APEC Project Final Report

The APEC Training Course on Response to Human Infections with Avian Influenza H5N1 and Pandemic H1N1 2009 Viruses

September 16-18, 2009
Beijing, China

APEC Health Working Group

December 2009

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Sponsored by
The Ministry of Health, People's Republic of China

Supported by
Asia-Pacific Economic Cooperation (APEC)

Organized by
The Chinese Center for Disease Control and Prevention

CONTENT

FINAL REPORT

BACKGROUND

In order to strengthen the capacity of relevant economies in response to the pandemic threat, the Ministry of Health of China, with the support of the APEC Secretariat, hosted **The APEC Training Course on Response to Human Infections with Avian Influenza H5N1 and Pandemic H1N1 2009 Viruses** (Training Course) from September 16-18, 2009 at Chang An Grand Hotel in Beijing, China.

The Training Course responds directly to 2006 Ministerial Meeting on endorsing the APEC Action Plan on Prevention and Response to Avian and Influenza Pandemics adopted in May 2006 and affirming their commitment to its implementation. The aim of the training is to build the technical capacity for animal and human Influenza surveillance, strengthen field investigation and emergency response, and share the successful experiences and lessons learned in the surveillance, control and prevention of AI A/H5N1 and Pandemic H1N1 2009 among APEC economies.

Entrusted by the Chinese Ministry of Health, the Chinese Center for Disease Control and Prevention (China CDC) was responsible for organizing the local planning and implementation work of the Training Course, including inviting speakers and training candidates, training module design, managing meeting logistics, preparing training materials and submitting project progress and final report etc.

OBJECTIVES

The Training Course has the following objectives:

1. Build the technical capacity for animal and human Influenza surveillance; strengthen field investigation and emergency response

2. Share the successful experiences and lessons learned in the surveillance, control and prevention of AI A/H5N1 and Pandemic H1N1 2009 among APEC economies.

3. Increase understanding and cooperation among APEC economies through the sharing of disease control and response activities.

IMPLEMENTATION

Fifteen trainees from Republic of Korea, Malaysia, Papua New Guinea, Peru, the Philippines, Russia, Singapore, Thailand, Vietnam and Macao SAR China attended the Training Course, nine speakers being invited from the US CDC, World Health Organization (WHO), World Organisation for Animal Health (OIE), Malaysian and China, and two facilitators who assisted in group discussions in case study sessions participated the Training Course. Dr. Vincent Liu from APEC Secretariat Health Working Group was specially invited to observe the Training Course (See Appendix 1 List of participants).

To reflect the consolidated working relationship and collaboration in response to pandemic influenza, the Association of Southeast Asian Nations (ASEAN) Secretariat sent Malaysian expert as their representative to this APEC training course to share best practices and efforts done by ASEAN on the development of capacity building projects on avian influenza.

Opening and welcome address was delivered by Mr. Minghui Ren, Director-General of the International Cooperation Department, Ministry of Health of China, who was also the project overseer of this Training Course. Then, Dr. Wannian Liang, Deputy Director of Health Emergency Office of Ministry of Health of China, Prof. Weizhong Yang, Deputy Director of China CDC and Dr. Vincent Liu, Program Director, APEC Secretariat gave their remarks one by one to stress the importance of effective rapid response in combating pandemic as well as the significance of information sharing and international collaboration.

The Training Course consisted of two parts, two-day plenary sessions integrated with a half day case study group training sessions. The first part of the Training Course provided a forum to exchange the most updated technical information and views on current epidemic situations on global and regional avian influenza H5N1 and pandemic H1N1 2009 viruses, as well as to inform the relevant and successful measures taken by member economies and recommended by health authorities as WHO and US CDC in cases of investigation and emergency response to the influenza pandemic. As for the second part, trainees were divided into two groups, each was led by one expert and one facilitator and began with an overall introduction on the case background and issues to solve, and then followed by discussions on a list of questions to be considered in three scenarios in the investigations into the cluster of human infections of avian influenza H5N1 and pandemic influenza. Each trainee will be instructed to share their own perspective and experiences in the real-time world. Finally, the expert and facilitator summarized the discussion results and presented the most appropriate or evidence-based practices for each question.

In the closing address, Dr. Vincent Liu stressed the importance of global network building among government agencies, public health authorities, scientists and healthcare workers dedicated to the disease prevention and outbreak mitigation. These networks enabled real-time sharing of important epidemiological, clinical and basic science information about the current pandemic. He, representing APEC HWG urge the trainees to share the contacts back home to expand this global public health information network. APEC is expected to do more at bilateral and regional levels to help complement WHO's efforts to coordinate this and future global outbreak responses.

Agenda please see Appendix 2.

LIST OF PRESENTERS AND TOPICS

1. Global situation and surveillance of human infection of AI H5N1 and pandemic H1N1 2009
   By Chin-Kei Lee, WHO

2. ASEAN Cooperation in Combating Avian Influenza
   By R.F.N. Rachmat, Malaysia

3. ASEAN Regional Cooperation in Pandemic Preparedness and Response
   By Christina Rundi, Malaysia

4. Surveillance and control of human infection of AI H5N1 and pandemic H1N1 2009 in China
   By Christina Rundi, Malaysia

5. Global Influenza epidemiology in animals
   By Kenji Sakurai, OIE Regional Representation for Asia & the Pacific

6. Surveillance and Control of Influenza in animals in China
   By Chen Jiming, China Animal Health and Epidemiology Center

7. RRT composition and guidelines
   By Jeffrey McFarland, US CDC

8. Human AI (H5N1) case investigation
   By Jeffrey McFarland, US CDC

9. Laboratory test:
   a. Specimen collecting and preserving
   b. Specimen transportation
   c. Results interpretation
   By Wang Dayan, China CDC

10. Personal protection and Infection control in healthcare facilities and community
    By Jeffrey McFarland, US CDC

11. Risk communication
    By Melinda Frost, US CDC

12. Rapid Containment for H5N1 in early stage of pandemic
    By Satoko Otsu, WPRO

13. From Case Investigation to Community Mitigation on Pandemic H1N1 2009
    By Satoko Otsu, WPRO

14. Containment and mitigation of Pandemic H1N1 2009 in US
    By Jeffrey McFarland, US CDC

15. Containment and mitigation of Pandemic H1N1 2009 in China
    By Xiang Nijuan, China CDC

For each presentation, please see Appendix 3.

EVALUATION

Questionnaires were distributed to all trainees and trainers and collected at the end of the training course. Assessment was conducted after the training to assure a comprehensive understanding of the proposed training course.

Questionnaires were collected at the closing ceremony of this training program. All the trainees and trainers gave a positive remark and more than eighty percent of the trainees evaluated this training program as “effective”, “satisfactory” or “well-organized”. They thought that the training program has provided a platform for both trainees and trainers from different economies to learn valuable experiences and skills on containment and mitigation of the adverse effect of infectious diseases. This would help to improve the information sharing systems, which results in a higher level of communication and networking between APEC economies.

The feedbacks from the questionnaires showed that workshops and case-studies are the most favorable part for most of the trainees. They regarded workshops and case-studies as “beneficial” and “practical”(see Appendix 4 for case study materials). When it comes to suggestions on future APEC projects, some trainees felt that it would be more beneficial if the APEC could either prolong the time for training or provide more opportunities of trainings on disease control and prevention.

In addition, a number of trainers and trainees thought that it was a pity that delegates from economies such as Mexico and Chile did not attend the training program, who may share their experiences on risk management of H1N1. In this sense, greater participation of APEC training program on health-related issues would be helpful to strengthen information sharing between economies.

OUTPUT & INFLUENCE

The Training course produced a documented collection of recommended guidance for the planning of rapid response capacity building, and experiences and lessons learned from different APEC economies and in Avian Influenza and pandemic prevention and control and a series of training aids for case study.

The document updated APEC members on relevant and successful measures taken by member economies in case investigation and emergency response and was designed to embrace both policy and technical contents so as to bring relevant information to decision makers and health workers involved in pandemic planning and responses.

After the course, the trainees could be the trainers to disseminate the knowledge and skills learned from the course and improve the capacity of RRT in local levels in their own economy.
The long-term effect of the training course can enhance understanding and cooperation of member economies and potential development of collaborations on Avian Influenza and influenza pandemics in the APEC region.

All hard copy (100 copies) and E-copy of the training courses materials including presentation slides, case study training aid, participants list and contact information were collected and

distributed to all participants. If possible, these materials can be put on the websites of APEC and China CDC to be shared by anyone who is interested in (see Appendix 3, 4).

CONSULTATION

As the "think-tank" of the Training Course, experts from Chinese Ministry of Health, Ministry of Agriculture, China CDC and WHO, US CDC provided consultation support in terms of program design, program management, nomination and invitation of speakers and facilitators, and implementation evaluation. Among them, three consultants were contracted and satisfactorily performed the following tasks before, during and after the training courses:

1. To assist in the development of the training program and specific modules on RRT tailored to trainees from APEC economies and incorporation of components of the knowledge and lessons learnt from the global and regional response to pandemic H1N1 2009;
2. To develop the training materials and training aids (including training methods, handouts and case study design);
3. To identify and invite suitable speakers and representatives from international organizations such as WHO, OIE, and APEC economies including epidemiologists, veterinarian officers, etc.;
4. To communicate with APEC secretariat, consultants and trainees to facilitate their participation;
5. To provide project management consulting services;
6. To deliver the training services;
7. To lead and facilitate the group discussion in case study sessions, summarize the highlights and discussion results of each group;
8. To prepare the final report of the training course to be submitted to the APEC.

STATEMENT OF EXPENSE

Content	Unit	Unit rate(RMB)	Currency(RMB)
1. Hosting: venue rental and stationary	3 days	11,000	33,000
2. Production, printing of Training materials:	100 copies	90	9,000
3. Consultation fee	3 persons	24,480	73,440
4. Translation fee			6000
		TOTAL	121,440

Appendix 1 List of participants

Economy/ Organization	First name	Last name	Department/Institution
1. China-Macao Special Administrative Region	Hoi-Tou	LEI	Macao Civic and Municipal Affairs Bureau
2. China-Macao Special Administrative Region	Lek-Hou	LEONG	Center for Disease Prevention and Control
3. Republic of Korea	Hyun-ho	CHO	Animal Disease Management Division-National Veterinary Research & Quarantine Service
4. Malaysia	R.F.N	RACHMAT	Epidemiology and Surveillance Section
5. Malaysia	Rundi	CHRISTINA	Communicable Diseases Unit, Ministry of Health Malaysia
6. Papua New Guinea	Peter	WAI'IN	National Agriculture Quarantine & Inspection Authority
7. Peru	Escate	MUNAYCO	Direccion General de Epidemiologia (Epidemiology deparment)
8. Peru	Cesar	CABEZAS	National Institute of Health
9. Philippines	Joselito	FELICIANO	Department of Health – National Epidemiology Center
10. Philippines	Gerardo	LIRAG	Lung Center of the Philippines
11. Singapore	Hariharan	SUBROMONY	Communicable Diseases Division, Ministry of Health
12. Thailand	Ajchara	VARARUK	Bureau of Emerging Infectious Diseases, Department of Disease Control
13. Thailand	Nuttavadee	PAMARANON	Bureau of Diseases Control & Veterinary Services, Department of Livestock Development
14. Vietnam	Nguyen Hong	NHUNG	Ministry of Health
15. Vietnam	Tran Van	BAN	Vietnam Department for Preventive and Environment
16. APEC	Jing-Yen	LIU	APEC Secretariat
17. US	Jeffrey	MCFARLAND	Epidemiologist, US Centers for Disease Control and Prevention
18. US	Melinda	FROST	Health communication specialist, US Centers for Disease Control and Prevention

Economy/ Organization	First name	Last name	Department/Institution
19. China	Ji Ming	CHEN	Director, Laboratory of Animal Epidemiological Surveillance, China Animal Health and Epidemiology Center
20. WHO	Chin-kei	LEE	CSR team leader, WHO Beijing Office
21. WHO	Satoko	OTSU	WHO WPRO
22. OIE	Kenji	SAKURAI	Regional Representation for Asia & the Pacific, OIE
23. China	Minghui	REN	Director-General, Department of International Cooperation, Minister of Health, P. R. China
24. China	Peilong	LIU	Senior advisor, Department of International Cooperation, Minister of Health, P. R. China
25. China	Yong	FENG	Director, Office of International Organizations, Department of International Cooperation, Minister of Health, P. R. China
26. China	Sujian	SITU	Program Officer, Office of International Organizations, Department of International Cooperation, Minister of Health, P. R. China
27. China	Wannian	LIANG	Deputy Director, Office of Health Emergency, Minister of Health, P. R. China
28. China	Min	XU	Specialist, Office of Health Emergency, Minister of Health, P. R. China
29. China	Zhengfu	QIANG	Director, Office of International Cooperation, China CDC
30. China	Hongjie	YU	Deputy Director, Office of Disease Control and Emergency Response, China CDC
31. China	Yuelong	SHU	Director, National Influenza Center, China CDC
32. China	Dayan	WANG	Specialist, National Influenza Center, China CDC
33. China	Nijuan	XIANG	Health specialist, Division of Respiratory Diseases, Office of Disease Control and Emergency Response, China CDC
34. China	Huanyu	WU	Epidemiologist, Shanghai CDC
35. China	Jianming	OU	Epidemiologist, Guangdong CDC
36. China	Min	HU	Program officer, Division of Respiratory Diseases, Office of Disease Control and

Economy/ Organization	First name	Last name	Department/Institution
			Emergency Response, China CDC
37. China	Lin	FENG	Director, Office of International Cooperation, China CDC
38. China	Xiaoqi	WANG	Program Officer, Office of International Cooperation, China CDC
39. China	Siyang	YUAN	Program Officer, Office of International Cooperation, China CDC
40. China	Jianjun	HUANG	Program Officer, Office of International Cooperation, China CDC
41. China	Liping	ZHENG	Program Officer, Office of International Cooperation, China CDC
42. China	Xiaoxue	LI	Program assistant

Appendix 2 Agenda

APEC Training Course on Response to Human Infections with Avian Influenza H5N1 and Pandemic H1N1 2009 Viruses

16-18 September 2009 Beijing, China

Training Program

DAY ONE

Time	Activities
Chair: *Ren Minghui,Director, Department of International Cooperation, Ministry of Health(MoH), China*	
8:00-9:00	Registration
9:00-9:30	Opening remarks • *Liang WanNian, Deput Director,Office of Health Emergency,MoH, China* • *Yang Weizhong,Chinese Center for Disease Control and Prevention(China CDC)*
9:30-9:40	Opening remark *Vincent Liu, APEC Secretariat*
9:40-9:50	Training orientation • *Hu Min,Office of Disease Control and Emergency Response, China CDC*
9:50-10:05	Group photo
10:05-10:20	Tea break
Module I:	
Moderator：Jeffrey McFarland, US Centers for Disease Control and Prevention(US CDC)	
10:20-10:50	Global situation and surveillance of human infection of AI H5N1 and pandemic H1N1 2009 • *Chin-Kei Lee,WHO*
10:50-11:10	ASEAN Cooperation in Combating Avian Influenza • *Volunteer from Malaysia (R.F.N Rachmat)*
11:10-11:30	ASEAN Regional Cooperation in Pandemic Preparedness and Response • *Volunteer from Malaysia (Christina Rundi)*
11:30-11:50	Q&A
11:50-12:10	Surveillance and control of human infection of AI H5N1 and pandemic H1N1 2009 in China • *Xu Min,Office of Health Emergency , MoH, China*
12:10-12:20	Situation of pandemic H1N1 2009 in Malaysia • *Volunteer from Malaysia （Christina Rundi ）*

12:20-12:30	Q&A
12:30-14:00	Lunch
Module 2:	
Moderator：Jeffrey McFarland, US CDC	
14:00-14:20	Global Influenza epidemiology in animals • *Kenji Sakurai, OIE Regional Representation for Asia & the Pacific*
14:20-15:00	Surveillance and Control of Influenza in animals in China • *Chen Jiming, China Animal Health and Epidemiology Center*
15:00-15:20	Q&A
15:20-15:40	Tea Break
Module 3:	
Moderator：Jeffrey McFarland, US CDC	
15:40-18:10	Case study (H5N1)
18:30	Welcome Dinner

DAY TWO

Time	Activities
Module 4:	
Moderator：Chin-kei Lee,WHO	
8:30-8:50	RRT composition and guidelines • *Jeffrey McFarland, US CDC*
8:50-9:20	Human AI (H5N1) case investigation • *Jeffrey McFarland, US CDC*
9:20-9:40	Q&A
Module 5:	
Moderator：Chin-kei Lee ,WHO	
9:40-10:20	Laboratory test: a. Specimen collecting and preserving b. Specimen transportation c. Results interpretation • *Wang Dayan, National Influenza Center, National Institute for Viral Disease Control and Prevention, China CDC*
10:20-10:30	Q&A
10:30-10:50	Tea Break
Module 6:	

Moderator：Chin-kei Lee,WHO	
10:50-11:20	Personal protection and Infection control in healthcare facilities and community • *Jeffrey McFarland, US CDC*
11:20-11:40	Q&A
Module 7:	
Moderator：Chin-kei Lee,WHO	
11:40-12:10	Risk communication • *Melinda Frost, US CDC*
12:10-12:30	Q&A
12:30-14:00 Lunch	
Module 8:	
Moderator：Xiang Nijuan，Chinese Center for Disease Control and Prevention	
14:00-14:20	Rapid Containment for H5N1 in early stage of pandemic • *Satoko Otsu, WPRO*
14:20-14:40	From Case Investigation to Community Mitigation on Pandemic H1N1 2009 • *Satoko Otsu, WPRO*
15:20-15:35	Containment and mitigation of Pandemic H1N1 2009 in US • *Jeffrey McFarland, US CDC*
15:35-15:55	Tea Break
15:55-16:15	Containment and mitigation of Pandemic H1N1 2009 in China • *Volunteer from China(Xiang Nijuan, Chinese Center for Disease Control and Prevention)*
16:15-17:00	Q&A
17:00	Dinner

DAY THREE

Time	Activities
Module 9:	
Moderator：Xiang Nijuan, Chinese Center for Disease Control and Prevention	
8:30-10:00	Case Study (H1N1)
10:00-10:20	Tea Break
10:20-11:20	Case Study (H1N1)
11:20-11:40	Evaluation, Meeting Materials Delivering
11:40-12:00	Training Course Summary

	Vincent Liu, APEC Secretariat
12:00-14:00	Lunch

Appendix 3 Presentations (Please check the slides in the attached disk.)

Appendix 4 Case Study Materials

Case study 1

Facilitator's Guide: September 2009

Learning objectives:

After completing this case study, the participants should be able to:

1) To understand the complexities and concepts of pandemic H1N1 influenza response.

