Disease Surveillance Project Network, which includes 12 laboratories established in 2009 with the apex laboratory at the National Centre of Disease Control. Additionally, there have been several studies done by individual investigators. There are 26 laboratories in the public sector and 19 laboratories in the private sector. Six of the laboratories have biosafety level 3 facilities, and two laboratories (NIV and the National Centre of Disease Control) have the capacity for virus isolation and sequencing.

Under the ICMR network, SARI sites were selected based on accessibility to hospitals and geographical location of the regional centre. For case selection, SARI cases who agreed to participate are sampled and tested by real-time RT-PCR for influenza in the regional laboratories where surveillance activities are carried out; some laboratories conduct further testing for the presence of other respiratory viruses. In the referral laboratory, molecular characterization, sequencing and antiviral susceptibility assays are done. In 2011, 97 out of 1090 (8.9%) SARI cases had influenza; in 2012, 134 out of 1421 (9.4%); in 2013, 4 out of 96 (4.1%). Of the 8352 hospitalized patients referred to NIV from Maharashtra state, 1950 (23.3%) were influenza-positive with influenza A(H1N1)pdm09 co-circulating with type B influenza in 2012 and with influenza A(H3N2) in 2013. A study conducted in adult SARI patients from a tertiary care centre in Pune in 2010 showed influenza A(H1N1)pdm09 predominating in 221 out of 661 (33.6%) patients. Similarly, a study involving 193 paediatric patients showed 27.5% having influenza-related and 21.2% having respiratory syncytial virus-related SARI.

The network provides results in real-time, i.e. within 24 hours of receiving clinical samples, to health care providers, local corporations or the municipality, state health authorities and the central government. Data are also updated weekly in FluNet.

Policy changes occurred during the influenza A(H1N1)pdm09 pandemic; a major diagnostic and management strategy change was implemented using data from the surveillance site in Maharashtra. Now, they are trying to impress upon policy-makers the need for vaccination, particularly for high-risk individuals, which can have a staggered approach in India due to varying seasonality in different geographical areas. The use of the southern hemisphere vaccine in major parts of India could also be introduced.

2.4.5 Viet Nam country presentation

Dr Le Thi Quynh Mai, National Institute of Hygiene and Epidemiology, stated that SARI sentinel surveillance is a component of national influenza surveillance in Viet Nam. It was established in 2005 with four hospital sentinel sites, which were selected from the four biggest and most densely populated cities of the country’s four regions: Ha Noi (north), Khanhhoa (central), Daclak (highland) and Ho Chi Minh City (south). Using the WHO case definition, samples are collected and transferred to four national and regional laboratories. Conventional RT-PCR or real-time RT-PCR is applied to identify 12 different respiratory viruses: influenza A, influenza B, SARS coronavirus, respiratory syncytial virus, human metapneumovirus, rhinovirus, human parainfluenza viruses, as well as avian influenza A(H5N1), avian influenza A(H7N9) and MERS-CoV.
During 2011–2013, a total of 3589 SARI samples were tested. Influenza viruses were identified in 421 (12%) samples, in which influenza A(H3N2) and influenza A(H1N1)pdm09 constituted 31% each, while influenza B was 38%. Other respiratory viruses were noted in 448 (13.6%) samples.

The National Influenza Surveillance in Viet Nam is a member of GISRS to monitor influenza viruses and to provide scientifically valid information, including on animal influenza viruses with human pandemic potential, and technical guidance for national preventive policy. It also shares epidemiological and virological data and materials with WHO reference laboratories and GISRS. Sustaining and improving the National Influenza Surveillance system is needed since the appearance of new pathogens (e.g. MERS-CoV, H7N9) have the potential to affect public health.

2.4.6 Lao People’s Democratic Republic country presentation

Dr Phengta Vongphrachanh, National Centre for Laboratory and Epidemiology, spoke about how national disease surveillance in the Lao People’s Democratic Republic includes the National Surveillance System of Notifiable Diseases and the Lao Early Warning and Response Network, which provide weekly notification of 17 conditions and diseases based on syndromic and clinical diagnosis from all 17 provinces. The Early Warning Outbreak Recognition System also provides syndromic surveillance of outpatients in 12 provincial hospitals. In addition, influenza systems include clinical and virological surveillance, SARI surveillance and the nonmalaria febrile illness (NMFI) study.

Sentinel surveillance for influenza started in 2006. There are a total of 15 sentinel sites across the country, representing the three parts of the country, and includes 8 sites for ILI, 5 for SARI, and 2 for NMFI. Specimens are collected from all cases meeting the SARI case definition; specimen and case reporting forms are completed. Inpatient departments aggregate data collected, and all samples and completed forms are sent to the NIC for testing by RT-PCR, virus isolation and identification. Data are analysed, interpreted and used to produce weekly and monthly reports. Results are sent from laboratory technicians to the laboratory chief, NIC director, Ministry of Health and partners, then to FluNet. In 2010, influenza virus strains detected in the Lao People’s Democratic Republic matched the influenza vaccine in the southern hemisphere, so the seasonal influenza vaccine in the southern hemisphere was selected for use.

From January 2012 through September 2013, the most common subtypes among ILI cases were influenza A(H1N1)pdm09, influenza A(H3) and influenza B, accounting for 32%, 24% and 12% of samples, respectively. The highest peak of influenza activity was in September 2012, and the majority of cases were detected between July 2012 and February 2013. For SARI, the same subtypes were detected with similar seasonal variation, including a peak of influenza B in January 2012.

Challenges for influenza surveillance in the Lao People’s Democratic Republic include the lack of a national programme or policy to regulate biosafety practices. Also, there is no routine data-sharing with animal or food laboratories. Finally, there are limited financial resources to sustain the surveillance programme.
A strategic plan is needed for upcoming 5 years, during which the National Centre for Laboratory and Epidemiology will also ask for increased funds from the government to support its budget. More ownership and commitment from the Ministry of Health is needed to improve sustainability so that data can continue to improve the understanding of the seasonality, risk groups and disease burden in the Lao People’s Democratic Republic and assist national public health authorities in formulating control and vaccination policies.