2) To strengthen and maintain the influenza pandemic response at national level.

3) To develop tools for further dissemination of knowledge on influenza pandemic response in individual countries.

Expected participants:
1) One participant from Ministry of Health from each country
2) One participant from Ministry of Agriculture from each country

Sogeru

Sogeru is a country in Asia that contains 21 provinces and a population of approximately 300 million people concentrated primarily in the eastern and southern costal regions of the country.

Geography: Country spreads across several climatic zones and is bordered by 12 other countries on the west and north. There are high mountains and place with difficult access in the north and west of the country but the population is sparse. The migration of population across the border and in country migration from rural to urban areas is frequent with a potential of developing the public health events of national concern. Recently the surveillance activities have been focused to that problem. The population are predominantly Buddhist. The majority of population live in the cities along the eastern and southern coast. In the western part of the country live only 25% of population. The whole country is experiencing often flooding, earthquakes and other natural disasters which put extra demand on health services.

Health care: Cholera, plague, dengue, dysentery, watery diarrhea, typhoid, food poisoning, influenza, rubella, hand and mouth disease, rabies, viral hepatitis, and meningococcal meningitis are endemic with somewhat cyclic epidemic patterns. Malaria and dengue is a problem in the tropical zone on the south of the country.

The Sogeru Ministry of Health is the focal point for planning, organization, financing, regulation and provision of health care for the population. Provincial health authorities are responsible for public health investigation, interventions and curative care at provincial level and district health authorities at district level. There are 21 provincial hospitals, 126 district hospitals and several other hospitals as university hospitals, private hospitals, traditional hospitals and many local health stations/traditional clinics.

There is an uneven geographical distribution of health care that has problems with poor quality of care and low

service utilization in rural areas. However a government is making an effort to improve the infrastructure and support social mobilization so the situation is improving.

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Influenza laboratory testing capabilities: District hospitals and traditional hospitals have no laboratory capacity. Provincial hospitals can conduct tests to confirm clinical diagnosis. The National laboratory is the only lab equipped to undertake virus isolation and the antigenic and genetic analyses needed for vaccine development and monitoring virus evolution using WHO influenza reagent kit. The closest WHO reference laboratory is outside of the country.

Surveillance infrastructure: There is web based national notifiable disease surveillance system. There is also hospital-based sentinel influenza-like illness (ILI) surveillance comprised of 27 hospitals (including 17 provincial hospitals, 10 district hospitals and 17 provincial labs and one national lab in the network). Event-based Public Health Information Reporting System collects reports, from the entire country, of outbreak, food poisoning and other cause-unknown cluster of adverse health events.

Beginning in April 2009 there have been an increasing number of reports from sentinel influenza sites on increasing number of ILI cases in one province in the southeastern part of the country.

Scenario 1 Sporadic cases – initial first cases

(initial cases of pandemic H1N1 reported related to travel)

(covers approximately one week period of time)

Background in the world:

In March two countries experienced human infections with a new influenza virus: influenza A(H1N1). On 31 March the evolution of the situation prompted the Director-General of the World Health Organization (WHO) to determine that it constituted a public health emergency of international concern under the current International Health Regulations (IHR). Following emerging evidence of community human-to-human transmission in two countries, WHO raised the pandemic alert level from phase 4 (on 17 April) to phase 5 (on 19 April) and from phase 5 to phase 6 (on 27 april). This communicated clear signals to governments, that preparations for a pandemic should be intensified. WHO advises no restriction of regular travel or closure of borders. It is considered prudent for people who are ill to delay international travel and for people developing symptoms following international travel to seek medical attention, in line with guidance from national authorities. There is also no risk of infection from this virus from consumption of well-cooked pork and pork products. Individuals are advised to wash hands thoroughly with soap and water on a regular basis and should seek medical attention if they develop any symptoms of influenza-like illness.

Background in the country:

No cases of H1N1 in the country. MOH issued national epidemiologic alert to influenza sentinel sites and hospitals asking them to look for any unusual increase of ILI cases, collection of specimens and laboratory testing. No other measures adopted so far.

Exercise:

On May 31 the flight RK63 from Anharu to Guru landed at the International airport. The flight took 12 hours. Among the passengers was 25-year-old student arriving from studies in Anharu. He took a taxi from the airport to his home where he stayed the remaining part of day with his parents. He had no close contact with other persons.

On June 1, 2009, he didn't feel well so he stayed at home and later developed fever, sore throat, cough and chills so he walked to the hospital to seek medical assistance. Contacts (parents) reported no recent respiratory illness. Doctor calls you, because he is aware of his travel from country with occurrence of pandemic H1N1, as the symptoms developed in less than 48 hours after arriving to Guru. You get also a call from director of hospital who is interesting in the appropriate infection control measures which should be adopted to protect

health workers and other patients in the hospital.

In early afternoon of June 2, influenza A pandemic (H1N1) infection was confirmed. Epidemiologist is going to investigate contacts. Investigation reveals no presence of respiratory illness as of date.

MOH is calling emergency meeting. It is necessary to respond to the situation that the first imported case of pandemic H1N1 has been reported in the country.

On June 3 the first case is reported to WHO.

Q1: Doctor is asking if it is a Pandemic Influenza H1N1 case? What will you tell him?

There is important to distinguish between laboratory confirmed and clinically compatible case.

The following case definition should be used to report confirmed cases of pandemic (H1N1) 2009 virus infection to WHO: An individual with laboratory-confirmed pandemic (H1N1) 2009 virus infection by one or more of the following tests

- polymerase chain reaction (PCR);
- viral culture
- 4-fold rise in pandemic (H1N1) 2009 virus virus-specific neutralizing antibodies.

Probable case: Individual with with influenza test that is positive for influenza A, but is unsubtypable by reagents used to detect seasonal influenza virus infection
OR
An individual with clinically compatible illness or who died of an unexplained acute respiratory illness who is considered to be epidemiologically linked to a probable or confirmed case.

Student is a suspected pandemic H1N1 case with "probable case" designation as there is not so far any laboratory confirmation.

Q2: Doctor is also asking if the case should be isolated and if antivirals should be provided?

Isolation is generally used to reduce community transmission by decreasing contact between infected and non-infected persons. Any Isolation needs to be applied in conjunction with hand and respiratory hygiene measures as well as infection control measures at home to minimize transmission risk. Strict hospital isolation may be implemented when the number of cases is still small.

Options for isolation of ill individuals include:

- isolation of only severe cases in hospital
- isolation of all probable and confirmed cases in health care facilities
- isolation of mild probable and confirmed cases at home
- isolation of all suspected cases in health care facilities (in settings where home isolation is unlikely to work – e.g. overcrowding)
- advice to ill individuals (e.g. all suspected cases) to stay home and avoid contact with others if they are ill, whenever possible.

Persons with influenza A(H1N1) infection who present with an uncomplicated febrile illness do not require treatment unless they are at increased risk of influenza-related complications.

Priority use of antivirals is recommended for treatment of patients at increased risk of influenza-related complications (extracted from US CDC). People considered as "at increased risk of influenza-related complications" are:

- persons with chronic diseases or with suppressed immune systems,
- children younger than five years old,
- adults 65 years and older, and
- pregnant women.

These groups may change as the situation evolves.

Q3: Furthermore, you get the call from the Director of the hospital asking you about the infection control measures that should be adopted in the hospital in order to protect health workers and other patients. What will you recommend?

Participants should be encouraged to brainstorm as many useful elements that they think should be captured in this kind of respiratory outbreak investigation.

KEY ELEMENTS FOR INFECTION PREVENTION IN HEALTH CARE

1. **Basic infection control recommendations for all health-care facilities** Standard and Droplet Precautions should be used when caring for a patient with an acute, febrile, respiratory illness.

2. **Respiratory hygiene/cough etiquette** Health-care workers, patients and family members should cover their mouth and nose with a

disposable tissue when coughing, then discard the tissue in a receptacle and perform hand hygiene afterwards.

3. **Triage, early recognition and reporting of pandemic (H1N1) infection** Consider assessing pandemic (H1N1) 2009 virus infection in patients with acute, febrile, respiratory illness in places where community-level spread is occurring or in patients who have been in an affected region within one week prior to symptom onset and who have been exposed to pandemic (H1N1) 2009 by an infected patient.[13]

4. **Placement of suspected and confirmed pandemic (H1N1) 2009 infected patients** Place patients with the same diagnosis in wards keeping at least 1 metre distance between beds.[14] All persons entering the isolation area should adhere to Standard and Droplet Precautions. For health services targeting healthy populations, such as pregnant women, children attending immunization services or regular check-ups, measures must be taken to avoid exposing healthy people to suspected or confirmed cases.

5. **Additional measures to reduce pandemic (H1N1) 2009 virus transmission associated with health care** Limit the number of health-care workers/family members/visitors exposed to the pandemic (H1N1) 2009 patient. Implement rooming-in policies to keep mothers and babies together.

6. **Specimen transport/handling within health-care facilities** Follow applicable transport regulations and requirements and use Standard Precautions for specimen transport to the laboratory. Health-care facility laboratories should follow good biosafety practices.[15]

7. **Family member/visitor recommendations** Family members/visitors should be limited to those essential for patient support and should use the same IC precautions as health-care workers.

8. **Patient transport within health-care facilities** Suspected or confirmed pandemic (H1N1) 2009 patients should wear a medical mask or cover their cough and practice appropriate hand hygiene while being transported within health-care facilities.

9. **Pre-hospital care** (e.g. transportation to hospital). When transporting patients to hospital, IC precautions are similar to those practiced during hospital care for all involved in the care of suspected pandemic (H1N1) 2009 patients.

10. **Occupational health** Monitor health of health-care workers exposed to pandemic (H1N1) 2009 patients. Health-care workers with symptoms should stay at home. Vulnerable groups at high risk for complications of pandemic (H1N1) 2009 infection should carefully follow recommended infection-control measures. In addition, alternatives such as reassignment to other duties should be considered. Antiviral prophylaxis should follow local policy.

11. **Waste disposal** Standard Precautions should be used when handling and disposing of sharps and contaminated items.

12. **Dishes/eating utensils** Wash using routine procedures with water and detergent. Use non-sterile rubber gloves.

13. **Linen and laundry** Wash with routine procedures, water and usual detergent; avoid shaking linen/laundry during handling before washing. Wear non-sterile rubber gloves.

14. **Environmental cleaning** Ensure that appropriate and regular cleaning is performed with water and usual detergent on soiled and/or frequently touched surfaces (e.g. door handles).

15. **Patient care equipment** Ensure cleaning and disinfection of reusable equipment between patients.

16. **Duration of pandemic (H1N1) 2009 infection control precautions** Until further information becomes available, IC precautions should be practiced for seven days from the onset of symptoms. For prolonged illness with complications (i.e. pneumonia), control measures should be used during the duration of acute illness. Children may shed the virus longer than adults, and personal hygiene and separation from immunologically naive family members is recommended for at least one week after the resolution of fever.

17. **Patient discharge** If the pandemic (H1N1) 2009 patient is still infectious upon hospital discharge (i.e. discharged within the period of IC precautions: see 16 above), instruct family members on appropriate IC precautions in the home.

18. **Prioritization of PPE when supplies are limited** Medical masks and hand hygiene supplies should be prioritized for the care of all pandemic (H1N1) 2009 patients.

19. **Health-care facility (HCF) engineering controls** The HCF spaces should be well ventilated. Aerosol-generating procedures should be performed in adequately-ventilated rooms ($\geq$12 air changes per hour).

20. **Mortuary care** Mortuary staff and the burial team should apply Standard Precautions, i.e. perform proper hand hygiene and use appropriate PPE according to the risk of exposure to body fluids (e.g. gown, gloves, and facial protection if there is a risk of splashes from patient's body fluids/secretions onto staff member's body and face).

21. **Health-care facility managerial activities** Development of procedures to ensure proper implementation of administrative controls, environmental controls and use of PPE, including adequate staffing and supplies, training of staff, education of patients and visitors and a strategy for risk communication.

Q4: You will need to advise the local epidemiologist on how to handle the contacts. He wants to know if he should trace all contacts, quarantine them and provide antiviral prophylaxis. What do you advise?

Quarantining of contacts is to reduce community transmission by decreasing contact between potentially infectious and non-infected persons. Identification of close contacts often requires contact tracing. Members of households with probable or confirmed cases of influenza A(H1N1) as close contacts may be at increased risk

of infection. A significant proportion of these people may shed virus and be at risk of infecting others in the community despite being asymptomatic. Quarantining these household members for a period of 7 days following symptom onset in the ill household member may reduce this
risk. Some persons may experience a longer period of quarantine if multiple household members become ill over an extended period of time.

Quarantine measures need to be applied in conjunction with hand and respiratory hygiene measures as well as infection control measures at home
to minimize transmission risk.

Options for quarantine of household members and contacts include:

- advise household members and close contacts of probable or confirmed cases to stay home for an incubation period (e.g. 7 days) and to minimize their contact with others in the community
- advise household members and close contacts of suspect cases to stay home and to minimize their contact with others
- mandatory home-based quarantine
- facility-based quarantine of all contacts
- no quarantine measures to be implemented once community-level outbreaks are occurring.

Antiviral use should be prioritized for treatment, not prophylaxis.

Post-exposure antiviral prophylaxis should be considered for the following (US CDC):
- close contacts of cases (confirmed, probable) who are at high risk for complications of influenza; - health care personnel, public health workers with unprotected exposure to confirmed case or case during the case's infectious period.

Pre-exposure antiviral prophylaxis should be considered only for
- people in close contact with high risk for influenza complication
- health care facility workers who are exposed to confirmed influenza A(H1N1) without proper use of PPE.

If the contact happened after infectious period (currently one day prior to onset and seven days after), it may not be necessary to administer post-exposure prophylaxis.

Either oseltamivir or zanamivir may be used or administered if there is no contraindication.

General population - NO
Close contacts of confirmed cases –

- persons at increased risk of influenza-related complications Consider

Health care personnel and public health workers exposed

- with PPE: NO (follow up needed)
- without PPE with increased risk of infl. related complications Consider

Q5: What would be a requirement for surveillance after reflecting on the current situation of the first confirmed case of Pandemic Influenza A/H1N1 in the country? How would you choose to report the first pandemic Influenza A/ H1N1 case?

In this phase is important case detection and outbreak investigation

In countries with no apparent virus circulation the aims of surveillance are to document the first appearance of the pandemic (H1N1) 2009 virus and to collect sufficient information on initial cases for risk assessment. The requirements are to:

- detect and confirm the spread of pandemic (H1N1) 2009 virus into areas, e.g. administrative units, not previously reporting confirmed cases

- investigate changes in the characteristics of the pandemic such as any increase in the severity of the disease.

Triggers/signals for the investigation of suspected cases or clusters of pandemic (H1N1) 2009 virus infection include:

• cluster(s)2 of cases of unexplained ILI or acute lower respiratory tract infection

• severe, unexplained respiratory illness

• changes in the epidemiology of mortality associated with the occurrence of ILI or lower respiratory tract illness, an increase in the number of deaths observed from respiratory illness or an increase in the occurrence of severe respiratory disease in previously healthy adults or adolescents and/or among pregnant women

• abnormally high levels of absenteeism in a school or workplace setting.

The initial investigation should include laboratory confirmation of any suspected case of pandemic (H1N1) 2009 virus. Member States without laboratory capacity or with no access to laboratory capacity for confirmation, should contact their WHO regional office, so that an appropriate laboratory can be identified for the submission and testing of samples. At any stage during the pandemic, unexplained clusters of respiratory disease or deaths, or any change in the epidemiological or clinical presentation of the disease seen to date, requires immediate investigation. The number of samples collected will vary depending on the needs of the investigation.

The first confirmed of pandemic (H1N1) 2009 virus infection detected in a country should be immediately reported by the IHR National Focal Point to the IHR Contact Point at the relevant WHO Regional Office as well as the WHO Country Representative where applicable. WHO will follow established processes for internal communications about such notifications. Confirmed cases reported to WHO should be attributed to the country, territory or area in which they are identified.

Q6: What kind of measures would you recommend in this situation?

In general measures are aiming at reducing transmission and mitigating impact with focus on vulnerable population. They

- Delay outbreak peak
- Delay spread and shift an epidemic curve to the right side
- Reduce peak burden on health care facilities (e.g. hospitals)
- To “buy time” for other measures (e.g. vaccination)
- Reduce morbidity and mortality through reducing the total number of cases

Key considerations of adoption of specific measures should be:

- Bases on risk assessment, esp severity and potential impact
- evidence-based
- Balance benefits against costs'
- Need to be tailored to country and local setting
- Planning, coordination and communication are a key

There are two main groups of interventions:

- Non-pharmaceutical interventions
    - Individual and household level public health measures
    - Societal level public health measures, including social distancing
- Pharmaceutical interventions
    - Use of matched vaccines
    - Use of effective antiviral drugs

Individual/household measures are always strongly encouraged, as they help prevent the transmission of all respiratory infections, including the new influenza A(H1N1) infections. there are two groups of individual measures related to the new influenza A(H1N1) with two different objectives: (1) to protect oneself from infection; (2) to prevent infection to others when ill.

The following are some examples of personal protective measures:

- avoiding and limiting contact with ill persons especially those with influenza-like illness and acute respiratory illness
- hand hygiene (e.g. wash hands with soap and water or alcohol-based rub, if available)
- correct use of surgical masks based on risk of exposure (e.g. when in close contact with an ill person who is unable to wear a mask)
- cough/respiratory etiquette (cover coughs and sneezes) to prevent infection to others
- use of surgical masks by ill persons if they have to be in contact with others
- other hygiene measures that fit local social and cultural contexts and needs (including no spitting).

Stock piling of not only antivirals but also antibiotics

Scenario 2 sporadic cases

(Sporadic cases reported from various sites in the country related to travel)
(covers aaproximately 2 weeks period of time)

Situation in the world:
As of these dates there are 9 countries officially reported 148 cases of pandemic A H1N1 infection but the situation evolves rapidly at the time.

Situation in the country:
At early stage the country has reported the first case of H1N1 to the World Health Organization. Following this another 23 suspected cases have been detected by screening at the airport. Of those 7 cases of pandemic H1N1 have been laboratory confirmed. Another 12 sporadic cases have been reported from several places in the town. Of those 10 cases of pandemic H1N1 confirmed. All are related to travel to countries with occurrence of pandemic H1N1.

Health measures for all airport passengers have been implemented including medical check and temperature screening. The country is undertaking case investigation, contact tracing and quarantining vigorously. Confirmed pandemic H1N1 cases are treated with antivirals. Antivirals are also given to contacts of pandemic H1N1 cases. There is increasing demand on health services with low impact of infection on health workers.

Exercise:
(continuing of the story from the previous exercise)

On June 3 you find that stewardess and one passenger who were close contacts of the case on the RK63 flight developed ILI symptoms including fever, muscle pains and nasal congestion yesterday before being tested positive for pandemic H1N1 virus.

Media report first H1N1 case in the headlines and are demanding more updated information on situation.

Meeting at the Ministry of health is debating about the containment (delaying) versus mitigation strategies.

MOH is alarmed by increasing reports of patients with ILI from one province based on review of sentinel surveillance data. On June 5 local epidemiologist is going to investigate the reports of increasing ILI cases in neighbouring province. He has found apparent increase of influenza like illness over last two weeks including one severe case (10 years boy who developed fever, cough and vomiting with onset of symptoms on June 2. Mother bring him to the hospital on June 3. The result of testing in the hospital laboratory was negative for H1N1, H3N2 and H5N1 so the specimens have been sent to the reference laboratory on June 4 that confirms positive result for pandemic H1N1 virus on June 5. Boy developed acute respiratory distress syndrome). The case died on 6 June and has been reported by MOH to WHO as the first death related to pandemic H1N1 infection in the country.

The major culture exhibition is planned to be held next week. It is expected that it will take 4 days and it is estimated that it can host 110 000 visitors coming mainly from different parts of the country but also from abroad.

Q1: What stage of the pandemic are you in now?

WHO pandemic Stage 6.

In nature, influenza viruses circulate continuously among animals, especially birds. Even though such viruses might theoretically develop into pandemic viruses, in **Phase 1** no viruses circulating among animals have been reported to cause infections in humans.

In **Phase 2** an animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans, and is therefore considered a potential pandemic threat.

In **Phase 3**, an animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver. However, limited transmission under such restricted circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic.

Phase 4 is characterized by verified human-to-human transmission of an animal or human-animal influenza reassortant virus able to cause "community-level outbreaks." The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk for a pandemic. Anycountry that suspects or has verified such an event should urgently consult with WHO so that the situation can be jointly assessed and a decision made by the affected country if implementation of a rapid pandemic containment operation is warranted. Phase 4 indicates a significant increase in risk of a pandemic but does not necessarily mean that a pandemic is a forgone conclusion.

Phase 5 is characterized by human-to-human spread of the virus into at least two countries in one WHO region (Figure 5)23. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.

Phase 6, the pandemic phase, is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is under way.

Q2: Doctors are asking you if the cases should be still isolated and antivirals provided. What will you advise them? Why?

Strict hospital isolation may be implemented when the number of cases is still small.

In general at the end of this phase the strict isolation of cases should be reassessed. Some countries still keep containment strategy and follow up with isolation of cases. Some of those will already shift to the mitigation and the isolation at the hospital is replaced by self isolation of cases at home and hospitalization of only severe cases.

For antivirals it is the same as in the first scenario but for probable case it is only consider based on risk of influenza-related complications and available resources

Q3: The provincial epidemiologist wants to know if contact tracing, quarantining and prohylactic use of antivirals for contacts should be continued. What will you advise them? Why?

Identification of close contacts often requires contact tracing, which is resource intensive and becomes challenging when the outbreak is getting large. In the later stage it is rather replaced by self-monitoring of health (e.g. monitoring temperatures of caregivers) and reporting of illness with following isolation in case of illness.

Antivirals:
General population: NO need
Close contacts of confirmed cases:

- at low risk influenza complications: Consider based on risk and available resources
- at increased risk of influenza complications: Consider

Health care personnel public health workers:

- exposed with PPE: NO (follow up needed)
- without PPE:persons at increased risk of influenza-related complications Consider

Q4: MOH is asking you what kind of surveillance is required at this stage and how pandemic H1N1 cases should be reported to WHO. What is your advice? Why?

<u>In this phase it is important to provide characterization of virus and disease:</u>

- Initial comprehensive assessment (FF100)
- Contact tracing
- Case-based sentinel surveillance
- Lab confirmation

Once the pandemic (H1N1) virus has been detected it is important to:

- describe the epidemiological and virological features of cases to guide control and prevention activities as required
- assess disease severity
- laboratory testing priorities:
    - confirming infection in new areas
    - Testing severe cases
    - Monitoring the co-circulation of pandemic h1N1 virus and seasonal virus

(countries with limited laboratory capacity, or limited access to laboratory capacity, should according to the WHO recommendation to test a number of samples per week in order to verify that disease activity is still largely due to pandemic (H1N1) 2009 virus).

After the first case(s) of pandemic (H1N1) 2009 virus infection have been notified and for as long as is feasible for the country, IHR National Focal Points or national public health authorities should report the following information to WHO on a weekly basis:

• the number of confirmed cases and deaths in confirmed cases
• the age distribution of confirmed cases and deaths (where available).

Countries should contact the relevant WHO regional office for reporting arrangements. A summary form has been developed to facilitate the reporting of this information to WHO WHO will use the information in accordance with Article 11 of the IHR (2005) as required by the circumstances of the pandemic.

In addition to the information asked above, all Member States are strongly encouraged to share with WHO any additional information relevant for ongoing global risk assessment. This includes, in particular, information on the clinical spectrum of the disease, the proportion of cases with severe illness, and risk groups for severe outcome. For detailed case-based information, a form has been developed to facilitate the collection of these data.

Q5: The Minister of Health has asked you to explain what are the pros and cons of the containment and mitigation strategies and what would be the most suitable one for the country at this stage. What is containment? What is mitigation? What advice do you give the Minister? Why?

Containment definition- To stop or delay the spread of the virus by detecting cases and taking vigorous actions, such as contact tracing, treatment and/or quarantine of contacts

Mitigation definition- To slow the spread of the virus in the community and minimize transmission to vulnerable populations
To ensure healthcare for those who need it most
To minimise social disruption and other negative consequences

Using a strategy of mitigation in when no community transmission is present means that it might be lost opportunity to delay the spread

Using a strategy of containment in when the community transmission is present means that resources intensive and minimal public health benefit

Need to shift from "containment" to "mitigation", but decision to shift appeared to be difficult in some countries (political, technical issues)

Q6: Are there any measures at this stage at the national level which you would consider necessary (e.g. stockpiles of medicaments etc)?

Societal measures, including social distancing

- Suspension of classes and child care programmes
- Adjusting or changing work patterns
- Restriction of public or mass gatherings
- Domestic travel advisories and restrictions

International travel and screening

- Health advice and alerts to travelers
- Health declaration form
- Temperature screening
- On-board identification of suspected travelers
- International travel advisory, restriction, border closure?

Management of symptomatic & exposed travelers - Symptomatic travellers (isolation & treatment…) Exposed travellers (quarantine…)

Q7: What information will you want to communicate to the public and how will you present the situation to the media?

Messaging should encourage the public to be aware of the potential for illness and to engage in conscientious public hygiene (e.g.: hand hygiene, cough etiquette, etc.) and seek medical attention as needed. At the same time, announcements much take care to balance out the potential for indifference and the under-allocation of resources versus the potential for panic and over-allocation of resources.

Good communication is vital as situations surrounding this pandemic are fluid and change daily. It was recommended that public health officials must convey a strong, consistent, easily-understood and actionable message to the public and to health care providers.

Q8: What advice would you provide to organizers of the cultural exhibition with respect to the current pandemic situation in the country?

The aim of the measure should be to reduce community transmission and delay the spread of disease in the community through deceasing the number of human contacts

Options for restricting public or mass gathering include:

- postponing, cancelling or modifying only selected and main types of public or mass gathering based on the assessed situations
- postponing, cancelling or modifying all public or mass gatherings when community-level outbreak is occurring.

Q9: What would you need to observe to indicate that there was either continued sporadic cases or progression to community transmission?

Need to examine your surveillance data. Continued sporadic cases will be separated by space and time. Cases caused by community transmission will cluster in space and time and not have any history of importation.

Scenario 3: School outbreak(s) and community transmission

(Clusters of cases reported from various sites in the country and widespread incidence of H1N1 cases in the country)
(covers undefined period of time)

Situation in the world:
At this stage more than 182,000 laboratory confirmed cases of pandemic influenza H1N1, 1799 deaths, in 177 countries and territories have been reported to WHO. As more and more countries have stopped counting individual cases, particularly of milder illness, the case number is significantly lower than the actually number of cases that have occurred.

Rates of influenza illness continue to decline in the temperate regions of the southern hemisphere, areas of tropical regions are reporting increasing rates of illness. In the Northern temperate zones, overall rates are declining but main influenza season is to come in next months.

WHO has also been notified of 12 cases of oseltamivir resistant virus. There is also no evidence of onward transmission from these cases.

Situation in the country:
Situation in the country further evolved and you see majority of locally acquired pandemic H1N1 cases and only few imported cases. The transmission is already established in the country including school outbreaks and

cluster of cases. The total number of confirmed pandemic H1N1 cases starts at the time on 150 and later is increasing about one hundred per day. There are several deaths and 78 severe cases reported due to pandemic H1N1 infection. The lab services are overwhelmed by testing of clinical specimens and health services overwhelmed by patients. The MOH is deciding to revise the initial strategy to respond to increase of pandemic H1N1 cases. Pandemic vaccine clinical trials are closing to the end and limited amount of pandemic vaccine might be available soon.

Exercise:
On 11 June MOH receives report on outbreak at school in Wugan.

On 12 June the rapid investigation is conducted by epidemiologists. They notify 20 absentees of total 62 students in 2 classes. They also find that 18 other persons (staff of the school, teachers) who have been in contact with students of affected classes. There were not found any sick children in other classes. None of the students reported travel to abroad before 6 June.

Of 42 students present at time of investigation at school 5 were newly symptomatic students. All cases had mild illness with reported symptoms: headache, fever, cough, sore throat and rhinorrhea. The onset of outbreak was probably sometimes around June 9-10.

On June 14 you have received results form laboratory indicating that specimens from all newly symptomatic students were tested positive for pandemic H1N1 in all 5 students..
Subsequent investigation of contacts finds 11 persons with ILI symptoms of those one was confirmed as pandemic H1N1. Several contacts reported travel abroad.

Ministry of health calls the meeting responding to the current development.

Q1: What stage of the pandemic are you in now?
WHO pandemic Stage 6.
In nature, influenza viruses circulate continuously among animals, especially birds. Even though such viruses might theoretically develop into pandemic viruses, in **Phase 1** no viruses circulating among animals have been reported to cause infections in humans.
In **Phase 2** an animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans, and is therefore considered a potential pandemic threat.
In **Phase 3**, an animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver. However, limited transmission under such restricted circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic.
Phase 4 is characterized by verified human-to-human transmission of an animal or human-animal influenza reassortant virus able to cause “community-level outbreaks.” The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk for a pandemic. Anycountry that suspects or has verified such an event should urgently consult with WHO so that the situation can be jointly assessed and a decision made by the affected country if implementation of a rapid pandemic containment operation is warranted. Phase 4 indicates a significant increase in risk of a pandemic but does not necessarily mean that a pandemic is a forgone conclusion.
Phase 5 is characterized by human-to-human spread of the virus into at least two countries in one WHO region (Figure 5)23. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.
Phase 6, the pandemic phase, is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is under way.

Q2: What would you suggest for case finding, isolation and antiviral treatment of cases at this stage?

When community-level transmission is widely occurring, the most feasible option is to isolate and manage severe cases to reduce deaths in hospitals with appropriate medical facilities, and to advise sick people (relatively mild cases) to stay at home (home isolation).

Only severe cases require treatment by antivirals.

Q3: What would you suggest for contact tracing, quarantining/ isolation and prophylactic use of antivirals for contacts at this stage?

Identification of close contacts during community-level outbreaks is not conducted and contact management is based on self observation and self isolation in case of illness.

Antivirals:
General population NO
Close contacts of confirmed cases
- at low risk infl complications NO (but follow up necessary)
- for increased risk of infl complication – available resource CONSIDER based on risk and

Health care personnel publ health workers
- exposed with PPE NO (but follow up necessary)
- without PPE Consider based risk and available resource

Q4: Local authorities and the Director of the school are asking you about whether to close the school or not. What would you recommend? Why?

Closing schools in the early phases of an outbreak may be effective for reducing within-school transmission, but were not necessarily effective (or measurable) for reducing overall community transmission. Well-managed school closure measures may have some effect in delaying spread.

When considering mitigating the spread of influenza A (H1N1) in school settings, it was suggested that perhaps full school closures were not warranted, but class suspensions might be. In most cases, school suspensions are decided by local, rather than national, authorities. They must weight benefits of reducing transmission against economic and social costs. Decision is based on local situation and context (case by case)

Negatives:
- high social & economic cost
- Second consequences
- Need alternative childcare programme
- Absenteeism of working parents, including HCWs
- Educational continuity?

Strategies regarding personal hygiene should be evaluated relative to the type of school (nursery/day care, elementary, junior, or senior high school) and the effectiveness of that strategy to reduce transmission.

Options for suspensions of classes include:
- advise only ill children, school students and faculty staff to stay home (no school closure)
- suspend those classes which contain confirmed or probable cases of influenza A(H1N1)

- dismiss classes in which influenza A(H1N1) cases are confirmed in the school(s)
- dismiss classes in the community in which outbreaks are occurring (e.g. a district)
- dismiss classes in administrative areas (e.g. city, district, province, prefecture) with confirmed cases
- pre-emptively close schools in unaffected areas
- dismiss classes in the whole country (e.g. nationwide school closure in small Pacific island countries and territories).
- Options for types of classes to be suspended or schools to be closed (may depend on age-specific attack rates) include:
    - only child care programmes
    - only primary and secondary schools
    - both child care and school programmes
    - all schools, colleges, universities and vocational programmes

Q5: MOH is asking you what kind of surveillance would you suggest now that the laboratory services are overwhelmed by clinical specimens?

Following the initial assessment of the early cases, the laboratory testing of a sample of suspected cases of pandemic (H1N1) 2009 virus is sufficient for ongoing virological surveillance. Laboratory sampling should then be directed towards:

• confirming infection in new areas
• testing severe cases
• monitoring the co-circulation of pandemic (H1N1) 2009 virus).

Global influenza virological monitoring is dependent upon the existing capacity of influenza virus surveillance and national capacity for virus detection and characterization. During Phase 6, the main objective of laboratory surveillance is to monitor the evolution of the virus for the purpose of:

• detecting any genetic drift or re-assortment events that may affect virus pathogenicity
• identifying drug resistance status
• ensuring the specificity and sensitivity of current diagnostic assays
• informing vaccine development.

As the the country has a WHO designated National Influenza Centre (NIC) and is conducting regular seasonal surveillance it is asked to provide WHO Collaborating Centres (WHOCC) with a representative number of isolates for further characterization and for use in vaccine updates or drug resistance monitoring (*Virological surveillance activities will vary according to existing laboratory capacities in terms of response, number of samples tested, number of samples selected for full characterization of the virus and many other factors)*

(Countries without a designated NIC but with ongoing existing influenza surveillance activities that have previously contributed isolates to WHOCCs for vaccine considerations, should continue to do so as category above.

Countries without a designated NIC and with no ongoing influenza surveillance activities but with capacity to diagnose the pandemic (H1N1) 2009 virus and/or other influenza A subtypes should follow their national guidelines for pandemic preparedness and the global surveillance guidelines in this document and send a representative number of specimens or isolates, depending on their laboratory capacity, to WHOCCs for further characterization.

Countries without a designated NIC, with no ongoing influenza surveillance activities and with no laboratory capacity to diagnose the pandemic (H1N1) 2009 influenza virus should collect representative samples from clinically compatible cases from newly affected areas and among severe cases. Each country should aim to collect clinical samples per week and send to neighboring countries or regional influenza laboratories with laboratory capacity for virus characterization.)

Country is asked to provide a general interpretation of information derived from a variety of information sources including qualitative (non-numerical) indicators describing the geographical spread, the trend in the number of cases, the intensity of acute respiratory disease, and the impact on the health-care system. *(Epidemiological monitoring will be carried out differently by Member States. Therefore, WHO monitoring activities will accommodate several types of data to allow countries at different stages of the pandemic to participate in this monitoring effort, regardless of their surveillance and laboratory capacities.)*

Information sources for the qualitative assessment may include:

- sentinel sites influenza-like illness (ILI) *(in some countries for acute respiratory illness (ARI) or/and severe acute respiratory illness (SARI))*
- absenteeism rates from schools or work places
- use of pharmaceuticals for symptomatic relief of respiratory disease
- outpatient or emergency department visits for acute respiratory illness
- vital statistics indicating respiratory disease as cause of death
- formal and informal reports from district health authorities or health-care providers.

In addition because the epidemiological surveillance system is established a set of quantitative (numerical) data can be provided that can be derived from existing surveillance system for ILI.

Reporting requirements:
The following reporting arrangements should be followed by national health authorities in collaboration with their National IHR Focal Point:

- National health authorities from all countries should inform WHO on a weekly basis of their qualitative assessment of the geographical spread, trend of cases, intensity of disease, impact on the health-care system, and deaths.
- National health authorities from countries with established influenza surveillance systems should report on a weekly basis data on ILI and/or SARI
- National influenza centres or reporting laboratories are asked to report weekly via FluNet7 on the number of specimens collected and processed for influenza and the number of specimens tested that are positive for influenza by subtype.

In addition to notifications to the National IHR Focal Point, WHO has developed a surveillance system called FluID that can be used by countries to assist in reporting.

- Change in sampling strategy not done in timely manner
  - Large number of samples sent to NIC
  - Pressures from hospitals / national authorities / politicians
  - Testing for PH surveillance vs. Testing for patient management
  - Labs overwhelmed

Q6: What kind of pharmaceutical and non-pharmaceutical measures would you recommend to mitigate community transmission? Why?

Once a disease is spreading widely, for example, if community-level outbreaks are occurring, many cases (especially mild) would need to stay home instead of being isolated in health care facilities. At this stage,

infection prevention and control measures and patient management at home becomes important components of public health interventions to reduce further spread. Ill persons at home should be cared for by designated caregivers (such as parents taking care of ill children). Standard precaution measures should be applied when caring for probable and confirmed cases in the home.

Infection prevention and control in the home setting is aimed to prevent infection from ill persons and reduce the risk of exposure in the home setting,

Actions needed

- Prepare for rational public health actions, especially implementation options of nonpharmaceutical interventions based on assessed situations and country context. Advance planning is the key to smooth implementation.
- Implement individual and household public health measures, including hand and respiratory hygiene, to protect individuals from infection.
- Implement societal measures such as social distancing when necessary, to slow down or reduce transmission at population level.