2.4.7 Thailand country presentation

Dr Malinee Chittaganpitch, Thai NIC, explained that in Thailand, there are currently two surveillance systems that capture the incidence of SARI. First is the National Institute of Health (NIH) surveillance system, which is a collaborative project by NIH, Bureau of Epidemiology and the US CDC. This programme started in 2013 and will be funded completely in 2014. The system has 11 sites in 10 provinces across the country and collects ILI samples, which are sent to the NIC weekly to be tested for influenza and other respiratory viruses. Influenza isolates are characterized by HI and gene sequencing; some samples are selected for antiviral resistance testing. Since 2010, 5 of the 11 sites in this system have started to enrol SARI cases.

The second system is the Bureau of Epidemiology and International Emerging Infections Programme (IEIP) surveillance system, which has two components. The first is SARI surveillance conducted by the Bureau of Epidemiology, which is nationwide surveillance and can detect emerging infectious diseases such as avian influenza A(H1N1)pdm09, and MERS-CoV. Samples are sent to the laboratory for confirmation, depending on the clinician’s judgement. The second component of this system is severe and fatal pneumonia surveillance conducted through a Bureau of Epidemiology and IEIP collaboration. All samples in this system, from 31 sites in 17 provinces, are sent to NIH for bacteria and virus testing.

Current challenges in SARI surveillance are how to integrate data from multiple sources simply and efficiently for data access, management, coordination and reporting; how to utilize laboratory data for public health actions; how to use data on local influenza strains for vaccine programme decisions; how to alert a threshold for influenza activity; and how to coordinate with private hospitals participating in surveillance systems (i.e. reports of SARI in tourists, cases of unknown aetiology). In the long term, the Ministry of Public Health needs to sustain the existing SARI surveillance with its own budget, since it is currently funded mainly from external sources, and to expand and sustain RT-PCR capacity in all regional hospitals to support SARI surveillance.

2.4.8 China country presentation

Zhibin Peng, on behalf of Dr Yu Hongie, China CDC, stated that in December 2009, sentinel SARI surveillance was initialized at 10 sentinel hospitals, 4 located in northern China and 6 located in southern China. Inpatients who met the SARI case definition were registered, and a standardized case report form was used to collect information including demographics, clinical symptoms, medical history,
complications, treatment and outcomes. Respiratory specimens were collected from SARI cases and transferred to the influenza network laboratories for influenza subtyping.

A total of 5638 SARI cases were registered between February 2011 and October 2013. Of these, 330 (5.8%) were influenza-positive. The median age of SARI cases and influenza-positive cases was 12 years and 20 years, respectively. About 41.1% of SARI cases and 33.8% of influenza-positive cases were under 5 years of age, and 19.6% of SARI cases and 27.1% of influenza-positive cases were at least 65 years old. Of 330 influenza-positive cases, 217 (65.7%) cases were influenza A, and 110 (33.3%) cases were influenza B. Hypertension, coronary heart disease, diabetes, chronic obstructive pulmonary disease and chronic bronchitis were common among adult SARI cases. Asthma and cancer were also common among adult SARI cases; in contrast, about 95% of paediatric SARI cases had no history of chronic disease or co-morbidity. There was a regular winter peak of SARI and influenza in the four northern sentinel hospitals, which was similar to the findings of sentinel ILI surveillance, but there was no obvious seasonality in the six southern sentinel hospitals.

2.5 Plenary session 4: Supporting the introduction of influenza vaccines

Chair: Dr Devendra Mourya, NIV, India

The use of influenza vaccines has long been the foundation for public health programmes to prevent seasonal influenza and a major feature of pandemic responses. However, vaccine availability and use has been mostly concentrated in high-income countries and areas. Recently, many low- and middle-income countries and areas have developed robust influenza surveillance, laboratory testing and outbreak response capacity, driven in part by the priority of pandemic preparedness. An important product of building the capacity for influenza surveillance in these countries is the increased understanding of the epidemiology and burden of seasonal influenza, and the value of influenza prevention both in-country and worldwide. Additionally, increased vaccine production and vaccine development by manufacturers in low- and middle-income countries has led to the prospect of more accessible and less expensive influenza vaccines. Greater use of a seasonal influenza vaccine globally could be an important tool for both reducing the annual incidence of severe respiratory disease and responding to a pandemic.

2.5.1 Support for global introduction of influenza vaccines

Ms Ann Moen, US CDC, described how each NIC is collecting important data to support vaccine strain selection. As the quality of data increases, data are also useful in determining the burden of disease and for supporting national influenza vaccination policy development.

There are several programmes that support countries as they consider the implementation of vaccine policy, including the Strategic Advisory Group of Experts’ recommendations for influenza vaccines, the PIP Framework and global action plans to support the introduction of influenza vaccines. Global Action Plan II (2011–2016) follows Global Action Plan I (2006–2011) through three main objectives:
(1) increase seasonal use of vaccines; (2) increase vaccine production capacity; and
(3) increase research and development.

National influenza surveillance programmes are essential because developing policy requires a solid evidence base (e.g. risk groups, timing of campaigns), and the Strategic Advisory Group of Experts recognizes that countries and areas should develop policy based on local priorities and needs. Influenza surveillance provides important information on the seasonality for timing of vaccination, strains and data to formulate vaccines, baseline activity and severity to monitor disease and evaluate impact, and platforms to monitor burden of disease and evaluate interventions.

2.5.2 Influenza vaccine manufacturing capacity in the South-East Asia Region

Dr Pushpa Wijesinghe, SEARO, described that the Global Action Plan for Influenza Vaccines calls for increasing seasonal influenza vaccine use, vaccine production capacity, research and development. The increase in seasonal influenza vaccine use helps project the future needs for seasonal influenza vaccines and effective deployment of vaccines in a future pandemic. In the South-East Asia Region, the current use of seasonal influenza vaccines is insufficient to sustain the Regional vaccine production capacity, since only Thailand systematically conducts seasonal influenza vaccination. Aligning with the Global Action Plan, the Region acquired Regional influenza vaccine production capacity during 2006–2011.

Key regional achievements include recognition of self-reliance in domestic vaccine production as a health security and economic stability measure; public investments in industrial-scale vaccine manufacturing; acquisition of production technology; and staff capacity-building in vaccine production, management and quality control. Ensuring sufficient demand of seasonal influenza vaccines to sustain Regional production capacity and keeping manufacturers engaged in production are the key challenges, although there are a multitude of other challenges as well. Moving forward, recommendations to sustain Regional production capacity include encouraging regular use of seasonal influenza vaccines, networking to secure additional finances (both locally and internationally), enhancement of capacity development and transfer technology, and increased research and development.

Three major vaccine-manufacturing countries have operationalized a competitive business model and a public sector national security model for influenza vaccine production in the Region. However, insufficient use of seasonal influenza vaccines is currently the major impediment for sustaining the acquired Regional vaccine production capacity.

2.5.3 Strategizing pandemic influenza preparedness and response including local influenza vaccine-manufacturing capacity through seasonal influenza vaccination: Thailand’s experience

Dr Opart Kankawingpong, Department of Disease Control, Thailand, detailed that since 2005, Thailand has been preparing multiple strategies for pandemic influenza through development of the National Plan on Influenza Pandemic Preparedness.
The national plan determines the key measures in preparation for and handling of pandemic influenza, including (1) vaccination for health workers and targeted high-risk populations to prevent seasonal influenza and to promote increased use of vaccines in public and private health facilities; (2) promotion of appropriate health behaviours for influenza prevention and risk reduction, with special emphasis on personal hygiene and prevention in public and crowded places; (3) establishment of surveillance at the community level, with emphasis on community participation; (4) provision of recommended health measures at point of entry; (5) preparation for management of corpses, in case of a large number of deaths, in addition to psycho-social measures for mental health rehabilitation; and (6) technical cooperation with international organizations on control of disease outbreaks. Among these measures, vaccination is one of the most important strategies to protect at-risk populations against influenza. Access to pandemic influenza vaccine is a crucial measure to ensure health security of people in the country.

Thailand is now trying to develop vaccine policies for influenza vaccine production with the aim of providing sufficient amounts of vaccine for domestic use through the following strategies:

1. **Vaccine production.** The Vaccine Production Project began in 2007 when the Cabinet approved the US$40 million budget for a 5-year plan to establish an industrial-scale influenza vaccine plant. WHO has also supported this project by providing a US$5 million grant and technical support. Under the government’s pharmaceutical organization management system, this vaccine facility is expected to produce 10 million doses of inactivated influenza vaccine and 60 million doses of live attenuated influenza vaccine during the pandemic.

2. **Increased usage of seasonal influenza vaccine.** After the first launch of the national influenza vaccination campaign in 2008, vaccination demand has had a tendency to increase every year. For example, in 2012, about 3.3 million people received the influenza vaccine (30% of the 10.0 million target population). Increased demand has supported the need for local vaccine production.

3. **Capacity building.** Both vaccine development production and increased utilization of seasonal influenza vaccination require numerous resources and capacities to achieve the country’s goals.
2.6 Debate: In a limited resource setting, is SARI surveillance worthwhile?

Chair: Dr Gina Samaan, US CDC, Indonesia

Debate participants: Dr Erlang Samoedro, Ministry of Health, Indonesia; Dr Katelijn Vandemaele, WHO Headquarters; Dr Sue Huang, Institute of Environmental Science and Research, New Zealand; Dr Darouny Phonekeo, Ministry of Health, Lao People’s Democratic Republic; Dr Andrew Corwin, US CDC, Lao People’s Democratic Republic; Dr Sirenda Vong, WHO China, China; Dr Raymond Lin, National Public Health Laboratory, Singapore; Dr Veronica Tallo, Research Institute for Tropical Medicine, Philippines

The debate raised important points about both the benefits and challenges of SARI surveillance in a resource-limited setting.

SARI surveillance is a uniform case ascertainment strategy that enables real-time comparison within and between countries and areas and has benefits for both low- and high-income settings. This standardization allows interpretation of the burden of disease across sites to assist with understanding the aetiology and seasonality of severe disease with important denominator data. However, clear objectives are needed to make SARI surveillance effective and to balance SARI and ILI surveillance efforts.

SARI surveillance does not really serve as early warning system as stated on p. 19: "sentinel SARI surveillance is not designed for early warning, it can provide an excellent platform when new respiratory pathogens are detected and allow rapid assessment of the historical and geographic extent of a new respiratory disease".

Data from SARI surveillance can support information to convince policy-makers to introduce vaccine policy and to develop policies for the management of patients, by emphasizing severe infections. However, there are questions about the direct benefits of SARI surveillance for hospitals and clinicians, since screening and sample collection creates additional work and cost. Timely reporting systems must be in place to provide clinical benefit. However, the SARI surveillance platform can also be used to improve laboratory capacity and establish centres of excellence in surveillance and pandemic preparedness.

Sustainability is questionable, and it is important that measures of sustainability and plans for what will be done when external funding expires are established. Additionally, if SARI surveillance is donor-driven, efforts may not address country priorities, referring back to the need for clear objectives.

2.7 Group work: Proposed annual epidemiology and laboratory survey

Participants divided into groups to review and discuss a proposed annual epidemiology and laboratory survey. Feedback suggested that an annual tool to monitor capabilities and activities may be useful, but additional clarification and work are needed to develop an effective tool. The tool should be modified to address both quantity and quality of data collected and shared, to add measures of improving harmonization/data-sharing between laboratories and epidemiologists, and to consider additional partners that are not normally participants in the NIC meeting.
2.8 Plenary session 5: Combatting emerging disease threats
Chair: Masato Tashiro, NIID, Japan

As mentioned during plenary session 1, 2013 has been an unusual year with two new viral infections being detected for the first time, avian influenza A(H7N9) and MERS-CoV. In addition to preparing for novel agents such as these, it is important to remain vigilant for those pathogens that are already circulating in the Asia-Pacific region, such as avian influenza A(H5N1). Developing a better understanding of the epidemiology and virology of these pathogens is essential to mount an effective response.

2.8.1 Influenza A(H5N1) situation and response measures in Cambodia

Dr Ly Sovann, Communicable Diseases Control Department, Cambodia, described that in Cambodia, there are seven ILI surveillance sites, nine ILI project sites and four SARI surveillance sites. All ILI and SARI surveillance sites share information on a routine basis through weekly and monthly reports and also in the detection of a case that is a potential public health emergency. All SARI and ILI surveillance sites use different case definitions, but these definitions are very similar, and most use the WHO case definition. The first poultry case of H5N1 was detected in 2004 in Phnom Penh, and the human case of H5N1 was detected in 2005 in Kampot. Since 2005, there have been a total of 44 human cases, 23 of which occurred in 2013, most (20) reported by event-based surveillance, 2 by ILI surveillance and 1 by SARI surveillance. Most cases occurred between January and April, were among a young age group (5–14 years old) and had confirmed contact with sick or dead poultry.