Potential benefits should be carefully balanced against potentially significant social and economic costs. Decision should be based on assessed situation and local context
No standard combination of measures will fit all countries – "one size does not fit all"
Must be communicated to public and other stakeholders

Q7: How will you use vaccine if only limited amounts of the vaccine will be available? What is the priority?

There are three different objectives that country could adopt as part pandemic vaccination strategy:

- protect the integrity of the health-care system and the country's critical infrastructure;
- reduce morbidity and mortality; and
- reduce transmission of the pandemic virus within communities.

Country could use a variety of vaccine deployment strategies to reach these objectives but any strategy should reflect the country's epidemiological situation, resources and ability to access vaccine, to implement vaccination campaigns in the targeted groups, and to use other non-vaccine mitigation measures.

As vaccines available initially will not be sufficient, a step-wise approach to vaccinate particular groups may be considered. The following groups for consideration (noting that countries need to determine their order of priority based on country-specific conditions):

1) health care workers workers as a first priority to protect the essential health infrastructure.
1) pregnant women
2) children aged above 6 months with one of several chronic medical conditions
3) healthy young adults of 15 to 49 years of age
4) healthy children
5) healthy adults of 50 to 64 years of age
6) healthy adults of 65 years of age and above.

Although the severity of the pandemic is currently considered to be moderate with most patients experiencing uncomplicated, self-limited illness, some groups such as pregnant women and persons with asthma and other chronic conditions such as morbid obesity appear to be at increased risk for severe disease and death from infection.

Case study 2

Facilitator's Guide: September 2009

Learning objectives:

After completing this case study, the participants should be able to:

1) To understand the complexities and concepts of pandemic H1N1 influenza response.

2) To strengthen and maintain the influenza pandemic response at national level.

3) To develop tools for further dissemination of knowledge on influenza pandemic response in individual countries.

Expected participants:
1) One participant from Ministry of Health from each country
2) One participant from Ministry of Agriculture from each country

Sogeru

Sogeru is a country in Asia that contains 21 provinces and a population of approximately 300 million people concentrated primarily in the eastern and southern costal regions of the country.

Geography: Country spreads across several climatic zones and is bordered by 12 other countries on the west and north. There are high mountains and place with difficult access in the north and west of the country but the population is sparse. The migration of population across the border and in country migration from rural to urban areas is frequent with a potential of developing the public health events of national concern. Recently the surveillance activities have been focused to that problem. The population are predominantly Buddhist. The majority of population live in the cities along the eastern and southern coast. In the western part of the country live only 25% of population. The whole country is experiencing often flooding, earthquakes and other natural disasters which put extra demand on health services.

Health care: Cholera, plague, dengue, dysentery, watery diarrhea, typhoid, food poisoning, influenza, rubella, hand and mouth disease, rabies, viral hepatitis, and meningococcal meningitis are endemic with somewhat cyclic epidemic patterns. Malaria and dengue is a problem in the tropical zone on the south of the country.

The Sogeru Ministry of Health is the focal point for planning, organization, financing, regulation and provision of health care for the population. Provincial health authorities are responsible for public health investigation, interventions and curative care at provincial level and district health authorities at district level. There are 21 provincial hospitals, 126 district hospitals and several other hospitals as university hospitals, private hospitals, traditional hospitals and many local health stations/traditional clinics.

There is an uneven geographical distribution of health care that has problems with poor quality of care and low service utilization in rural areas. However a government is making an effort to improve the infrastructure and support social mobilization so the situation is improving.
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Influenza laboratory testing capabilities: District hospitals and traditional hospitals have no laboratory capacity. Provincial hospitals can conduct tests to confirm clinical diagnosis. The National laboratory is the only lab equipped to undertake virus isolation and the antigenic and genetic analyses needed for vaccine development and monitoring virus evolution using WHO influenza reagent kit. The closest WHO reference laboratory is outside of the country.

Surveillance infrastructure: There is web based national notifiable disease surveillance system. There is also hospital-based sentinel influenza-like illness (ILI) surveillance comprised of 27 hospitals (including 17 provincial hospitals, 10 district hospitals and 17 provincial labs and one national lab in the network). Event-based Public Health Information Reporting System collects reports, from the entire country, of outbreak, food poisoning and other cause-unknown cluster of adverse health events.

Beginning in April 2009 there have been an increasing number of reports from sentinel influenza sites on increasing number of ILI cases in one province in the southeastern part of the country.

Scenario 1 Sporadic cases – initial first cases

(initial cases of pandemic H1N1 reported related to travel)

(covers approximately one week period of time)

Background in the world:

In March two countries experienced human infections with a new influenza virus: influenza A(H1N1). On 31 March the evolution of the situation prompted the Director-General of the World Health Organization (WHO) to determine that it constituted a public health emergency of international concern under the current International Health Regulations (IHR). Following emerging evidence of community human-to-human transmission in two countries, WHO raised the pandemic alert level from phase 4 (on 17 April) to phase 5 (on 19 April) and from phase 5 to phase 6 (on 27 april). This communicated clear signals to governments, that preparations for a pandemic should be intensified. WHO advises no restriction of regular travel or closure of borders. It is considered prudent for people who are ill to delay international travel and for people developing symptoms following international travel to seek medical attention, in line with guidance from national authorities. There is also no risk of infection from this virus from consumption of well-cooked pork and pork products. Individuals are advised to wash hands thoroughly with soap and water on a regular basis and should seek medical attention if they develop any symptoms of influenza-like illness.

Background in the country:

No cases of H1N1 in the country. MOH issued national epidemiologic alert to influenza sentinel sites and hospitals asking them to look for any unusual increase of ILI cases, collection of specimens and laboratory testing. No other measures adopted so far.

Exercise:

On May 31 the flight RK63 from Anharu to Guru landed at the International airport. The flight took 12 hours. Among the passengers was 25-year-old student arriving from studies in Anharu. He took a taxi from the airport to his home where he stayed the remaining part of day with his parents. He had no close contact with other persons.

On June 1, 2009, he didn't feel well so he stayed at home and later developed fever, sore throat, cough and chills so he walked to the hospital to seek medical assistance. Contacts (parents) reported no recent respiratory illness. Doctor calls you, because he is aware of his travel from country with occurrence of pandemic H1N1, as the symptoms developed in less than 48 hours after arriving to Guru. You get also a call from director of hospital who is interesting in the appropriate infection control measures which should be adopted to protect health workers and other patients in the hospital.

In early afternoon of June 2, influenza A pandemic (H1N1) infection was confirmed. Epidemiologist is going

to investigate contacts. Investigation reveals no presence of respiratory illness as of date.

MOH is calling emergency meeting. It is necessary to respond to the situation that the first imported case of pandemic H1N1 has been reported in the country.

On June 3 the first case is reported to WHO.

Q1: Doctor is asking if it is a Pandemic Influenza H1N1 case? What will you tell him?

There is important to distinguish between laboratory confirmed and clinically compatible case.

The following case definition should be used to report confirmed cases of pandemic (H1N1) 2009 virus infection to WHO: An individual with laboratory-confirmed pandemic (H1N1) 2009 virus infection by one or more of the following tests

- polymerase chain reaction (PCR);
- viral culture
- 4-fold rise in pandemic (H1N1) 2009 virus virus-specific neutralizing antibodies.

Probable case: Individual with with influenza test that is positive for influenza A, but is unsubtypable by reagents used to detect seasonal influenza virus infection
OR
An individual with clinically compatible illness or who died of an unexplained acute respiratory illness who is considered to be epidemiologically linked to a probable or confirmed case.

Student is a suspected pandemic H1N1 case with "probable case" designation as there is not so far any laboratory confirmation.

Q2: Doctor is also asking if the case should be isolated and if antivirals should be provided?

Isolation is generally used to reduce community transmission by decreasing contact between infected and non-infected persons. Any Isolation needs to be applied in conjunction with hand and respiratory hygiene measures as well as infection control measures at home to minimize transmission risk. Strict hospital isolation may be implemented when the number of cases is still small.

Options for isolation of ill individuals include:

- isolation of only severe cases in hospital
- isolation of all probable and confirmed cases in health care facilities
- isolation of mild probable and confirmed cases at home
- isolation of all suspected cases in health care facilities (in settings where home isolation is unlikely to work – e.g. overcrowding)
- advice to ill individuals (e.g. all suspected cases) to stay home and avoid contact with others if they are ill, whenever possible.

Persons with influenza A(H1N1) infection who present with an uncomplicated febrile illness do not require treatment unless they are at increased risk of influenza-related complications.

Priority use of antivirals is recommended for treatment of patients at increased risk of influenza-related complications (extracted from US CDC). People considered as "at increased risk of influenza-related complications" are:

- persons with chronic diseases or with suppressed immune systems,
- children younger than five years old,
- adults 65 years and older, and
- pregnant women.

These groups may change as the situation evolves.

Q3: Furthermore, you get the call from the Director of the hospital asking you about the infection control measures that should be adopted in the hospital in order to protect health workers and other patients. What will you recommend?

Participants should be encouraged to brainstorm as many useful elements that they think should be captured in this kind of respiratory outbreak investigation.

KEY ELEMENTS FOR INFECTION PREVENTION IN HEALTH CARE

1. **Basic infection control recommendations for all health-care facilities** Standard and Droplet Precautions should be used when caring for a patient with an acute, febrile, respiratory illness.

2. **Respiratory hygiene/cough etiquette** Health-care workers, patients and family members should cover their mouth and nose with a

disposable tissue when coughing, then discard the tissue in a receptacle and perform hand hygiene afterwards.

3. **Triage, early recognition and reporting of pandemic (H1N1) infection** Consider assessing pandemic (H1N1) 2009 virus infection in patients with acute, febrile, respiratory illness in places where community-level spread is occurring or in patients who have been in an affected region within one week prior to symptom onset and who have been exposed to pandemic (H1N1) 2009 by an infected patient.[13]

4. **Placement of suspected and confirmed pandemic (H1N1) 2009 infected patients** Place patients with the same diagnosis in wards keeping at least 1 metre distance between beds.[14] All persons entering the isolation area should adhere to Standard and Droplet Precautions. For health services targeting healthy populations, such as pregnant women, children attending immunization services or regular check-ups, measures must be taken to avoid exposing healthy people to suspected or confirmed cases.

5. **Additional measures to reduce pandemic (H1N1) 2009 virus transmission associated with health care** Limit the number of health-care workers/family members/visitors exposed to the pandemic (H1N1) 2009 patient. Implement rooming-in policies to keep mothers and babies together.

6. **Specimen transport/handling within health-care facilities** Follow applicable transport regulations and requirements and use Standard Precautions for specimen transport to the laboratory. Health-care facility laboratories should follow good biosafety practices.[15]

7. **Family member/visitor recommendations** Family members/visitors should be limited to those essential for patient support and should use the same IC precautions as health-care workers.

8. **Patient transport within health-care facilities** Suspected or confirmed pandemic (H1N1) 2009 patients should wear a medical mask or cover their cough and practice appropriate hand hygiene while being transported within health-care facilities.

9. **Pre-hospital care** (e.g. transportation to hospital). When transporting patients to hospital, IC precautions are similar to those practiced during hospital care for all involved in the care of suspected pandemic (H1N1) 2009 patients.

10. **Occupational health** Monitor health of health-care workers exposed to pandemic (H1N1) 2009 patients. Health-care workers with symptoms should stay at home. Vulnerable groups at high risk for complications of pandemic (H1N1) 2009 infection should carefully follow recommended infection-control measures. In addition, alternatives such as reassignment to other duties should be considered. Antiviral prophylaxis should follow local policy.

11. **Waste disposal** Standard Precautions should be used when handling and disposing of sharps and contaminated items.

12. **Dishes/eating utensils** Wash using routine procedures with water and detergent. Use non-sterile rubber gloves.

13. **Linen and laundry** Wash with routine procedures, water and usual detergent; avoid shaking linen/laundry during handling before washing. Wear non-sterile rubber gloves.

14. **Environmental cleaning** Ensure that appropriate and regular cleaning is performed with water and usual detergent on soiled and/or frequently touched surfaces (e.g. door handles).

15. **Patient care equipment** Ensure cleaning and disinfection of reusable equipment between patients.

16. **Duration of pandemic (H1N1) 2009 infection control precautions** Until further information becomes available, IC precautions should be practiced for seven days from the onset of symptoms. For prolonged illness with complications (i.e. pneumonia), control measures should be used during the duration of acute illness. Children may shed the virus longer than adults, and personal hygiene and separation from immunologically naive family members is recommended for at least one week after the resolution of fever.

17. **Patient discharge** If the pandemic (H1N1) 2009 patient is still infectious upon hospital discharge (i.e. discharged within the period of IC precautions: see 16 above), instruct family members on appropriate IC precautions in the home.

18. **Prioritization of PPE when supplies are limited** Medical masks and hand hygiene supplies should be prioritized for the care of all pandemic (H1N1) 2009 patients.

19. **Health-care facility (HCF) engineering controls** The HCF spaces should be well ventilated. Aerosol-generating procedures should be performed in adequately-ventilated rooms ($\geq$12 air changes per hour).

20. **Mortuary care** Mortuary staff and the burial team should apply Standard Precautions, i.e. perform proper hand hygiene and use appropriate PPE according to the risk of exposure to body fluids (e.g. gown, gloves, and facial protection if there is a risk of splashes from patient's body fluids/secretions onto staff member's body and face).

21. **Health-care facility managerial activities** Development of procedures to ensure proper implementation of administrative controls, environmental controls and use of PPE, including adequate staffing and supplies, training of staff, education of patients and visitors and a strategy for risk communication.

Q4: You will need to advise the local epidemiologist on how to handle the contacts. He wants to know if he should trace all contacts, quarantine them and provide antiviral prophylaxis. What do you advise?

Quarantining of contacts is to reduce community transmission by decreasing contact between potentially infectious and non-infected persons. Identification of close contacts often requires contact tracing. Members of households with probable or confirmed cases of influenza A(H1N1) as close contacts may be at increased risk of infection. A significant proportion of these people may shed virus and be at risk of infecting others in the community despite being asymptomatic. Quarantining these household members for a period of 7 days following symptom onset in the ill household member may reduce this

risk. Some persons may experience a longer period of quarantine if multiple household members become ill over an extended period of time.

Quarantine measures need to be applied in conjunction with hand and respiratory hygiene measures as well as infection control measures at home
to minimize transmission risk.

Options for quarantine of household members and contacts include:

- advise household members and close contacts of probable or confirmed cases to stay home for an incubation period (e.g. 7 days) and to minimize their contact with others in the community
- advise household members and close contacts of suspect cases to stay home and to minimize their contact with others
- mandatory home-based quarantine
- facility-based quarantine of all contacts
- no quarantine measures to be implemented once community-level outbreaks are occurring.

Antiviral use should be prioritized for treatment, not prophylaxis.

Post-exposure antiviral prophylaxis should be considered for the following (US CDC):
- close contacts of cases (confirmed, probable) who are at high risk for complications of influenza; - health care personnel, public health workers with unprotected exposure to confirmed case or case during the case's infectious period.

Pre-exposure antiviral prophylaxis should be considered only for
- people in close contact with high risk for influenza complication
- health care facility workers who are exposed to confirmed influenza A(H1N1) without proper use of PPE.

If the contact happened after infectious period (currently one day prior to onset and seven days after), it may not be necessary to administer post-exposure prophylaxis.

Either oseltamivir or zanamivir may be used or administered if there is no contraindication.

General population - NO
Close contacts of confirmed cases –

- persons at increased risk of influenza-related complications Consider

Health care personnel and public health workers exposed

- with PPE: NO (follow up needed)
- without PPE with increased risk of infl. related complications Consider

Q5: What would be a requirement for surveillance after reflecting on the current situation of the first confirmed case of Pandemic Influenza A/H1N1 in the country? How would you choose to report the first pandemic Influenza A/ H1N1 case?

In this phase is important case detection and outbreak investigation

In countries with no apparent virus circulation the aims of surveillance are to document the first appearance of the pandemic (H1N1) 2009 virus and to collect sufficient information on initial cases for risk assessment. The requirements are to:

- detect and confirm the spread of pandemic (H1N1) 2009 virus into areas, e.g. administrative units, not previously reporting confirmed cases

- investigate changes in the characteristics of the pandemic such as any increase in the severity of the disease.

Triggers/signals for the investigation of suspected cases or clusters of pandemic (H1N1) 2009 virus infection include:

• cluster(s)2 of cases of unexplained ILI or acute lower respiratory tract infection

• severe, unexplained respiratory illness

• changes in the epidemiology of mortality associated with the occurrence of ILI or lower respiratory tract illness, an increase in the number of deaths observed from respiratory illness or an increase in the occurrence of severe respiratory disease in previously healthy adults or adolescents and/or among pregnant women

• abnormally high levels of absenteeism in a school or workplace setting.

The initial investigation should include laboratory confirmation of any suspected case of pandemic (H1N1) 2009 virus. Member States without laboratory capacity or with no access to laboratory capacity for confirmation, should contact their WHO regional office, so that an appropriate laboratory can be identified for the submission and testing of samples. At any stage during the pandemic, unexplained clusters of respiratory disease or deaths, or any change in the epidemiological or clinical presentation of the disease seen to date, requires immediate investigation. The number of samples collected will vary depending on the needs of the investigation.

The first confirmed of pandemic (H1N1) 2009 virus infection detected in a country should be immediately reported by the IHR National Focal Point to the IHR Contact Point at the relevant WHO Regional Office as well as the WHO Country Representative where applicable. WHO will follow established processes for internal communications about such notifications. Confirmed cases reported to WHO should be attributed to the country, territory or area in which they are identified.

Q6: What kind of measures would you recommend in this situation?

In general measures are aiming at reducing transmission and mitigating impact with focus on vulnerable population. They

- Delay outbreak peak
- Delay spread and shift an epidemic curve to the right side
- Reduce peak burden on health care facilities (e.g. hospitals)
- To “buy time” for other measures (e.g. vaccination)
- Reduce morbidity and mortality through reducing the total number of cases

Key considerations of adoption of specific measures should be:

- Bases on risk assessment, esp severity and potential impact
- evidence-based
- Balance benefits against costs'
- Need to be tailored to country and local setting
- Planning, coordination and communication are a key

There are two main groups of interventions:

- Non-pharmaceutical interventions
    - Individual and household level public health measures
    - Societal level public health measures, including social distancing

- Pharmaceutical interventions
    - Use of matched vaccines
    - Use of effective antiviral drugs

Individual/household measures are always strongly encouraged, as they help prevent the transmission of all respiratory infections, including the new influenza A(H1N1) infections. there are two groups of individual measures related to the new influenza A(H1N1) with two different objectives: (1) to protect oneself from infection; (2) to prevent infection to others when ill.

The following are some examples of personal protective measures:

- avoiding and limiting contact with ill persons especially those with influenza-like illness and acute respiratory illness
- hand hygiene (e.g. wash hands with soap and water or alcohol-based rub, if available)
- correct use of surgical masks based on risk of exposure (e.g. when in close contact with an ill person who is unable to wear a mask)
- cough/respiratory etiquette (cover coughs and sneezes) to prevent infection to others
- use of surgical masks by ill persons if they have to be in contact with others
- other hygiene measures that fit local social and cultural contexts and needs (including no spitting).

Stock piling of not only antivirals but also antibiotics

Scenario 2 sporadic cases

(Sporadic cases reported from various sites in the country related to travel)
(covers aaproximately 2 weeks period of time)

Situation in the world:
As of these dates there are 9 countries officially reported 148 cases of pandemic A H1N1 infection but the situation evolves rapidly at the time.

Situation in the country:
At early stage the country has reported the first case of H1N1 to the World Health Organization. Following this another 23 suspected cases have been detected by screening at the airport. Of those 7 cases of pandemic H1N1 have been laboratory confirmed. Another 12 sporadic cases have been reported from several places in the town. Of those 10 cases of pandemic H1N1 confirmed. All are related to travel to countries with occurrence of pandemic H1N1.

Health measures for all airport passengers have been implemented including medical check and temperature screening. The country is undertaking case investigation, contact tracing and quarantining vigorously. Confirmed pandemic H1N1 cases are treated with antivirals. Antivirals are also given to contacts of pandemic H1N1 cases. There is increasing demand on health services with low impact of infection on health workers.

Exercise:
(continuing of the story from the previous exercise)

On June 3 you find that stewardess and one passenger who were close contacts of the case on the RK63 flight developed ILI symptoms including fever, muscle pains and nasal congestion yesterday before being tested positive for pandemic H1N1 virus.

Media report first H1N1 case in the headlines and are demanding more updated information on situation.

Meeting at the Ministry of health is debating about the containment (delaying) versus mitigation strategies.

MOH is alarmed by increasing reports of patients with ILI from one province based on review of sentinel

surveillance data. On June 5 local epidemiologist is going to investigate the reports of increasing ILI cases in neighbouring province. He has found apparent increase of influenza like illness over last two weeks including one severe case (10 years boy who developed fever, cough and vomiting with onset of symptoms on June 2. Mother bring him to the hospital on June 3. The result of testing in the hospital laboratory was negative for H1N1, H3N2 and H5N1 so the specimens have been sent to the reference laboratory on June 4 that confirms positive result for pandemic H1N1 virus on June 5. Boy developed acute respiratory distress syndrome). The case died on 6 June and has been reported by MOH to WHO as the first death related to pandemic H1N1 infection in the country.

The major culture exhibition is planned to be held next week. It is expected that it will take 4 days and it is estimated that it can host 110 000 visitors coming mainly from different parts of the country but also from abroad.

Q1: What stage of the pandemic are you in now?

WHO pandemic Stage 6.

In nature, influenza viruses circulate continuously among animals, especially birds. Even though such viruses might theoretically develop into pandemic viruses, in **Phase 1** no viruses circulating among animals have been reported to cause infections in humans.

In **Phase 2** an animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans, and is therefore considered a potential pandemic threat.

In **Phase 3**, an animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver. However, limited transmission under such restricted circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic.

Phase 4 is characterized by verified human-to-human transmission of an animal or human-animal influenza reassortant virus able to cause "community-level outbreaks." The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk for a pandemic. Anycountry that suspects or has verified such an event should urgently consult with WHO so that the situation can be jointly assessed and a decision made by the affected country if implementation of a rapid pandemic containment operation is warranted. Phase 4 indicates a significant increase in risk of a pandemic but does not necessarily mean that a pandemic is a forgone conclusion.

Phase 5 is characterized by human-to-human spread of the virus into at least two countries in one WHO region (Figure 5)23. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.

Phase 6, the pandemic phase, is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is under way.

Q2: Doctors are asking you if the cases should be still isolated and antivirals provided. What will you advise them? Why?

Strict hospital isolation may be implemented when the number of cases is still small.

In general at the end of this phase the strict isolation of cases should be reassessed. Some countries still keep containment strategy and follow up with isolation of cases. Some of those will already shift to the mitigation and the isolation at the hospital is replaced by self isolation of cases at home and hospitalization of only severe cases.

For antivirals it is the same as in the first scenario but for probable case it is only consider based on risk of influenza-related complications and available resources

Q3: The provincial epidemiologist wants to know if contact tracing, quarantining and prohylactic use of antivirals for contacts should be continued. What will you advise them? Why?

Identification of close contacts often requires contact tracing, which is resource intensive and becomes challenging when the outbreak is getting large. In the later stage it is rather replaced by self-monitoring of health (e.g. monitoring temperatures of caregivers) and reporting of illness with following isolation in case of illness.

Antivirals:
General population: NO need
Close contacts of confirmed cases:

- at low risk influenza complications: Consider based on risk and available resources
- at increased risk of influenza complications: Consider

Health care personnel public health workers:

- exposed with PPE: NO (follow up needed)
- without PPE:persons at increased risk of influenza-related complications Consider

Q4: MOH is asking you what kind of surveillance is required at this stage and how pandemic H1N1 cases should be reported to WHO. What is your advice? Why?

<u>In this phase it is important to provide characterization of virus and disease:</u>

- Initial comprehensive assessment (FF100)
- Contact tracing
- Case-based sentinel surveillance
- Lab confirmation

Once the pandemic (H1N1) virus has been detected it is important to:

- describe the epidemiological and virological features of cases to guide control and prevention activities as required
- assess disease severity
- laboratory testing priorities:
    - confirming infection in new areas
    - Testing severe cases
    - Monitoring the co-circulation of pandemic h1N1 virus and seasonal virus

(countries with limited laboratory capacity, or limited access to laboratory capacity, should according to the WHO recommendation to test a number of samples per week in order to verify that disease activity is still largely due to pandemic (H1N1) 2009 virus).

After the first case(s) of pandemic (H1N1) 2009 virus infection have been notified and for as long as is feasible for the country, IHR National Focal Points or national public health authorities should report the following information to WHO on a weekly basis:

• the number of confirmed cases and deaths in confirmed cases
• the age distribution of confirmed cases and deaths (where available).

Countries should contact the relevant WHO regional office for reporting arrangements. A summary form has been developed to facilitate the reporting of this information to WHO WHO will use the information in accordance with Article 11 of the IHR (2005) as required by the circumstances of the pandemic.

In addition to the information asked above, all Member States are strongly encouraged to share with WHO any additional information relevant for ongoing global risk assessment. This includes, in particular, information on the clinical spectrum of the disease, the proportion of cases with severe illness, and risk groups for severe outcome. For detailed case-based information, a form has been developed to facilitate the collection of these data.

Q5: The Minister of Health has asked you to explain what are the pros and cons of the containment and mitigation strategies and what would be the most suitable one for the country at this stage. What is containment? What is mitigation? What advice do you give the Minister? Why?

Containment definition- To stop or delay the spread of the virus by detecting cases and taking vigorous actions, such as contact tracing, treatment and/or quarantine of contacts

Mitigation definition- To slow the spread of the virus in the community and minimize transmission to vulnerable populations
To ensure healthcare for those who need it most
To minimise social disruption and other negative consequences

Using a strategy of mitigation in when no community transmission is present means that it might be lost opportunity to delay the spread

Using a strategy of containment in when the community transmission is present means that resources intensive and minimal public health benefit

Need to shift from "containment" to "mitigation", but decision to shift appeared to be difficult in some countries (political, technical issues)

Q6: Are there any measures at this stage at the national level which you would consider necessary (e.g. stockpiles of medicaments etc)?

Societal measures, including social distancing

- Suspension of classes and child care programmes
- Adjusting or changing work patterns
- Restriction of public or mass gatherings
- Domestic travel advisories and restrictions

International travel and screening

- Health advice and alerts to travelers
- Health declaration form
- Temperature screening
- On-board identification of suspected travelers
- International travel advisory, restriction, border closure?

Management of symptomatic & exposed travelers - Symptomatic travellers (isolation & treatment…) Exposed travellers (quarantine…)

Q7: What information will you want to communicate to the public and how will you present the situation to the media?

Messaging should encourage the public to be aware of the potential for illness and to engage in conscientious public hygiene (e.g.: hand hygiene, cough etiquette, etc.) and seek medical attention as needed. At the same

time, announcements much take care to balance out the potential for indifference and the under-allocation of resources versus the potential for panic and over-allocation of resources.

Good communication is vital as situations surrounding this pandemic are fluid and change daily. It was recommended that public health officials must convey a strong, consistent, easily-understood and actionable message to the public and to health care providers.

Q8: What advice would you provide to organizers of the cultural exhibition with respect to the current pandemic situation in the country?

The aim of the measure should be to reduce community transmission and delay the spread of disease in the community through deceasing the number of human contacts

Options for restricting public or mass gathering include:

- postponing, cancelling or modifying only selected and main types of public or mass gathering based on the assessed situations
- postponing, cancelling or modifying all public or mass gatherings when community-level outbreak is occurring.

Q9: What would you need to observe to indicate that there was either continued sporadic cases or progression to community transmission?

Need to examine your surveillance data. Continued sporadic cases will be separated by space and time. Cases caused by community transmission will cluster in space and time and not have any history of importation.

Scenario 3: School outbreak(s) and community transmission

(Clusters of cases reported from various sites in the country and widespread incidence of H1N1 cases in the country)
(covers undefined period of time)

Situation in the world:
At this stage more than 182,000 laboratory confirmed cases of pandemic influenza H1N1, 1799 deaths, in 177 countries and territories have been reported to WHO. As more and more countries have stopped counting individual cases, particularly of milder illness, the case number is significantly lower than the actually number of cases that have occurred.

Rates of influenza illness continue to decline in the temperate regions of the southern hemisphere, areas of tropical regions are reporting increasing rates of illness. In the Northern temperate zones, overall rates are declining but main influenza season is to come in next months.

WHO has also been notified of 12 cases of oseltamivir resistant virus. There is also no evidence of onward transmission from these cases.

Situation in the country:
Situation in the country further evolved and you see majority of locally acquired pandemic H1N1 cases and only few imported cases. The transmission is already established in the country including school outbreaks and cluster of cases. The total number of confirmed pandemic H1N1 cases starts at the time on 150 and later is increasing about one hundred per day. There are several deaths and 78 severe cases reported due to pandemic H1N1 infection. The lab services are overwhelmed by testing of clinical specimens and health services

overwhelmed by patients. The MOH is deciding to revise the initial strategy to respond to increase of pandemic H1N1 cases. Pandemic vaccine clinical trials are closing to the end and limited amount of pandemic vaccine might be available soon.

Exercise:
On 11 June MOH receives report on outbreak at school in Wugan.

On 12 June the rapid investigation is conducted by epidemiologists. They notify 20 absentees of total 62 students in 2 classes. They also find that 18 other persons (staff of the school, teachers) who have been in contact with students of affected classes. There were not found any sick children in other classes. None of the students reported travel to abroad before 6 June.

Of 42 students present at time of investigation at school 5 were newly symptomatic students. All cases had mild illness with reported symptoms: headache, fever, cough, sore throat and rhinorrhea. The onset of outbreak was probably sometimes around June 9-10.

On June 14 you have received results form laboratory indicating that specimens from all newly symptomatic students were tested positive for pandemic H1N1 in all 5 students..
Subsequent investigation of contacts finds 11 persons with ILI symptoms of those one was confirmed as pandemic H1N1. Several contacts reported travel abroad.

Ministry of health calls the meeting responding to the current development.

Q1: What stage of the pandemic are you in now?
WHO pandemic Stage 6.
In nature, influenza viruses circulate continuously among animals, especially birds. Even though such viruses might theoretically develop into pandemic viruses, in **Phase 1** no viruses circulating among animals have been reported to cause infections in humans.
In **Phase 2** an animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans, and is therefore considered a potential pandemic threat.
In **Phase 3**, an animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver. However, limited transmission under such restricted circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic.
Phase 4 is characterized by verified human-to-human transmission of an animal or human-animal influenza reassortant virus able to cause "community-level outbreaks." The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk for a pandemic. Anycountry that suspects or has verified such an event should urgently consult with WHO so that the situation can be jointly assessed and a decision made by the affected country if implementation of a rapid pandemic containment operation is warranted. Phase 4 indicates a significant increase in risk of a pandemic but does not necessarily mean that a pandemic is a forgone conclusion.
Phase 5 is characterized by human-to-human spread of the virus into at least two countries in one WHO region (Figure 5)23. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.
Phase 6, the pandemic phase, is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is under way.

Q2: What would you suggest for case finding, isolation and antiviral treatment of cases at this stage?

When community-level transmission is widely occurring, the most feasible option is to isolate and manage severe cases to reduce deaths in hospitals with appropriate medical facilities, and to advise sick people (relatively mild cases) to stay at home (home isolation).

Only severe cases require treatment by antivirals.

Q3: What would you suggest for contact tracing, quarantining/ isolation and prophylactic use of antivirals for contacts at this stage?

Identification of close contacts during community-level outbreaks is not conducted and contact management is based on self observation and self isolation in case of illness.

Antivirals:
General population NO
Close contacts of confirmed cases
- at low risk infl complications NO (but follow up necessary)
- for increased risk of infl complication – available resource CONSIDER based on risk and

Health care personnel publ health workers
- exposed with PPE NO (but follow up necessary)
- without PPE resource Consider based risk and available

Q4: Local authorities and the Director of the school are asking you about whether to close the school or not. What would you recommend? Why?

Closing schools in the early phases of an outbreak may be effective for reducing within-school transmission, but were not necessarily effective (or measurable) for reducing overall community transmission. Well-managed school closure measures may have some effect in delaying spread.

When considering mitigating the spread of influenza A (H1N1) in school settings, it was suggested that perhaps full school closures were not warranted, but class suspensions might be. In most cases, school suspensions are decided by local, rather than national, authorities. They must weight benefits of reducing transmission against economic and social costs. Decision is based on local situation and context (case by case)

Negatives:
- high social & economic cost
- Second consequences
- Need alternative childcare programme
- Absenteeism of working parents, including HCWs
- Educational continuity?

Strategies regarding personal hygiene should be evaluated relative to the type of school (nursery/day care, elementary, junior, or senior high school) and the effectiveness of that strategy to reduce transmission.

Options for suspensions of classes include:
- advise only ill children, school students and faculty staff to stay home (no school closure)
- suspend those classes which contain confirmed or probable cases of influenza A(H1N1)
- dismiss classes in which influenza A(H1N1) cases are confirmed in the school(s)
- dismiss classes in the community in which outbreaks are occurring (e.g. a district)
- dismiss classes in administrative areas (e.g. city, district, province, prefecture) with confirmed cases

- pre-emptively close schools in unaffected areas
- dismiss classes in the whole country (e.g. nationwide school closure in small Pacific island countries and territories).
- Options for types of classes to be suspended or schools to be closed (may depend on age-specific attack rates) include:
    - only child care programmes
    - only primary and secondary schools
    - both child care and school programmes
    - all schools, colleges, universities and vocational programmes

Q5: MOH is asking you what kind of surveillance would you suggest now that the laboratory services are overwhelmed by clinical specimens?

Following the initial assessment of the early cases, the laboratory testing of a sample of suspected cases of pandemic (H1N1) 2009 virus is sufficient for ongoing virological surveillance. Laboratory sampling should then be directed towards:

• confirming infection in new areas
• testing severe cases
• monitoring the co-circulation of pandemic (H1N1) 2009 virus).

Global influenza virological monitoring is dependent upon the existing capacity of influenza virus surveillance and national capacity for virus detection and characterization. During Phase 6, the main objective of laboratory surveillance is to monitor the evolution of the virus for the purpose of:

• detecting any genetic drift or re-assortment events that may affect virus pathogenicity
• identifying drug resistance status
• ensuring the specificity and sensitivity of current diagnostic assays
• informing vaccine development.

As the the country has a WHO designated National Influenza Centre (NIC) and is conducting regular seasonal surveillance it is asked to provide WHO Collaborating Centres (WHOCC) with a representative number of isolates for further characterization and for use in vaccine updates or drug resistance monitoring (*Virological surveillance activities will vary according to existing laboratory capacities in terms of response, number of samples tested, number of samples selected for full characterization of the virus and many other factors)*

(Countries without a designated NIC but with ongoing existing influenza surveillance activities that have previously contributed isolates to WHOCCs for vaccine considerations, should continue to do so as category above.

Countries without a designated NIC and with no ongoing influenza surveillance activities but with capacity to diagnose the pandemic (H1N1) 2009 virus and/or other influenza A subtypes should follow their national guidelines for pandemic preparedness and the global surveillance guidelines in this document and send a representative number of specimens or isolates, depending on their laboratory capacity, to WHOCCs for further characterization.

Countries without a designated NIC, with no ongoing influenza surveillance activities and with no laboratory capacity to diagnose the pandemic (H1N1) 2009 influenza virus should collect representative samples from clinically compatible cases from newly affected areas and among severe cases. Each country should aim to collect clinical samples per week and send to neighboring countries or regional influenza laboratories with laboratory capacity for virus characterization.)

Country is asked to provide a general interpretation of information derived from a variety of information sources including qualitative (non-numerical) indicators describing the geographical spread, the trend in the

number of cases, the intensity of acute respiratory disease, and the impact on the health-care system. *(Epidemiological monitoring will be carried out differently by Member States. Therefore, WHO monitoring activities will accommodate several types of data to allow countries at different stages of the pandemic to participate in this monitoring effort, regardless of their surveillance and laboratory capacities.)*

Information sources for the qualitative assessment may include:

- sentinel sites influenza-like illness (ILI) *(in some countries for acute respiratory illness (ARI) or/and severe acute respiratory illness (SARI))*
- absenteeism rates from schools or work places
- use of pharmaceuticals for symptomatic relief of respiratory disease
- outpatient or emergency department visits for acute respiratory illness
- vital statistics indicating respiratory disease as cause of death
- formal and informal reports from district health authorities or health-care providers.

In addition because the epidemiological surveillance system is established a set of quantitative (numerical) data can be provided that can be derived from existing surveillance system for ILI.

Reporting requirements:
The following reporting arrangements should be followed by national health authorities in collaboration with their National IHR Focal Point:

- National health authorities from all countries should inform WHO on a weekly basis of their qualitative assessment of the geographical spread, trend of cases, intensity of disease, impact on the health-care system, and deaths.

- National health authorities from countries with established influenza surveillance systems should report on a weekly basis data on ILI and/or SARI

- National influenza centres or reporting laboratories are asked to report weekly via FluNet7 on the number of specimens collected and processed for influenza and the number of specimens tested that are positive for influenza by subtype.