Evidence supports an increase in human cases, since surveillance systems have not changed, but hospitals are submitting more samples, and the prevalence of the virus in poultry seems higher (high positivity, i.e. 30–78% by polymerase chain reaction (PCR) for H5N1 virus detected in live markets in 2013). Still there is no evidence of human-to-human transmission, and most cases have confirmed direct contact with sick or dead poultry. There is no epidemiological link between current cases, and there have been no cases among health care workers, close contacts or family members of cases.

Before 2013, all of the avian influenza A(H5N1) viruses isolated from human and poultry belonged to clade 1 and then 1.1, genotype Z. In January 2013, a new clade 1.1 genotype emerged, with haemagglutinin and neuraminidase genes belonging to clade 1.1, but with all internal genes of clade 2.3.2.1 origin. Among 24 human cases in 2013, 16 strains have been successfully sequenced; 6 strains could not be sequenced because of low viral load in clinical samples and absence of growth in cell culture, and 3 strains are currently being analysed. Samples have also been sequenced from poultry outbreaks and from chickens, ducks and environmental samples obtained during a live bird market study. The antiviral drug tests did not detect any resistance of these strains to neuraminidase inhibitors (e.g. oseltamivir, zanamivir).

To monitor the risk of human-to-human transmission of the avian influenza virus, nasopharyngeal swabs and acute and convalescent sera of contacts of H5N1 cases (a total of 237 people) were tested by RT-PCR, HI and microneutralization tests. All the results were negative, demonstrating that the new genotype of H5N1 viruses currently
circulating in Cambodia seems to have not acquired the capacity to be more easily transmitted between humans. Additional research is needed to determine if this new genotype can be more easily transmitted between poultry and from poultry to human.

2.8.2 H5N1: A continued public health threat in Indonesia

Dr Vivi Setiawaty, National Institute of Health Research and Development, Indonesia, stated that the first human case of highly pathogenic avian influenza A(H5N1) virus in Indonesia was reported in July 2005. Since then, 195 cases have been reported, with 163 fatal as of November 2013. Most cases have had direct exposure as the source of infection. In 2013, the number of suspected cases decreased compared to the previous year, although surveillance activities remain active. Since 2005, Indonesia has detected clade 2.1 viruses in both humans and poultry. In 2012, clade 2.3 was detected in poultry; however, all human cases in 2012 and 2013 have remained clade 2.1 viruses. The genetic characteristics of the human H5N1 viruses remain the same and are still sensitive to oseltamivir.

The establishment of the laboratory network for avian influenza has been critical in the response to influenza A(H1N1)pdm09, as well as preparedness for MERS-CoV and H7N9. There is one referral laboratory, and there are 43 regional laboratories distributed around the country. Some challenges of maintaining the laboratory network include a high turnover in staff, challenges in standardizing quality and ensuring enough reagents at each site. Therefore, it is very important to strengthen the avian influenza laboratory network.

The Indonesia NIC conducts several activities for strengthening the laboratory network, including routine evaluation of the laboratory network through an external quality control programme; annual training of RT-PCR techniques for H5N1 and H1N1pdm09 detection; training on packaging, shipping and storage of specimens to maintain specimen quality; biosafety and biosecurity training, involving several regional laboratories in ILI surveillance to improve routine testing capacity; and providing technical assistance to regional laboratories.

2.8.3 Middle East respiratory syndrome coronavirus: Global situation and regional preparedness

Dr Frank Konings, WPRO, said that MERS is caused by a coronavirus. The coronavirus family is large and consists of viruses that can cause several illnesses, ranging from the common cold to SARS. Besides human disease, coronaviruses can also cause disease in animals.

The media reported unusual cases of respiratory disease in Jordan in mid-September 2012, and official IHR notification of “novel coronavirus” infection to WHO was done on 22 September 2012. MERS-CoV became an emerging infectious disease event of global interest and common concern, and WHO activated its IHR Emergency Committee mechanism in July 2013. MERS-CoV updates are continually posted on the WHO website. At the time of this meeting, a total of 172 cases were reported, of which 68 (40%) had died.
There are reasons to be concerned about MERS-CoV. For example, the virus has caused severe human infection and death. There is evidence of imported cases through international travel. It has the ability to transmit between humans. Finally, there are critical information gaps to be filled, for example, on its reservoir, source of infection, route of transmission and scope of spread.

WHO provided interim recommendations for laboratory testing for MERS-CoV to its Member States, including a number of PCR assays. For a case to be considered laboratory-confirmed, at least two targets need to be amplified or one target plus sequencing of an appropriate PCR product. As soon as primer and probe sequences were published, WHO started working with its Member States in both Regions to establish capacity for MERS-CoV testing, including provision of positive control material. Besides laboratory recommendations, WHO also developed recommendations related to surveillance and reporting, infection control and prevention, as well as travel and trade.

WHO recognizes that this is an evolving situation that requires close monitoring and, in the meantime, it must manage uncertainty. In the Regions, it provides a unique opportunity to implement APSED (2010) and IHR (2005). The Asia-Pacific region needs to prepare for response to possible imported cases and clusters according to a comprehensive framework for action.

2.8.4 Middle East respiratory syndrome preparedness in Sri Lanka

Dr C. J. S. Jayamaha, Medical Research Institute, Sri Lanka, stated that Sri Lanka has established influenza surveillance in human and animal populations. Through SARI surveillance, ILI surveillance and surveillance of pneumonia of unknown aetiology, human surveillance systems provide epidemiological and virological information.

MERS-CoV is of particular concern in Sri Lanka because the country sends a significant contingent of workers to the Middle East, especially to Saudi Arabia. Furthermore, a substantial portion of the Muslim population makes the pilgrimage to Mecca, and numbers of tourists visiting Sri Lanka from the Middle East are increasing. Preparedness measures have included distributing informative leaflets for pilgrims through mosques and travel agencies, educating staff at points of entry, increasing awareness among workers through the Foreign Employment Bureau and alerting hospitals for case notification and surveillance. Surveillance efforts have detected six possible cases to date, all of which have tested negative by PCR.

2.8.5 Disease severity assessment during a pandemic

Dr Katelijn Vandemaele, WHO Headquarters, detailed how the IHR Review Committee evaluated the response to the influenza A(H1N1)pdm09 pandemic and, among the recommendations issued to WHO, were asked to revise pandemic preparedness guidance and to develop and apply measures to assess the severity.

Severity assessments are a composite measure based on multiple data sources. As further information from any of these data sources becomes available, the overall severity should be reassessed. Each of these assessments will enable refinement of the
assessment and allow the detection of any changing behaviour of the virus, which may lead to changes in prevention and control measures.

Simplistic severity scores, while easy to communicate, are of limited value to policy-makers. For that reason, WHO plans to provide some detail about different aspects of an outbreak using a variety of parameters organized into a severity profile. This profile should provide the tools to assist countries by providing some analysis of the implications of the data parameters for Member States with varying levels of capacity and demographics. The parameters included in this analysis of severity can be grouped into broad areas: virological, clinical, transmission, mortality/morbidity and impact.

To be useful, the risk assessment incorporating severity should provide as much information as possible to answer the following key questions about a potential emerging pandemic:

- How different is this virus from previous ones?
- Is community transmission sustained and how fast is it spreading?
- What proportion of cases is severe and who is most at risk?
- What are the clinical features of the disease?
- What will be the impact on the health-care sector?

One needs to keep in mind that different data will be available at different points in time, reassessment will be needed periodically, there are limitations of what can be known and when it can be known. This must be communicated to manage expectations. Perhaps the best way to interpret national data is to know the historical context and baseline for a country or area. Therefore, WHO would like to organize a questionnaire to check what information has already been collected during seasonal influenza and what Member States think that they would be able and willing to collect during a pandemic. This will help WHO refine the parameters. The plan is to pilot a subset of these parameters in some countries during the normal influenza season.

2.9 Site visits

Site visits were made to the Chinese NIC, where participants listened to a presentation on NIC activities and visited laboratory facilities; Peking University People's Hospital, where participants learned about hospital SARI and ILI surveillance activities and visited the infectious disease ward; and the China CDC of Xicheng District, where participants learned about China CDC’s influenza surveillance network and visited laboratory facilities.
2.10  Plenary session 6: Technical updates on influenza research for public health action

Chairs: Dr Patrick Reading, VIDRL, Australia, and Dr Vinod Bura, WHO/Myanmar, Myanmar

Research provides opportunities to further understand the emergence, circulation, control and impact of influenza viruses in both Regions. Sharing findings from research studies provides important evidence to support public health action and policy for influenza prevention and control, for epidemiologists, laboratorians and policy-makers throughout the Regions.

2.10.1 Southern hemisphere influenza and vaccine effectiveness research and surveillance in New Zealand

Dr Sue Huang, Institute of Environmental Science and Research, New Zealand explained that the Southern Hemisphere Influenza and Vaccine Effectiveness Research and Surveillance (SHIVERS) project was established in October 2011. It is a multicentre and multidisciplinary collaboration between the Institute of Environmental Science and Research, Auckland District Health Board (ADHB), Counties Manukau District Health Board (CMDHB), University of Otago, University of Auckland, WHO Collaborating Centre at St Jude Children’s Hospital and US CDC. The SHIVERS project has 9 objectives: (1) determine the incidence and prevalence of SARI; (2) assess influenza vaccine effectiveness; (3) study the interaction between influenza virus and other pathogens; (4) ascertain the causes of respiratory mortality; (5) determine the incidence and prevalence of non-severe respiratory illness; (6) conduct an influenza seroprevalence study; (7) determine influenza risk factors; (8) study the immune response to influenza; and (9) determine the health care and societal economic burden and vaccine cost-effectiveness of influenza.

To address the objectives, two surveillance systems have been proposed for the 838 000 residents living in Auckland’s ADHB and CMDHB regions: (1) hospital-based surveillance, that is, enhanced, active, year-round surveillance for SARI cases and a proportion of non-SARI respiratory cases, intensive care unit admissions and deaths with laboratory confirmation for influenza and other respiratory infections; and (2) community-based surveillance, that is, enhanced, active, year-round sentinel general practice surveillance for illness caused by influenza and other respiratory pathogens.

Since 30 April 2012, four hospitals serving ADHB and CMDHB have been enrolling SARI cases. As of 30 September 2012, a total of 4417 patients hospitalized with suspected respiratory infections were assessed, and 2033 (46%) patients met the SARI case definition. Of 1430 SARI cases with specimens taken, 324 (23%) tested positive for influenza. Infants under 1 year of age experienced the highest rate of influenza hospitalization (282 out of 100 000) followed by persons 80 years and older (144 out of 100 000). Rates among Pacific islanders and Maori were 93 out of 100 000 and 46 out of 100 000, respectively, compared to 21 out of 100 000 among those of European descent. The lower socioeconomic status patients had the highest rate of influenza hospitalization (282 out of 100 000) followed by middle socioeconomic status patients (20 out of 100 000) and upper socioeconomic status patients (12 out of 100 000).
Results from the first season of hospital-based surveillance by SHIVERS suggest a high burden of severe influenza among the young, elderly, ethnic minorities and lower socioeconomic status patients. Community-based surveillance will commence in 2013 and will document the burden of less severe disease. The hospital and community-based surveillance systems will provide a research platform over the next 4 years to enable focus on the other SHIVERS objectives and therefore comprehensively investigate influenza epidemiology, aetiology, immunology and vaccine effectiveness. The outcomes of the SHIVERS project is to enable enhanced disease surveillance, assist with early detection and prediction, guide targeted vaccination strategies for the population and subgroups and inform better vaccine design, optimize clinical management and laboratory diagnosis, identify risk factors, understand host immune responses and identify better immune diagnostic markers.

2.10.2 Education strategies to support WHO vaccine policy initiatives

Dr Lance Jennings, Canterbury Health Laboratories, New Zealand, spoke about how expanding the use of seasonal influenza vaccines in the Asia-Pacific region faces many challenges. In response to the recent history in the region of the emergence of novel influenza viruses, avian influenza A(H5N1) and avian influenza A(H7N9), and knowledge that the region is important for the generation of seasonal influenza viruses and their global seeding, initiatives by WHO and other governmental and nongovernmental organizations to expand influenza awareness are gaining momentum.