In addition to notifications to the National IHR Focal Point, WHO has developed a surveillance system called FluID that can be used by countries to assist in reporting.

- Change in sampling strategy not done in timely manner
  - Large number of samples sent to NIC
  - Pressures from hospitals / national authorities / politicians
  - Testing for PH surveillance vs. Testing for patient management
  - Labs overwhelmed

Q6: What kind of pharmaceutical and non-pharmaceutical measures would you recommend to mitigate community transmission? Why?

Once a disease is spreading widely, for example, if community-level outbreaks are occurring, many cases (especially mild) would need to stay home instead of being isolated in health care facilities. At this stage, infection prevention and control measures and patient management at home becomes important components of public health interventions to reduce further spread. Ill persons at home should be cared for by designated

caregivers (such as parents taking care of ill children). Standard precaution measures should be applied when caring for probable and confirmed cases in the home.

Infection prevention and control in the home setting is aimed to prevent infection from ill persons and reduce the risk of exposure in the home setting,

Actions needed

- Prepare for rational public health actions, especially implementation options of nonpharmaceutical interventions based on assessed situations and country context. Advance planning is the key to smooth implementation.
- Implement individual and household public health measures, including hand and respiratory hygiene, to protect individuals from infection.
- Implement societal measures such as social distancing when necessary, to slow down or reduce transmission at population level.

Potential benefits should be carefully balanced against potentially significant social and economic costs. Decision should be based on assessed situation and local context
No standard combination of measures will fit all countries – "one size does not fit all"
Must be communicated to public and other stakeholders

Q7: How will you use vaccine if only limited amounts of the vaccine will be available? What is the priority?

There are three different objectives that country could adopt as part pandemic vaccination strategy:

- protect the integrity of the health-care system and the country's critical infrastructure;
- reduce morbidity and mortality; and
- reduce transmission of the pandemic virus within communities.

Country could use a variety of vaccine deployment strategies to reach these objectives but any strategy should reflect the country's epidemiological situation, resources and ability to access vaccine, to implement vaccination campaigns in the targeted groups, and to use other non-vaccine mitigation measures.

As vaccines available initially will not be sufficient, a step-wise approach to vaccinate particular groups may be considered. The following groups for consideration (noting that countries need to determine their order of priority based on country-specific conditions):

1) health care workers workers as a first priority to protect the essential health infrastructure.
1) pregnant women
2) children aged above 6 months with one of several chronic medical conditions
3) healthy young adults of 15 to 49 years of age
4) healthy children
5) healthy adults of 50 to 64 years of age
6) healthy adults of 65 years of age and above.

Although the severity of the pandemic is currently considered to be moderate with most patients experiencing uncomplicated, self-limited illness, some groups such as pregnant women and persons with asthma and other chronic conditions such as morbid obesity appear to be at increased risk for severe disease and death from infection.

Case study 3

Influenza A(H5N1) in Humans: Outbreak Investigation

(International Setting)

Facilitator's Guide: Sep 16, 2009

Learning Objectives

After completing this case study, the participant should be able to:

- **Demonstrate awareness of the important on-the-ground complexities** and management issues during an internationally located A(H5N1) outbreak investigation.
- **Understand key Influenza A(H5N1)-specific concepts** that include: appropriate specimen collection and transport, epidemiologic risk factors, transmission mechanisms and contact tracing, isolation/quarantine concerns, treatment/control measures such as antiviral use, risk communication principles, laboratory diagnostic methods, and ethical considerations.
- **Gain an appreciation for important A(H5N1) coordination efforts** involving the interface between animal and human health sectors, key stakeholders such as WHO, CDC and Ministries of Health and communication processes between CDC field staff, CDC Headquarters and relevant subject matter experts.

NOTE: Facilitators please have your group read this country description of Pegu out loud or to themselves. Highlight key points of lack of rural access to care, cultural proclivity for use of traditional healers, existing community surveillance infrastructure based on village health volunteers etc...

Pegu

Pegu is a “developing” country in Southeast Asia that contains 21 provinces and a population of approximately 50 million people concentrated primarily in the central and southern costal regions of the country.

Geography: There is a tropical monsoon climate. Pegu is bordered by five other countries on the Western, Eastern and Northern borders, but faces the ocean on its southwestern border. Rural, transient migratory populations regularly cross these borders and have prompted attempts at coordinated infectious disease surveillance activities between these countries. The population of Pegu is 90% Buddhist. The 75% of the population that live in rural areas do not have access to highways. Road conditions become very poor or impassible during the monsoon season and in a recent health survey 30% of rural population respondents indicated that they would not bother taking sick family members to local hospitals but instead would go to their village healer.

Health care: Malaria, cholera, plague, dengue, dysentery, watery diarrhea, viral hepatitis, and meningococcal meningitis are endemic with somewhat cyclic epidemic patterns. Polio is on the verge of being eradicated (reflecting a well-established grassroots polio eradication infrastructure) and efforts must be taken to ensure that final campaigns and interventions are completed. Conversely Dengue and Dengue Hemorrhagic Fever have been becoming an increasing problem in the country.

The Pegu Ministry of Health is the focal point for planning, organization, financing, regulation and provision of health care for the population. Hospitals within the country include teaching hospitals, specialist hospitals, provincial hospitals, district hospitals, and local health stations/traditional clinics. Every district has a 16-50 bed hospital, with a district medical officer who has both public health and curative responsibilities. There are 12 traditional hospitals in the country as well.

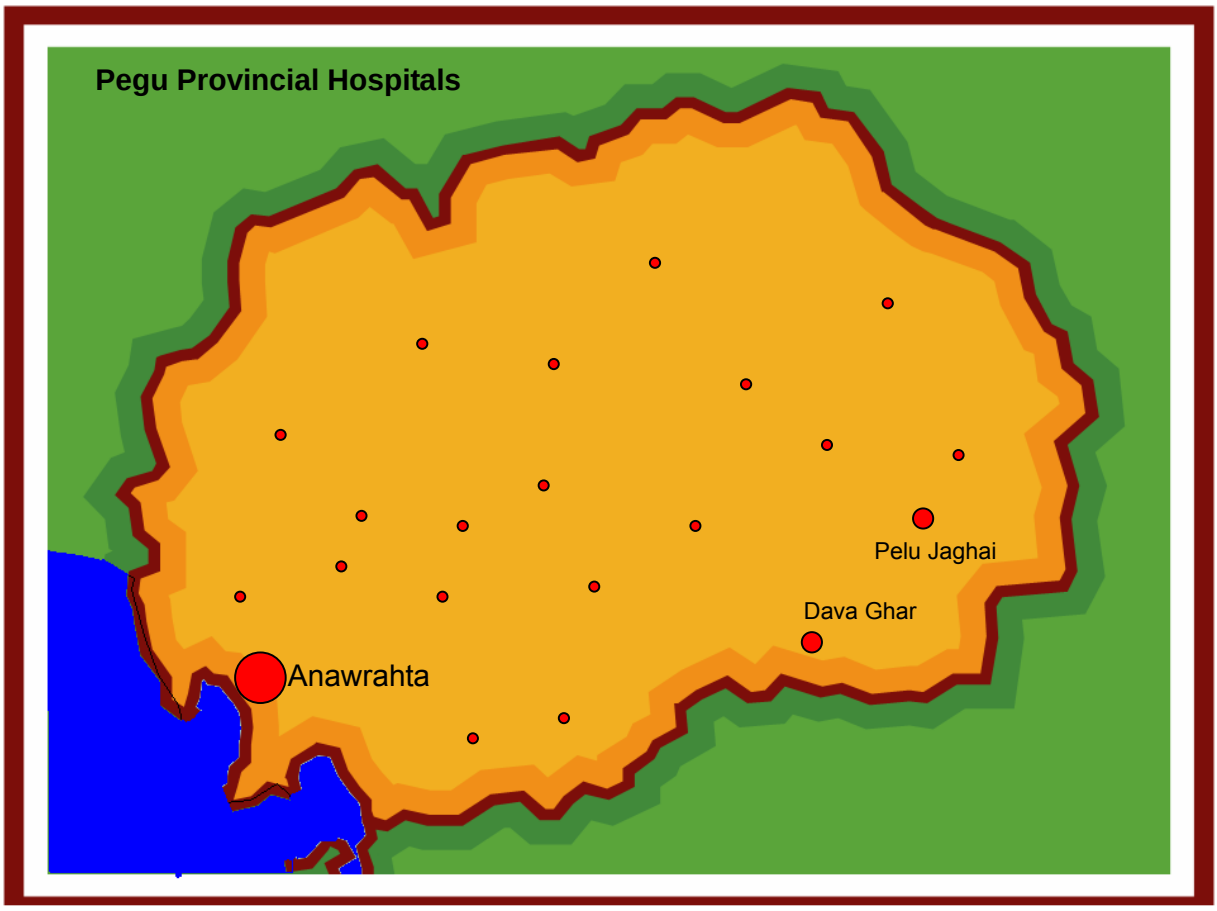
There is an uneven geographical distribution of health care that has problems with poor quality of care and low service utilization in rural areas. However a strong NGO presence and polio eradication efforts have produced a system of village health committees that provide informal communication mechanisms and some infrastructure for social mobilization. Generally, the leadership represented in these village health committees has connected those who traditionally lack adequate healthcare to health care providers, and has greatly facilitated public health campaigns associated with vaccine-preventable diseases, allowing them to be successful both in terms of mass immunizations and disease surveillance.

Influenza laboratory testing capabilities: District hospitals and traditional hospitals

have no laboratory capacity. The National laboratory is the only lab equipped to undertake virus isolation and the antigenic and genetic analyses needed for vaccine development and monitoring virus evolution. While this laboratory uses the WHO influenza reagent kit, the closest WHO reference laboratory is in the country to the Southeast of Pegu.

Surveillance infrastructure: There is a national notifiable disease surveillance system that requires a standard “minimum data set” from hospitals. The vital records system captures about 90% of urban, 50% of rural births. AFP surveillance is being undertaken throughout the country although significant cold chain challenges remain in rural areas.

Beginning in March 2006 there have been a series of reports from different media sources indicating mass deaths of flocks of chickens, geese, and other waterfowl. These deaths have primarily occurred in the southeastern region of Pegu. The Ministry of Agriculture (MOA) has sent investigators into this region to follow-up on these rumored reports, and has reported test results from three samples collected from dead chickens sent to the national laboratory in Anawrahta to be “weakly positive” for avian influenza A(H5N1) in April, 2006. There is no systematic surveillance for avian influenza A (H5N1) in poultry, wild bird or other animal populations.


Pegu Provincial Hospitals
Pelu Jaghai
Dava Ghar
Anawrahta

A. The Field Investigation

NOTE TO FACILITATOR:

- Remind participants that just as they would in a 'real-life' epidemic investigation, they should take notes on any and all details that they would likely need to conduct the investigation – such as pertinent epidemiological and clinical information, important dates and locations and relevant policies and procedures**.**
- Given the complexity of the story line, encourage the participants to start a line list on their own. Inform them they are already provided these but as it is part of the simulation, they should not look ahead.
- A graphical representation of cases, onset dates, sources of exposure and incubation periods is requested in Question 27. To save time, the facilitator may also use paper or a white board to create and update this graphic with the group (along with the line-lists) as the scenario progresses.
- They will be encouraged to use such details to assess epidemic curves, suggest modes of transmission, to evaluate surveillance activities, and to make recommendations for prevention and control strategies.
- It is recommended that facilitators decide how many and when BREAKS should be provided to the participants. It is *suggested that at least two short – 10-15 minute breaks are given* in the 4.5 hr session.
- This case study is focused on a human health investigation. If there are veterinarians present in the study group, please have them occasionally summarize the parallel agricultural investigations that would be occurring during this study.

JULY 15:

It is the morning of July 15, and you receive a call from a staff doctor at Dava Ghar hospital who notified the District Health Office that they have admitted 2 persons with severe respiratory illness. The doctor is concerned that his patients may have avian influenza, as a few confirmed poultry outbreaks have been reported in the neighboring province.

Apparently, the two patients are related – a 65 year-old grandmother (JAM) and her ten-year old grandson (AAJ). The grandmother (JAM) resides in the same house as the child's grandfather (AWM), and both live in a house near the grandson's house in a small mountain village in the province. This village is almost 60 km away from the hospital. The child's father was away in a nearby city during the week of illness onset and the grandmother (JAM), who is chronically in ill-health, became a caretaker of the child on July 11th along with the mother (NJC) who lives with the child. The grandfather (AWM) also helped despite his elderly status and chronic heart illness. The child (AAJ)

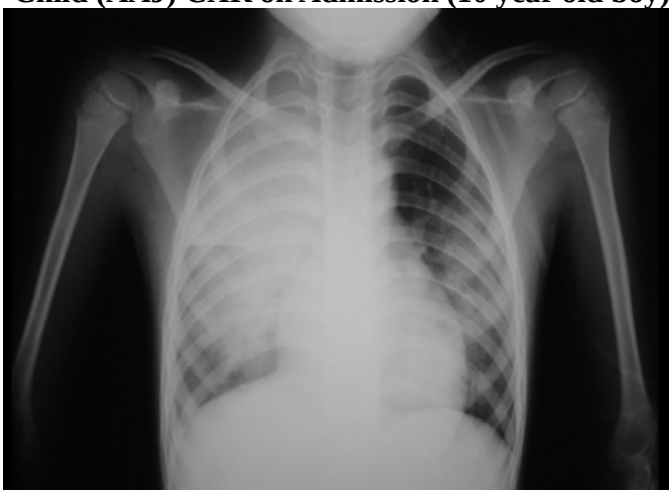
was brought to the hospital by his family two days ago and presented with the following symptoms: fever, cough, diarrhea and shortness of breath. The only pertinent history you are able to obtain regarding potential exposures is that the child visited a live-market (called the "Murg Market") with his mother (NJC) and uncle (JRO) *(definition – an open market where local farmers and community folk come to buy and sell produce, meat, live poultry, and other 'often live' animals, seafood, etc.)* in Pelu Jaghai province (where his friends and relatives live) on July 8th. The Director of Epidemiology of the MOH, following communication with the Ministry of Agriculture has determined that the Murg market was the location where the poultry that tested positive for A(H5N1) were discovered during the previous month. You obtain the history that the boy may have played with chickens at the live-market event.

Shortly after admission yesterday, the child rapidly decompensated because of worsening respiratory distress requiring endotracheal intubation and ventilatory support. He was started on Ceftriaxone.

The mother (NJC) is asymptomatic. The grandfather also denies any symptoms. The grandmother reports that her ongoing respiratory condition suddenly worsened on about July 9th. There are rumors that there are additional sick persons with similar symptoms in a village in the adjacent nearby province, Pelu Jaghai, as well as continuing rumors of widespread chicken deaths on local farms in Pelu Jaghai.

Further clinical history, obtained over the phone, reveals that the child (AAJ) became ill on July 10 and was admitted to the hospital almost 4 days later. By the 2nd day of illness (July 11th) the child's grandparents started assisting the mother with care of the child. The family was very distressed and kept close vigil taking care of the child for almost 48 hours in the village starting on July 11. By the 3rd day, the child was deteriorating and also had a documented a fever of 38.7 °C (101.7° F). The family decided to bring him to the Dava Ghar hospital, despite the long distance. The child arrived in unstable condition late at night on the 13th (admitted on the 14th early morning). His chest X-ray on admission is shown. His illness had rapidly progressed requiring respiratory support and was placed on the ventilator. His status was deemed critical with this life-threatening pneumonia. The grandmother (JAM) had similar symptoms of fever, cough and dyspnea that began on July 9th. Her working diagnosis was that of a severe acute respiratory infection (SARI) and as her condition was not improving, she also was admitted to the hospital on July 14th. The grandmother repeatedly denied any visits to the Murg market or contact with poultry.

Child (AAJ) CXR on Admission (10 year old boy)



Question 1—Estimated Time: 7 minutes

The MOH asks you how these two individuals fit into the World Health Organization (WHO) influenza A/(H5N1) case definitions. How do you classify them? (Refer to WHO case definition on the next page)

Facilitator Answer: Whenever a suspected case of human infection with avian influenza A (H5N1) virus is being investigated, evidence for A(H5N1) infection is based on three important elements: CLINICAL findings, EPIDEMIOLOGICAL findings and LABORATORY testing.

10 year old boy (AAJ):
Clinical: Fever, cough, diarrhea and shortness of breath
Epidemiological: Exposure to live-market on July 8th where influenza A(H5N1) infections in animals were confirmed in the last month.
Laboratory: No lab specimens available.

The CXR and clinical deterioration extend the 'suspected A(H5N1) status' to a **"probable case"** designation.

***65 year old grandmother (JAM*)**:
Clinical: Fever, cough, and shortness of breath
Epidemiological: Close contact (within 1 meter) with a person who is a suspected, probable, or confirmed H5N1 case. Close contact with probable case occurred 2 days after "onset of symptoms".
Laboratory: No lab specimens collected at time of questioning.

The above information is supportive of a designation of "**person under investigation.**"

NOTE: It should be noted that the grandmother 1) did not attend the live market and 2) was in fact symptomatic with respiratory complaints on July 9, prior to when her grandchild had onset of illness for the first time. However, the grandmother remains a source of concern since she is a contact of a probable case, is symptomatic, and has not provided any information about possible independent exposures to influenza A(H5N1).

WHO case definitions for human Infections with influenza A(H5N1) virus:

Suspected H5N1 case

A person presenting with unexplained acute lower respiratory illness with fever (>38 ºC) and (cough, shortness of breath or difficulty breathing).

AND

One or more of the following exposures in the 7 days prior to symptom onset:

a. Close contact (within 1 meter) with a person (e.g. caring for, speaking with, or touching) who is a suspected, probable, or confirmed H5N1 case;
b. Exposure (e.g. handling, slaughtering, defeathering, butchering, preparation for consumption) to poultry or wild birds or their remains or to environments contaminated by their feces in an area where H5N1 infections in animals or humans have been suspected or confirmed in the last month;
c. Consumption of raw or undercooked poultry products in an area where H5N1 infections in animals or humans have been suspected or confirmed in the last month;
d. Close contact with a confirmed H5N1 infected animal other than poultry or wild birds (e.g. cat or pig);
e. Handling samples (animal or human) suspected of containing H5N1 virus in a laboratory or other setting.

Probable H5N1 case (notify WHO)

Probable definition 1:

A person meeting the criteria for a suspected case

AND

One of the following additional criteria:

a. infiltrates or evidence of an acute pneumonia on chest radiograph plus evidence of respiratory failure (hypoxemia, severe tachypnea)

OR

b. positive laboratory confirmation of an influenza A infection but insufficient laboratory evidence for H5N1 infection.