Initiatives to document influenza vaccine use and recommendations in the region have been limited. Vaccine usage data collection was initiated by the Macroepidemiology of Influenza Vaccination Study Group for 1997–2003 from countries using seasonal vaccines in the region. The International Federation of Pharmaceutical Manufacturers and Associations Influenza Vaccine Supply International Task Force surveys obtained data on vaccine distribution in 19 countries from 2003–2007 and 2008–2009, while WHO conducted two surveys, in 2010 in 35 countries from the South-East Asia Region and the Western Pacific Region and in 2012. This most recent survey conducted by WHO describes seasonal influenza vaccination policies, recommendations and vaccine use in 36 (97%) of 37 countries in the Western Pacific Region. It collected data from 36 (97%) of 37 countries or areas in the Region. Fifty per cent (18 countries), comprising 93% of the Western Pacific Region’s population, had established seasonal influenza vaccination policies, while only 11 (30%) had no seasonal influenza vaccination policies or recommendations in place.

Recent research suggests that having recommendations for seasonal influenza vaccines alone is not sufficient to encourage high levels of vaccine uptake. Reimbursement and communication policies appear to improve vaccine uptake irrespective of a country’s development status. Although some countries, especially in temperate zones, have targeted vaccine communication strategies, nongovernmental organizations have filled the gap for establishing regional strategies. These have included the European Scientific Working Group on Influenza established in Europe in 1992, the National Influenza Summit in the United States of America in 2000 and the Asia-Pacific Alliance for the Control of Influenza (APACI) established in 2002.
APACI is a company limited by guarantee and registered in Hong Kong (China) in April 2012 as a charitable trust. The APACI model, focusing on influenza advocacy, has spawned influenza foundations in Thailand, India and Indonesia, and has linkages with other health professional organizations. Online regional newsletters *Influenza* and regular news updates are available on the APACI website. Educational collaborations are being initiated, and the first Asia-Pacific Influenza Summit series of meetings established. Through these initiatives, health care professionals and other health professional groups are brought together, focusing on best practices for the control of influenza, leading to improved policy and advocacy for vaccine uptake in the region.

Seasonal influenza vaccines are underutilized. WHO vaccine initiatives are focused on further developing consistent influenza vaccine policies and guidelines in countries in the region, while APACI supports these WHO initiatives and is leading influenza advocacy and the education of health care and other health professionals in the Asia-Pacific region.

2.10.3 Prevalence of influenza B lineages in Singapore, 2010–2013

Dr Cui Lin, National Public Health Laboratory, Singapore, discussed how sentinel influenza surveillance has been set up in Singapore by including over 100 primary care clinics and all public hospitals. Surveillance data are published online weekly. Real-time PCR and sequencing have been used to analyse influenza B viruses circulating in Singapore since 2010.

Multiple and quick switches of influenza B virus lineages had been observed during 2012–2013. Meanwhile, significantly increased proportion of Yamagata viruses was shown in patients aged 36 years or older, while the Victoria lineage was predominant in younger groups (p<0.05) from September 2011 to June 2012. Results provided additional support to quadrivalent vaccines containing viruses of both lineages to provide better protection to different age groups throughout the year.

2.10.4 Pandemic risk assessment studies on the H7N9 virus

Dr Jacqueline Katz, US CDC, described how the recent avian influenza A(H7N9) virus outbreak in humans has prompted studies to better understand the pandemic potential of this novel subtype. To assess the level of existing population immunity, about 900 stored sera was tested by HI and microneutralization assays for cross-reactive antibody against the H7N9 virus. Compared with turkey blood cells, the use of horse red blood cells in the HI assay was more sensitive for the detection of antibodies to H7 viruses. People of all ages had no serological immunity to the novel subtype and may be susceptible to H7N9 virus infection. Receptor binding studies revealed a mixed $\alpha_2$-3/$\alpha_2$-6 receptor binding with weak specificity for human-like $\alpha$ 2-6 receptors.

To study the pathogenesis and transmission of H7N9 viruses, the ferret model was used, recognized to be the best small animal model for the study of influenza virus. An H7N9 virus infection resulted in modest weight loss and transient inactivity, but

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6 http://www.apaci.asia
overall did not result in severe disease. The virus replicated efficiently in the upper and lower respiratory tract of ferrets. H7N9 viruses readily transmitted to naïve ferrets through direct contact, but, unlike seasonal H3N2 virus, did not transmit efficiently by respiratory droplets. Taken together, these results suggest that additional mammalian adaptation of H7N9 virus is required to achieve efficient airborne transmission in mammals. Nevertheless, the observed efficient replication of H7N9 virus in mammals and human airway cells underscore the need for heightened public health surveillance of this novel virus.

2.10.5 Combination serological methods for H7N9 antibody detection

Dr Bai Tian, China CDC, stated that a combination of serological methods, including HI, 4 microneutralization and western blot, were evaluated on detection of H7N9 antibodies in human samples. The modified western blot showed no cross-reaction antibody response to seasonal and H5 influenza viruses; H9 avian influenza viruses were used as another confirmatory method. HI assay using horse erythrocytes (hRBCs) and a modified microneutralization assay were more sensitive than turkey erythrocytes and the standard microneutralization assay. Validation of the HI assay using 15 convalescent confirmed case sera and 258 nonpatient sera showed that the HI assay had the highest sensitivity and specificity when using a cut-off HI titre of ≥20. This cut-off titre is recommended in seroepidemiological investigations for antibody screening. The modified microneutralization assay using the same groups show that it had the highest sensitivity and specificity when using a cut-off microneutralization titre of ≥10. Single sera with an HI titre of ≥160 and MN titre of ≥10 could be confirmed as seropositive for H7N9. Human sera with an HI titre 20–80 need further confirmation by microneutralization or western blot.