Probable definition 2:

A person dying of an unexplained acute respiratory illness who is considered to be epidemiologically linked by time, place, and exposure to a probable or confirmed H5N1 case.

Confirmed H5N1 case (notify WHO)

A person meeting the criteria for a suspected or probable case

AND

One of the following positive results conducted in a national, regional or international influenza laboratory whose H5N1 test results are accepted by WHO as confirmatory:

a. Isolation of an H5N1 virus;
b. Positive H5 PCR results from tests using two different PCR targets, e.g. primers specific for influenza A and H5 HA;
c. A fourfold or greater rise in neutralization antibody titer for H5N1 based on testing of an acute serum specimen (collected 7 days or less after symptom onset) and a convalescent serum specimen. The convalescent neutralizing antibody titer must also be 1:80 or higher;
d. A microneutralization antibody titer for H5N1 of 1:80 or greater in a single serum specimen collected at day 14 or later after symptom onset and a positive result using a different serological assay, for example, a horse red blood cell hem agglutination inhibition titer of 1:160 or greater or an H5-specific western blot positive result.

Question 2—Estimated Time: 10 minutes

You realize that you will likely need to start creating a line list.

What variables might be included?

- **Identification # (arbitrary)**
- Demographics and contact information
  - **Gender**
  - **Age**
  - Patient contact information
- **Possible exposure to infected animals or animal products in 7 days before symptom onset**
- **Possible contacts with suspect or confirmed human H5N1 cases in 7 days before symptom onset**
- **Occupation**
- Clinical data
  - **Symptoms on day of onset**
  - **Date of initial symptom onset**
  - Days of illness before initial presentation
  - Illness onset during antiviral prophylaxis
- Date of report
- Hospital test results
  - white blood cell count and differential

- haemoglobin/platelets
- Aspartate amino transferase (AST) /Amino alanine transferase (ALT) and creatinine
- − chest radiograph results

- **H5 Laboratory diagnoses**
  - Date of sampling
  - Type of specimens collected
  - Laboratory specimens sent to
  - Test results
- **Antiviral treatment and date initiated**
- **Status – case (based on case definition) vs. contact**
- **Final disposition**

KEY POINTS: Participants should be encouraged to brainstorm as many useful variables that they think should be captured in this kind of respiratory outbreak investigation. Keep in mind that additional variables may be collected as part of a case investigation and only a critical subset of these (e.g. such as those in bold above) may be included on a line list. WHO has posted a suggested templates for an A (H5N1) human case line listing, and also a template for a broader case report form on its web site.

http://www.who.int/csr/disease/avian_influenza/guidelines/globalsurveillance/en/.

Make the skeleton of a linelist with these categories on the white board. Remind the group that for purposes of this case study and time constraints there will be a finite small number of specific fields for which information on the line lists will be provided to them as the case investigation storyline unfolds. After they fill out the linelist for the second time on July 16th am (below), subsequent line list updates will be provided to them.

Question 3 – Estimated Time: 10 Minutes

Update the line list with the cases so far - *as of July 15th mid-day.*

(see updated line list)

Question 4—Estimated Time: 5 minutes

What criteria should be used to define who is a close contact of this probable case?

You should begin to assess contacts as soon as possible after the case patient presents for treatment. Close contact are defined in the *WHO guidelines for investigation of human cases of avian influenza A(H5N1)--January 2007* as ***people who came within 1 meter of shared space with a confirmed or suspect case patient beginning 1 day before onset of symptoms through 14 days after onset of symptoms*.**

http://www.who.int/csr/resources/publications/influenza/WHO_CDS_EPR_GIP_2006_4/en/index.html

The amount of time the potential contact was close to the patient is important to consider. Walking by the patient, without any direct conversation or contact may not be sufficient to classify someone as a contact. Persons the case has kissed, embraced or shared utensils with should definitely be considered contacts. Other examples of close contact (within 1 metre) with a person include providing care, speaking with, or touching. These contacts should be assessed for fever, and the presence of other symptoms compatible with influenza A (H5N1) in humans. Household members, friends, health care providers, pharmacists, traditional healers, workplace contacts and others are all examples of potential contacts.

Prioritization of contact tracing activities may be necessary if a large number of contacts are eligible for tracing or personnel resources are limited. In such situations it may be necessary to focus on those contacts with the highest risk of infection or exposure. Factors that can be used to prioritize among contacts include **1)** the probability of A(H5N1) infection in the case patient (e.g. contacts of confirmed or probable cases) and **2)** the duration, spatial proximity, and intensity of exposure to the case patient (e.g. unprotected health-care workers, household contacts sharing the same sleeping or eating space, persons providing bedside care).

Question 5—Estimated Time: 7 minutes

Assuming that neuraminidase inhibitors are available, should AAJ and JAM be given anti-viral treatment? Should the close contacts of AAJ be given anti-viral prophylaxis?

NOTE: If antiviral drugs are available, treatment doses should be provided to suspected, probable and confirmed cases as classified according to the WHO case definition.

By this classification:

- AAJ would meet the criteria to receive treatment with neuraminidase inhibitors.
- JAM would not meet the criteria for treatment with neuraminidase inhibitors

The *WHO Rapid Advice Guidelines on pharmacological management of humans infected with avian influenza A (H5N1) virus* also suggest that prophylaxis doses should be provided to all identified close contacts of confirmed cases, and if resources allow, to close contacts of "strongly suspected" cases as well.

http://www.who.int/csr/disease/avian_influenza/guidelines/pharmamanagement/en/index.html

- Asymptomatic contacts of AAJ would meet the criteria to receive prophylaxis with neuraminidase inhibitors (including JAM).
- Asymptomatic contacts of JAM would not meet the criteria to receive prophylaxis with neuraminidase inhibitors.

KEY POINTS: Participants should be reminded that the overall incubation period for influenza A(H5N1) is variable. They should also recognize that for current influenza A(H5N1) viruses, close and not casual contact is associated with person-to-person transmission. Individuals who are designated as contacts may in fact develop signs and symptoms of disease, leading to a change in their status to either suspected, probable or confirmed cases.

Question 6—Estimated Time: 8 minutes

If there are not enough antiviral resources to provide prophylaxis to all contacts, how should you prioritize resources?

The *WHO Rapid Advice Guidelines on pharmacological management of humans infected with avian influenza A (H5N1) virus* also classifies exposures into risk categories to assist with prioritization of chemo-prophylaxis. Prophylaxis should be given to each contact for 7-10 days after contact with case-patient. If neuraminidase inhibitors are available then high risk groups should be provided anti-viral prophylaxis, and moderate risk groups should be considered for prophylaxis depending on drug availability and strength of epidemiologic and clinical evidence:

Risk categories

High risk exposure groups are currently defined as:

- Household or close family contacts of a strongly suspected or confirmed H5N1 patient, because of potential exposure to a common environmental or poultry source as well as exposure to the index case.

Moderate risk exposure groups are currently defined as:

- Personnel involved in handling sick animals or decontaminating affected environments (including animal disposal) if personal protective equipment may not have been used properly.
- Individuals with unprotected and very close direct exposure to sick or dead animals infected with the H5N1 virus or to particular birds that have been directly implicated in human cases.
- Health care personnel in close contact with strongly suspected or confirmed H5N1 patients, for example during intubation or performing tracheal suctioning, or delivering nebulised drugs, or handling inadequately screened/sealed body fluids without any or with insufficient personal protective equipment. This group also includes laboratory personnel who might have an unprotected exposure to virus-containing samples.

Low risk exposure groups are currently defined as:

- Health care workers not in close contact (distance greater than 1 meter) with a strongly suspected or confirmed H5N1 patient and having no direct contact with infectious material from that patient.
- Health care workers who used appropriate personal protective equipment during exposure to H5N1 patients.
- Personnel involved in culling non-infected or likely non-infected animal populations as a control measure.
- Personnel involved in handling sick animals or decontaminating affected environments (including animal disposal), who used proper personal protective equipment

KEY POINTS: It should be tactfully explained to non-priority contacts that there is a scarcity of antiviral drugs and that they will be monitored carefully for the development of symptoms. To the extent possible plans regarding the distribution of scarce resources, such as access to prophylaxis treatment, should be specified in advance and government officials should engage stakeholders in determining what criteria should be used to make resource allocation decisions. Allocation plans should specify what goods are involved, who will make decisions about prioritization and distribution, who will be eligible to receive the scare resources, and what relevant criteria will be used to prioritize who will and will not receive resources. To the extent possible, there should be a commitment to transparency throughout the process and the reasoning behind choices should be fully articulated (in language appropriate for the intended audience).

JULY 16:

The hospital is a 5 hour car ride away and your RRT team doesn't arrive at the Dava Ghar hospital until the next day (July 16). You go directly to the hospital to begin investigation. You are told the following:

The boy's (AAJ) admission vital signs had been: a temperature of 39°C, heart rate of 120, tachypnea at 30 breaths/minute with a blood pressure (BP) of 90/60. His oxygen saturation was 88%; he was subsequently intubated on July 14th and placed on mechanical ventilation. He became hypotensive and went into renal failure. Despite aggressive measures, he died on the 16th morning, prior to your arrival.

You were told that respiratory sputum samples had been collected but subsequently discarded by the lab because they were considered of poor quality. Cultural practices and the family's wishes precluded any further post-mortem evaluation.

Reminder: make sure the participants are taking notes.

The grandmother was verified to be a caretaker of the child (AAJ) and presented to the hospital in moderate respiratory distress. Her vital signs were as follows: temperature of 38.5°C, a respiratory rate of 28 breaths/minute; BP of 160/95 and an oxygen saturation of 90%. The grandmother's initial laboratory findings included high lymphocyte / leukocyte counts.

You and your team recognize that you will need to quickly determine whether you're dealing with H5N1 or some other communicable pathogen. You are justifiably concerned that this may in fact represent an outbreak related to H5N1. You decide to send biological samples from the grandmother to the National laboratory for testing.

Question 7—Estimated Time: 3 Minutes

What specimens need to be collected from the grandmother?

The specimens most likely to allow rapid confirmation of the presence of influenza A(H5N1) include lower respiratory tract specimens. This is because the influenza A (H5N1) virus preferentially binds to receptors in the lower respiratory tract of humans.
If a patient has been intubated, then endotracheal fluid taken from the ET tube would provide an ideal specimen. Similarly if the patient has undergone a broncho-alveolar lavage (BAL) procedure or has had a chest tube inserted for other reasons (*these procedures should never be recommended for H5N1 diagnostic purposes alone*), good quality specimens might also be obtained for influenza A (H5N1) testing.

If the patient is ambulatory (like the grandmother in this case), throat swabs are the priority specimen type to be collected. However nasal swabs may also be diagnostically useful for human influenza virus subtypes that tend to bind to receptors in the upper

respiratory tract (e.g., influenza A (H3N2), A(H1N1), and other non-A(H5N1) human influenza viruses). However nasopharyngeal specimens are technically often difficult to obtain and training is required to carry out the collection with appropriate technique.

Blood specimens may also be collected. Blood specimens can be used to detect the presence of virus in the blood or antibodies against the virus. Specimens collected can also be used to test for other infections or concurrent illnesses. If blood specimens are taken, then convalescent serum specimens need to be collected 14 or more days after first specimen is taken.

It is better to collect too many specimens than not enough. Influenza virus is most likely to be detected soon after symptoms begin. Ideally specimens are collected:

- As soon as possible after symptoms begin – Although it may not always be logistically possible to collect respiratory specimens early in the clinical course of disease
- Before antiviral medications are administered (but do not delay treatment to get laboratory specimens)
- Even if symptoms began more than one week ago – It is still possible to detect virus in these specimens
- On multiple days when you have access to patient – It is best to collect multiple types of specimens on multiple days to increase chances of virus detection/isolation

Remind the participants that regardless of specimen type and collection method, it is important to use proper safety equipment including goggles and PPE for the protection of the individual(s) carrying out the procedure(s). Be very careful with needles and other sharp objects, as these items increase the chance of infecting someone. Treat all clinical samples as though they are potentially infected with avian influenza.

The World Health Organization has posted more description of the r*ecommended laboratory tests to identify influenza A/H5 virus in specimens from patients with an influenza-like illness* at http://www.who.int/csr/disease/avian_influenza/guidelines/labtests/en/ .

Question 8—Estimated Time: 7 minutes

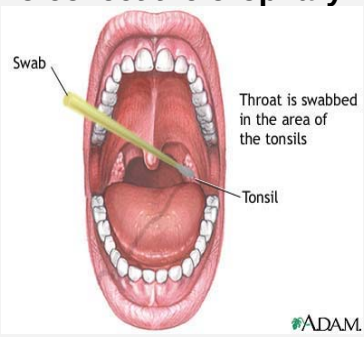
How should the oropharyngeal specimens be collected from the grandmother?

Collection begins with assembling your specimen collection kit. The specimen collection kit contains the supplies you will need to safely gather specimens from suspected cases of avian influenza. Vials containing viral transport medium (VTM) are one component of the specimen collection kit. In the table below you will see all items that should be in the specimen collection kit:

✓ Collection vials with VTM	✓ Tongue depressors	✓ Items for collection of blood
✓ Polyester fiber-tipped applicators	✓ Specimen collection cups or Petri dishes	✓ Personal Protective Equipment (PPE)
✓ Sterile saline which is 0,85% NaCl	✓ Transfer pipettes	✓ Field collection forms
✓ A sputum or mucus trap	✓ A secondary container	✓ A pen or marker for labeling samples
	✓ Ice pack	

Fiber-tipped applicators are used in collecting specimens from the oropharynx (throat), or the nasopharynx (nose). Although it may not always be possible, try not to use swabs made of cotton, that are treated with calcium alginate, or that have wooden handles or sticks since they inhibit PCR, a principle laboratory test used for influenza A (H5N1) confirmation. Individually wrapped applicators are preferable to ensure they are sterile. However if cotton-tipped swabs are the only type available, they should be used.

To collect the oropharyngeal specimen (perhaps have a clinician demonstrate):

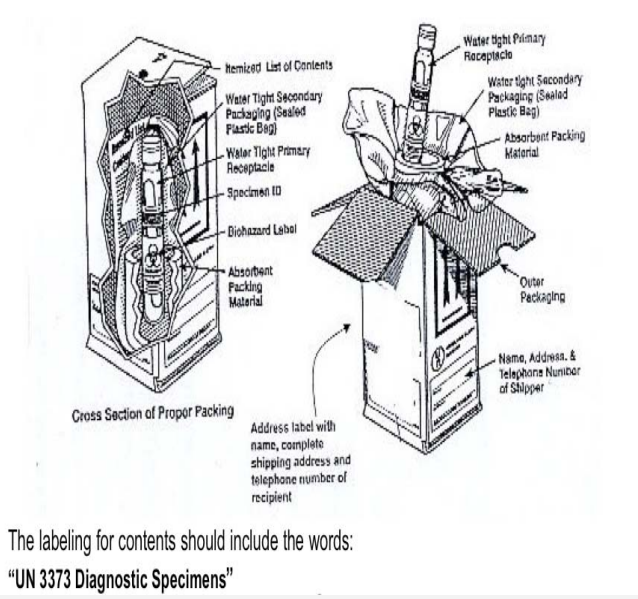


1. Have the patient open his/her mouth wide open
2. The patient should try to resist gagging and closing the mouth while the swab touches the back of the throat near the tonsils
3. Slowly remove the swab while slightly rotating it
4. Put tip of swab into vial containing VTM, breaking/cutting applicator's stick

Question 9—Estimated Time: 10 minutes

How should the oropharyngeal swab specimens be packaged, stored and transported?

Packaging, Storage and Handling:



Here is an image of a properly packed specimen:

- Three layers of packaging
- Absorbent packing material
- Specimen ID
- Biohazard label
- Itemized list of contents
- Labeling of the outer package as UN 3373 diagnostic specimens

If this material is not available to you, transport specimens with all appropriate labels and packaging in a cool box with ice.

For Specimens in VTM:

- Store specimens collected within 48 hours at 4 °C both before and during transportation. A cooler filled with ice packs can be used for this purpose.
- Store specimens at -70 °C beyond 48 hours (if you will not be able to immediately transport specimen to laboratory). Do not use dry ice unless the specimens are double-bagged and airtight; carbon dioxide from the dry ice can inactivate the virus.

- Do not store in standard freezer – keep them on ice or in a refrigerator (standard freezers will damage specimen)
- Avoid freeze – thaw cycles. It is better to keep a sample on ice even for a week, than to allow the sample to freeze and thaw multiple times

Transport (Shipping):

- When you send any specimens from potential cases of avian influenza from the field to a laboratory, we recommend that you follow WHO guidelines which have been outlined here for the safe transport of infectious substances and diagnostic specimens.

  http://www.who.int/csr/disease/avian_influenza/guidelines/transport/en/index.html

- In addition, you may need to follow local regulations on the transportation of infectious material.
- In all specimen shipments, include an itemized list of specimens, with specimen identification numbers that are linked to epidemiologic information and instructions for the laboratory.
- You will need to use a specimen tracking system to keep track of the specimens at all times. It is advisable to maintain a database that contains information about each specimen, including:
  - Identification or tracking number on the specimen field data collection form that links to the tracking number on epidemiologic data collection forms
  - Case demographics
  - When and where a specimen was collected
  - Type of specimen
- Be sure to coordinate the shipment with the laboratory. Arrangements should be made so that the laboratory is prepared to receive the specimens when they arrive.

KEY POINTS: Whenever possible the field team should oversee the actual steps involved in packaging, transport and shipping, including labeling specimens, packing, courier handoff, etc.

As part of contact tracing, you want to identify all of the potentially exposed individuals who have had contact with the probable case (AAJ). In a team meeting, you review available information and determine that the mother (NJC), uncle (JRO), and grandparents (JAM and AWM) qualify as contacts using the previously established criteria.

Question 10—Estimated Time: 10 Minutes

Update the line list with these known contacts. : *as of July 16th a.m*

KEY POINTS: As of July 16 a.m., this line list emphasizes that now there are at least 4 known contacts (AWM – the grandfather, JAM – the grandmother (and also a person under investigation), NJC – the mother and JRO – the uncle of the 10 year old index case (AAJ) at DG. While other contacts are not mentioned to keep the case study simple, as teaching point it is important to think beyond the nuclear family. This could include village health workers, traditional healers, taxi drivers and other people a case may have had close contact with while infectious. Future line list updates may be provided to the group without manual completion of each cell. This will facilitate the timely completion of the exercise.

Question 11—Estimated Time: 10 Minutes

What specific places would you visit to determine if there are additional more cases and contacts to be concerned about? What would your specific activities be at each of these places?

Note: The specific questions to be asked about exposure will be addressed in the next question so keep this discussion focused on the general activities to be undertaken at each location.