2.10.6 Neuraminidase inhibitor susceptibility of influenza A(H7N9) and A(H3N2) viruses with an R292K substitution in the neuraminidase gene

Dr Takato Odagiri, NIID, Japan, spoke about how four neuraminidase inhibitors are licensed for use in Japan: zanamivir, oseltamivir, peramivir and laninamivir. The R292K substitution in the neuraminidase protein of influenza A(H7N9) and A(H3N2) viruses was confirmed to exhibit high resistance to oseltamivir, peramivir and zanamivir. The I222R substitution showed resistance to oseltamivir. A/Shanghai/1/2013(H7N9) was a mixture of drug-sensitive (R292) and drug-resistant (292K) viruses with 40% and 60% proportion, respectively, and exhibited drug-sensitive phenotype. To detect drug-resistant phenotype in the 292R/K mixture of A(H7N9) virus, over 80% of 292K resistant-virus was necessary in the mixed population. Drug-resistant 292K virus will be missed in the most clinical isolates, when 292R drug-sensitive wild-type virus co-exists. Careful genetic analysis together with susceptibility assay is necessary to avoid missing the drug-resistant 292K virus.
3. SUMMARY AND CLOSING REMARKS

Ms Ann Moen, US CDC, highlighted that the Seventh Meeting has provided an important opportunity to see colleagues from across the Regions, to learn from one another about activities in each country and how to work together to improve systems collectively. On behalf of the US CDC, she thanked the China CDC and WHO for organizing the meeting, participants for committing their time to attend the meeting and Member States for their work as the backbone of the influenza system. She acknowledged that without Member States’ participation, vaccine strain selection and prevention and control efforts would not be possible.

Dr Erica Dueger, WPRO, thanked meeting organizers and participants, especially the China CDC for hosting the meeting. She commented that she has been impressed with the surveillance systems and the ongoing work in the Asia-Pacific region and feels privileged to work with a community so driven to work together, share ideas and move forward with efforts across the Regions.

Dr Pushpa Wijesinghe, SEARO, thanked WPRO, SEARO and the Secretariat for their roles in organizing and coordinating the meeting. He also thanked WHO Headquarters and the US CDC and other partners for their participation in the meeting. Dr Wijesinghe particularly acknowledged the hospitality of the China CDC and thanked Member States for their participation.

Dr Yuelong Shu, China CDC, thanked WPRO, SEARO, WHO Headquarters and WHO China for providing support to develop surveillance and response capacity. He also thanked participants for their participation in the meeting.

There are many challenges for emerging infectious diseases and influenza in the Asia-Pacific region. In particular, the unanswered questions about avian influenza A(H7N9)—its spread, pandemic potential and severity—and the emergence of MERS-CoV are current threats facing the region. Collaborative action will be essential to combat these threats, as well as future emerging infectious diseases, and will require sharing information, sharing technical expertise and mobilizing resources from each country and from the international community.

Dr Shu closed the meeting by expressing a hope that participants can work with WHO to make more contribution to the global influenza response, prevention and control.
4. CONCLUSION AND RECOMMENDATIONS

The main conclusions of the meeting were as follows:

4.1.1 Successful influenza surveillance networks in the Western Pacific and South-East Asia Regions have highlighted the value of communication and collaboration between epidemiology and laboratory partners, both within Member States and through WHO Collaborating Centres and other institutions.

4.1.2 However, new influenza viruses (i.e. H7N9) and other novel respiratory pathogens (i.e. MERS-CoV) continue to emerge and threaten our health security. Following the 2009 influenza A(H1N1)pdm09 pandemic, we recognize the importance of being able to quickly detect and document not only the existence, but also the severity, of these emergent viruses. We must continue to emphasize the important role of the influenza surveillance system in providing decision-makers with the data required to develop and fine-tune national influenza control policies.

4.1.3 Over the next 10 years, we expect that acute respiratory illness surveillance activities will remain international and national priorities, while simultaneously facing pressures from contraction of global funding for public health activities. It is imperative that we continue to develop flexible, adaptable surveillance systems and networks that not only meet, but to stay ahead of, emerging disease challenges and focus on support of practical control and response efforts.

4.1.4 In this light, Member States may want to continue to improve sentinel ILI and laboratory-based virological surveillance and to participate in GISRS.

4.1.5 Member States may want to maintain event-based surveillance for unusual clusters of respiratory infection, including severe disease and among at-risk groups, to support compliance with IHR (2005).

4.1.6 Member States may want to promote the surveillance, laboratory confirmation and reporting of hospitalized influenza cases, aligning with APSED (2010) and the PIP Framework. Where possible, this should include sentinel surveillance of hospitalized acute respiratory infection utilizing the SARI case definition to understand baseline activity and monitor changes in severe disease.

4.1.7 Member States may want to ensure national pandemic preparedness plans are updated and appropriate given the emergence of avian influenza A(H7N9), and NICs should maintain laboratory preparedness and safety plans to handle novel influenza virus samples including avian influenza A(H7N9).

4.1.8 Member States may want to encourage utilization of influenza surveillance data and research to support public health action.
4.1.9. WHO may want to provide technical guidance and support to Member States to ensure the alignment of influenza surveillance programmes with country-specific objectives for influenza prevention and control and with global surveillance standards.

4.1.10 WHO may want to provide practical guidance for pandemic risk and severity assessment by each Member State.

4.1.11 WHO may want to support Member States in prioritizing activities as outlined in the Biregional plan for further strengthening national influenza surveillance: guiding the way towards influenza control policy and regional surveillance.

4.1.12 WHO may want to determine how to best monitor changes in Member State influenza surveillance capacity before the Eighth Meeting in 2014.
SEVENTH MEETING OF THE NATIONAL INFLUENZA CENTRES AND INFLUENZA SURVEILLANCE IN THE WESTERN PACIFIC AND SOUTH-EAST ASIA REGIONS

Beijing, China
12–15 November 2013

ENGLISH ONLY

PROGRAMME OF ACTIVITIES

Day 1 – Tuesday, 12 November 2013

08:30–09:00 Registration

09:00–10:00 Opening session

Welcome and opening remarks

- Dr Bernhard Schwartlander, WHO Representative in the People's Republic of China
- Dr Xiao Donglou, Director-General of Public Health, Bureau of Disease Prevention and Control, National Health and Family Planning Commission, China
- Dr Yang Weizhong, Deputy Director General, Chinese Center for Disease Control and Prevention (China CDC), China

Self-introductions
Overview of objectives and agenda
Nomination of Chairs
Administrative announcements
Group photo

10:00–10:30 Coffee break

10:30–12:30 Plenary 1: Regional and global updates

10:30–10:50 Implementation of International Health Regulations (IHR) 2005 through Asia Pacific Strategy for Emerging Diseases (APSED) 2010
- Dr Li Ailan, WHO Regional Office for the Western Pacific (WHO/WPRO)

10:50–11:10 Influenza activity in the Southern Hemisphere
- Dr Ian Barr, WHO Collaborating Centre for Reference and Research on Influenza, Victorian Infectious Diseases Reference Laboratory, Australia

11:10–11:30 Influenza activity in the Northern Hemisphere
- Dr Masato Tashiro, WHO Collaborating Centre for Reference and Research on Influenza, National Institute of Infectious Diseases, Japan
11:30–11:50 Pandemic preparedness and Pandemic Influenza Preparedness (PIP) Framework
   - Dr Zhang Wenqing, WHO Headquarters (WHO/HQ)

11:50–12:30 Questions and clarifications

12:30–13:30 Lunch break

13:30–15:00 Plenary 2: Learning from the newly emerging influenza threat, H7N9

13:30–14:00 Laboratory preparedness and response to H7N9 outbreak
   - Dr Wang Dayan, China CDC, China

14:00–14:30 Epidemiological investigation to support H7N9 response
   - Dr Zhou Lei, China CDC, China

14:30–15:00 Preparing for upcoming influenza season based on lessons learnt in China
   - Dr Zhang Yanping, China CDC, China

15:00–15:30 Coffee break

15:30–17:00 Panel/Floor Discussion: H7N9 – are we prepared?

18:00–20:00 Welcome reception

Day 2 – Wednesday, 13 November 2013

08:30–08:40 Summary of Day 1

08:40–11:10 Plenary 3: Strengthening Severe Acute Respiratory Infection (SARI) surveillance to enhance the Asia Pacific influenza virologic platform

08:40–08:55 SARI surveillance – improving country capacity to detect/characterize outbreaks of severe respiratory disease
   - Dr Erica Dueger, WHO/WPRO

08:55–09:10 SARI surveillance – a global perspective
   - Dr Katelijn Vandemaele, WHO/HQ

Country presentations: SARI experience to date

09:10–09:25 Mongolia
   - Dr Nyamkhuu Dulmaa, National Center for Communicable Disease

09:25–09:40 India
   - Dr Devendra Mourya, National Institute of Virology

09:40–09:55 Viet Nam
   - Dr Le Thi Quynh Mai, National Institute of Hygiene and Epidemiology

09:55–10:10 Lao People's Democratic Republic
   - Dr Phengta Vongprachanh, National Center for Laboratory and Epidemiology

10:10–10:40 Coffee break
Country presentations: SARI experience to date (continued)

10:40–10:55 Thailand
- Dr Malinee Chittaganpitch, Thai National Influenza Center

10:55–11:10 China
- Dr Yu Hongjie, China CDC

11:10–12:10 Plenary 4: Supporting the introduction of influenza vaccines

11:10–11:30 Support for global introduction of influenza vaccines
- Dr Ann Moen, WHO Collaborating Centre for Surveillance, Epidemiology and Control of Influenza, United States Centers for Disease Control and Prevention (US CDC), United States of America

11:30–11:50 Influenza vaccine manufacturing/production capacity in the South-East Asia Region
- Dr Pushpa Wijesinghe, WHO Regional Office for South-East Asia (WHO/SEARO)

11:50–12:10 Strategizing Pandemic Influenza Preparedness and Response including local influenza vaccine manufacturing capacity through seasonal influenza vaccination: Thailand Experience
- Dr Opart Kankawingpong, Department of Disease Control, Thailand

12:10–13:10 Lunch break

13:10–14:40 Debate: In a limited resource setting, is SARI surveillance worthwhile?

14:40–15:10 Coffee break

15:10–16:40 Group Work: Proposed Annual Epidemiology and Laboratory Survey

15:10–15:25 Objectives and overview of group work

15:25–16:10 Epidemiology- and laboratory-structured group discussions

16:10–16:40 Feedback from group and discussion

Day 3 – Thursday, 14 November 2013

08:30–08:40 Summary of Day 2

08:40–11:10 Plenary 5: Combatting emerging disease threats

08:40–08:55 Influenza A/H5N1 situation and response measures in Cambodia
- Dr Ly Sovann, Communicable Diseases Control Department, Cambodia

08:55–09:10 H5N1 – a continued public health threat in Indonesia
- Dr Vivi Setiawaty, National Institute of Health Research and Development, Indonesia

09:10–09:25 MERS: Global situation and regional preparedness
- Dr Frank Konings, WHO/WPRO

09:25–09:40 MERS preparedness in Sri Lanka
- Dr C. J. S. Jayamaha, Medical Research Institute, Sri Lanka

09:40–10:10 Coffee break
10:10–11:10  Disease severity assessment during a pandemic  
*Dr Katelijn Vandemaele, WHO/HQ*

11:10–17:00  Site visits

Chinese National Influenza Center

Peking University People's Hospital (ILI and SARI sentinel hospital)

Centers for Disease Control and Prevention of Xicheng District (influenza surveillance network laboratory)

**Day 4 – Friday, 15 November 2013**

08:30–08:40  Summary of Day 3

08:40–12:00  Plenary 6: Technical updates on influenza research for public health action

08:40–09:00  Southern hemisphere influenza and vaccine effectiveness research and surveillance (SHIVERS) in New Zealand  
*Dr Sue Huang, Institute of Environmental Science and Research, New Zealand*

09:00–09:20  Education strategies to support WHO’s vaccine policy/guideline initiatives  
*Dr Lance Jennings, Canterbury Health Laboratories, New Zealand*

09:20–09:40  The prevalence of influenza B lineages in Singapore (2010-2013)  
*Dr Cui Lin, National Public Health Laboratory, Singapore*

09:40–10:00  Question and answer

10:00–10:30  Coffee break

10:30–10:50  Pandemic risk assessment studies on H7N9 virus  
*Dr Jacqueline Katz, Influenza Division, US CDC*

10:50–11:10  Combination serological methods for H7N9 antibody detection  
*Dr Bai Tian, China CDC, China*

11:10–11:30  Neuraminidase (NA) inhibitor susceptibility of influenza A(H7N9) and A(H3N2) viruses with an R292K substitution in the NA gene  
*Dr Takato Odagiri, WHO Collaborating Centre for Reference and Research on Influenza, NIID, Japan*

11:30–12:00  Question and answer

12:00–13:00  Lunch break

13:00–14:00  Summary and closing session
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