You should identify all contacts the boy may have had going back to one day before symptom onset. The list therefore in this situation might include school mates, play mates, health care personnel (including traditional healers), and persons involved in transportation of the child. There are (at least) three key sources of information that may prove useful:

1. **Hospital/Other Health Care Facilities**

    a. Talk to doctors, nurses, other hospital workers about their exposures, the possibility of illness among health care workers, and potential contacts of the case patient
    b. Retrace the movements of the cases within the hospital and determine possible exposures to staff, visitors and other patients. For example did any of the case patients spend time in a waiting room? Did the nurses and respiratory therapists wear PPE?

c. Contact other healthcare facilities in the province (e.g., clinics, other hospitals, lay health workers) and request that they increase their vigilance in looking for possible AI cases. Remind them of the WHO case definition. Perhaps offer to provide them with refresher training on case detection, reporting and infection control. Review health care registries to see if there are cases that may have been missed.

2. Talk to patient

a. If possible, meet with patient (may use relative as proxy if patient is too ill or is a young child)
b. RRT interviewer should wear full PPE (mask, gloves, gown, eye shield) if interviewing suspected cases.
c. Administer case finding questionnaire:
   - Ask the patient if s/he knows of anyone else who is sick with similar symptoms
   - Ask about risk factors and possible exposure
   - Ask about all of their personal contacts (family members, # and name; workplace contacts; school contacts or playmates)

3. **Go to home of case patients (village) to continue investigation**

a. Interview family members, other villagers and traditional healers that may be aware of additional cases.
   - Ask about exposure history of the patient; how they were exposed to poultry and other animals
   - Ask if others have developed symptoms
   - Conduct environmental survey - Chickens or other animals in/around house, samples from animals, environment
   - Identify any local outbreaks among animals
   - Ask the traditional healers/others who may see sick persons providers if they have received any visits from ill villagers.
   - PPE does not need to be worn unless in an environment known to be infected. It could create panic.

Key Points: Review critical data collection elements and collect this information from all possible sources of information in these contexts.

http://www.who.int/csr/disease/avian_influenza/guidelines/globalsurveillance/en/.

Question 12—Estimated Time: 15 Minutes

What kinds of exposure history and context do you want to elicit from the patient and family?

In countries or territories where influenza A(H5N1) viruses have been identified as a cause of illness in animals or people, the diagnosis of influenza A(H5N1) infection should be included in the differential diagnosis of all persons who have severe, unexplained acute febrile respiratory illness. In addition to symptoms, we want to consider the epidemiologic context of a patient that has acute respiratory disease. People who have touched ill poultry or have touched poultry that died of illness are at the greatest potential risk of infection.

Earlier, we mentioned that a patient suspected of an avian influenza infection should have a history strongly suggesting potential exposure to the H5N1 virus. Situations with potential for H5N1 exposure include:

- Contact with confirmed or suspect human H5 cases in the 7 days before symptom onset (including relationship with contact (first/last date of contact), type of contact (speaking distance, slept in same room, touched, provided bedside care, other).
- Awareness of clusters of severe respiratory illness in family, friends and co-workers.
- Exposure history to animals (chickens and other animals) and their environment in the 7 days before symptom onset (including setting, type of animal exposure, occupational exposure to animal and/or animal products, consumption of raw or undercooked animal products or traditional food preparations, or contact with an H5N1 outbreak in animals in the area
- Exposure to contaminated environments (e.g. exposure to poultry droppings including fertilizers or contaminated sewage, bathing in ponds/canals where domestic or wild birds can be found, etc.), and other animals regardless of their clinical status, especially those that may have consumed dead poultry (e.g. cats, dogs, and civets).
- Inquire about illness or deaths in birds, cats, swine, or other animals in the household and neighboring area.
- Examine the house and its surroundings for evidence of domestic poultry (e.g. feathers, scratch marks on the floor or furniture, bird droppings, cages, poultry bones/carcasses).
- Note if poultry and other animals were allowed to enter the house, had access to household water and food storage areas, and if persons, especially children, were exposed to poultry or interior or exterior environmental surfaces potentially contaminated by poultry.
- Map or photograph the house and its surroundings. Indicate its location with respect to homes of other relatives or neighbors, farms (backyard and commercial), markets and nearby bodies of water that birds could inhabit.

- Every culture produces unique exposures and risk factors. These need to be understood and included in your investigation tools. For example culture and country-specific risk factors identified to date include:

    - Consumption of duck blood pudding
    - Cock fighting, mouth-to-beak exposure, and associated activities
    - Swan defeathering
    - Playing with dead chickens and chicken body parts
    - Consumption of raw or undercooked poultry products
    - Live bird market and other occupational exposures

KEY POINTS: Unlike seasonal influenza or many other 'routine' respiratory pathogens, A(H5N1) infections have specific exposures (albeit often multiple and not clearly discernable) that need to be identified if at all possible. It is important to think of the local context when soliciting particular exposures. Review critical data collection elements and collect this information from all possible sources of information in these contexts.

http://www.who.int/csr/disease/avian_influenza/guidelines/globalsurveillance/en/.

As a result of additional case finding activities undertaken by your team a village health committee leader in nearby Pelu Jaghai has reported that there is also a child with unexplained respiratory illness there. The Director of Epidemiology recommends that you and part of your team go out to meet the MOH field workers in Pelu Jaghai and make site visits to the local hospital and villages. The Director of Epidemiology states that he will stay and manage the situation in Dava Ghar.

Reminder: make sure the participants are taking notes.

You visit the Pelu Jaghai hospital that day (July 16th). You are told by the staff doctor that yesterday they admitted a child of 11 years of age (TMU) for a severe respiratory illness characterized by fever, cough and shortness of breath that began on July 12. He is critically ill but not intubated and is available for clinical evaluation. He has been kept in an improvised isolation room (fan blowing out of the window) on one of the hospital wards. You and your team members don your PPE, evaluate the patient, review the medical charts and interview some available family members. The mother (ACM) of this boy (TMU) isn't a very good informant and cannot provide details about her son's recent history except that the boy was well up until July 12th when he developed illness. She recalls that the boy also visited the Murg market on July 8th as this was within walking distance of their house. No one else from her family visited the Murg market.

Question 13—Estimated Time: 5 minutes

Update line list: ***as of July 16th p.m.***

KEY POINTS: As of July 16 p.m. this line list shows there are two important individuals to follow in PJ – the 11 year old boy (TMU) who visited the PJ live-market on July 8th (SUSPECT CASE) and his mother (ACM - a CONTACT) who was a caregiver while he had his initial symptoms of respiratory illness.

Question 14—Estimated Time: 10 Minutes

You and your medical colleagues on the team realize the need to clinically evaluate TMU. What clinical features might distinguish influenza A (H5N1) infection in humans from more routine human influenza infections?

It can be difficult to tell if a patient has influenza because the signs and symptoms for influenza are similar to those for other diseases that may cause respiratory illnesses. If you do suspect influenza, there are a few differences between human influenza and avian influenza that you can assess.

Human influenza: usually leads to an upper respiratory infection. Signs and symptoms include fever, headache, cough, sore throat, muscle ache, and exhaustion. Other respiratory symptoms may appear, varying from sore throat to difficulty breathing. People generally recover anywhere from 2 to 7 days after symptoms appear. However, cough and muscle ache may last more than 14 days. Although influenza generally causes an upper respiratory infection, it can progress to pneumonia and respiratory failure in some cases.

Influenza A(H5N1) in humans: is different than seasonal human influenza infections. Avian influenza more often leads to a lower respiratory infection with variable upper respiratory involvement. Initial symptoms are similar to human influenza. These include fever, headache, cough, sore throat, muscle ache, and exhaustion. Symptoms of a lower respiratory infection appear early in course of the illness. Patients often begin to have difficulty breathing leading to progressive respiratory distress. A crackling sound may be heard during inhalation, and an increased respiratory rate may also be observed. By this time, sputum production may occur and may contain blood. Limited data also suggest that persons infected with influenza A (H5N1) may be more likely to have diarrhea. They may also be more likely to demosntrate lymphopenia, thrombocytopenia, and increased liver function tests.

KEY POINTS: Do not overplay our ability to clinically differentiate human from avian influenza, and note overall lack of high specificity in findings. There is always a critical need for discovering the important epidemiologic linkages and exposures to define who should have specimens collected for confirmatory testing. The underlying epidemiologic clues and laboratory testing must be sought and the two illnesses, seasonal influenza and A(H5N1) cannot be differentiated purely on clinical grounds. This is evident from the brief list of pathogens that can cause influenza-like-illness and/or severe pneumonia included below:

Viruses

- Human influenza viruses
- Parainfluenza viruses
- Respiratory syncytial virus
- Adenovirus
- Rhinovirus
- Flaviviruses (e.g. Dengue)
- Coronaviruses (including SARS-CoV)
- Human metapneumovirus
- Hantavirus
- New / emerging viruses, such as *bocavirus*

Bacterial

- *Mycobacteria tuberculosis*
- *Yersinia pestis* (pneumonic plague)
- *Streptococcus pneumoniae*
- *Staphylococcus aureus*
- *Hemophilus influenzae*
- *Burkholderia pseudomallei*
- *Legionella* spp.
- *Chlamydia pneumoniae*
- *Mycoplasma pneumoniae*
- *Coxiella burnetii* (Q fever)

JULY 17:

The hospitals in Dava Ghar and Pelu Jaghai both have suspected or probable cases of influenza A (H5N1) in their wards. Understandably, the hospital physicians and nurses are concerned about health care worker safety. You review infection control practices, respiratory hygiene and worker safety issues with the staff doctor.

Question 15—Estimated Time: 15 Minutes

What are some specific questions about infection control that you will ask at the hospitals?

Note: The guidance described below is taken from the WHO Avian Influenza Interim Infection Control Guideline for Health Care Facilities, 10 May 2007.

http://www.wpro.who.int/NR/rdonlyres/EA6D9DF3-688D-4316-91DF-5553E7B1DBCD/0/AI_Inf_Control_Guide_10May2007.pdf

- **Are standard precautions being practiced at all times?**
  - Is there constant use of gloves and hand washing (plus face-shields, masks, eye protection, or gowns if splashes are anticipated) for any contact with blood, moist body substances (except sweat), mucous membranes or non-intact skin?
  - Are gloves removed and discarded immediately after completion of a task, and hands washed every time gloves are removed?
  - Are appropriate administrative policies and practices in place; for example, posted signs, available hand sanitizers, tissues, and waste receptacles in clinic waiting rooms and emergency departments?
  - Is staff educated in respiratory hygiene and cough etiquette?
  - Is cohorting or spatial separation (ideally > 3 feet) of persons with respiratory infections being implemented?

- **Are contact and droplet precautions additionally implemented during routine care of suspected/probable/confirmed influenza A (H5N1) cases?**
  - Is there a private room or room shared for all influenza A(H5N1) cases?
  - Does staff wear disposable gown and gloves when entering the patients' rooms?
  - Are disposable gown and gloves removed and discarded inside the patients' rooms?
  - Are hands washed immediately after leaving the patients' rooms?
  - Is the patient's room cleaned daily using a hospital disinfectant, with attention to frequently touched surfaces (bed rails, bedside tables, lavatory surfaces, blood pressure cuff, equipment surfaces)?
  - Is there use of disposable equipment or patient-dedicated use of such equipment if possible (e.g. blood-pressure cuffs, stethoscopes)?
  - Are a face shield or goggles, and a surgical mask (not N-95) worn to prevent droplets from reaching the mucous membranes of the eyes, nose and mouth when within 1 meter of the patient?
  - Does the patient wear a surgical mask when outside of the patient room?

- **Are standard + contact + airborne procedures being implemented whenever performing aerosol-generating procedures on influenza A (H5N1) cases?**
  - Are aerosol-generating procedures being undertaken in an airborne infection isolation room?
    - This is a single-patient room equipped with special air handling and ventilation capacity that meets specific standards. This may be improvised to create negative pressure in low resource environments. If the facility has no negative air pressure rooms, negative pressure can be engineered by installing an exhaust fan and directing air from the inside of the room to an outside open area with no person movement. If the facility has no air conditioning, consider opening windows in isolation areas (but keep doors closed).
  - Is there a surgical mask on the patient?
  - Do personnel inside the negative pressure room wear a N-95 particulate respirator (or higher)?
  - Is isolation room air not re-circulating in the building?
  - Is exhaust air from the isolation room venting away from people (e.g. off the roof)?

- **Is the needed PPE available for staff?**

- **What is the policy for prophylaxis of health care workers?**

KEY POINTS: There are some key differences between CDC and WHO infection control guidance, partly due to increased availability of airborne isolation resources in the United States when compared to many parts of the world. Even though many experts consider that A(H5N1) is primarily spread by droplets, CDC guidelines state that given the uncertainty about the exact modes by which avian influenza may first transmit between humans, an airborne isolation room should be used, and a fit-tested N-95 respirator (or better) should be donned in the routine care of patients with documented or suspected avian influenza. http://www.cdc.gov/flu/avian/professional/infect-control.htm
The WHO guidelines recommend contact and droplet precautions for routine care of documented or suspected human influenza A (H5N1) cases but airborne precautions for aerosol-generating procedures.

Question 16—Estimated Time: 5 minutes

A triage nurse wearing an N-95 mask raises a concern that N-95 masks are in short supply. She asks you who these should be prioritized for?

- N-95 or higher masks are recommended for activities with high likelihood of generating infectious respiratory aerosols in patients with confirmed or suspected pandemic flu:
  - Intubation, nebulizer treatment, bronchoscopy
  - Resuscitation
  - Direct care for patients with influenza-associated pneumonia
- Surgical masks, not N-95s, should be put on patients when they are outside of the patient room.

You are intrigued by the possibility that there may be a possible epidemiologic connection between this 11 year old boy (TMU) in Pelu Jaghai and the 10 year old boy (AAJ) in Dava Ghar through a potential Murg market exposure. Through additional interviewing you also learn that the two boys played a local children's' game ~ 'hu-tu-tu' called 'chasing after the chicken' at the live-market. During this game they enjoyed chasing what appeared to be a very "slow and unsteady" chicken. You oversee the appropriate collection and transport of respiratory specimens from this 11 year old (TMU). You get the history that it was the uncle (JRO) of the 10 year old (AAJ) who took him to the live-market.

Reminder: make sure the participants are taking notes.

You return to Dava Ghar on the late afternoon of the 17th, tired and anxious that there are possibly other suspected cases of influenza A(H5N1) that you are missing.

JULY 18:

On the morning of the 18th, you go with the staff doctor to make rounds on the ward to see the grandmother (JAM) and to conduct active case surveillance for any interim cases of respiratory illness. You find that she is coughing copious amounts of yellow sputum with occasional hemoptysis; and though she is laboring to breath, she is not progressing to respiratory failure. She is still in isolation; you are given the results of the laboratory testing of specimens and much to your relief, the results are negative for influenza A(H5N1). One of her sputum specimens was positive for Acid Fast Bacilli. Her chest x-ray, which you had not been able to see initially,

now shows evidence of an upper lobe cavitary lesion.

As part of the team's daily updates, you are also told that the grandfather now has been documented to have a new fever and complaints of myalgias. Being frail and very anxious about JAM's condition, he hadn't really ventured out of her hospital room. He wore an N-95 mask almost continuously and sat by her bedside in deep concern. He has concomitant congestive heart failure due to hypertension (chronic). Though he had been already been started on chemoprophylaxis with Oseltamavir, his clinical status rapidly worsens .

Reminder: make sure the participants are taking notes.

Later on the 18th, you intend to get your team members together and create a more detailed summary of the 'cases' to date and to tally any data that they have acquired from their active case surveillance efforts. Your team also informs you that the throat swab specimen from the 11 year old child (TMU) is positive for H5 influenza by real-time RT-PCR.

A cloacal swab from the (now deceased) infected chicken that was collected during a parallel Ministry of Agriculture investigation has also tested positive for H5 influenza. The Murg market will be closed until further notice and active surveillance for illness among poultry is underway on source farms. Both the probable case (AAJ) and the confirmed case (TMU) have been reported to WHO which is mobilizing resources to assist in the investigation.

Question 17—Estimated Time: 5 Minutes

Update the line list - *as of July 18th p.m.*

KEY POINTS: As of July 18 p.m. this line list shows the grandfather (AWM) is now ill. Given his exposure to the index case at the family vigil (and not due to his exposure to JAM), AWM can now be considered a suspect CASE. Also, the grandmother (JAM) has TB, and not influenza A(H5N1) infection; so she actually becomes a 'CONTACT'. The 11 year old boy (TMU) at Pelu Jaghai hospital is the first confirmation of influenza A(H5N1) infection. Moreover, it should be noted that it seems more likely that he did not acquire the infection from his playmate (AAJ) at the live market but rather had an independent exposure to the infected chicken while they played the 'hu-tu-tu' game.

As you take a short walk to collect your thoughts you receive an urgent message on your cell phone from the Director of Epidemiology. He has just been notified that a reporter from the regional newspaper is pursuing a story on the ill patients in the adjacent province. Somehow the reporter has learned of the 'potential' exposure at the July 8th live-market and wants to write an article notifying the public. The Director of Epidemiology repeatedly states that he wants to talk directly with the reporter and maybe even conduct a press event. He asks you for a list of 'talking points' to be created by your team and then shared with the Public Information Officer (PIO) who works with the MOH.

Question 18—Estimated Time: 3 Minutes

What are the key principles and basic goals of emergency risk communication in this kind of situation?

Remind the class to keep in mind the 'STARCC' principle. Your public messages in a crisis must be: **S**imple, **T**imely, **A**ccurate, **R**elevant, **C**redible, **C**onsistent,

Messages should include:

- An expression of empathy ("I understand that everyone is very concerned about this situation…)
- Clarification of facts (who, what, why, where, when, why, how)
- What is not known
- The process for getting answers to what is not known
- Statement of commitment (to crisis response and recovery and to continue communications as more is known)
- Referrals for additional information.

Question 19—Estimated Time: 10 Minutes

What are three key communication messages that could be used to provide the public an update of the current situation?

Here is an example:

- The Pegu Government understand the concern that the public must feel about this situation. We will give you regular updates. Here are the facts we know to date:
    - One laboratory confirmed case of influenza A (H5N1) “bird flu” (in an 11 year old boy) has been identified in Pelu Jaghai.
    - Another 10 year old boy who died in Dava Ghar is considered a probable case.
    - Both were playing with a chicken at the Murg Market inpelu Jaghai that has been confirmed to have been infected with Influenza A (H5N1) “bird flu”.
- An official investigation, involving collaboration between the Pegu MOH, Ministry of Agriculture and the World Health Organization is underway.
    - Its early in our investigation and the complete scope of the infection among humans is unknown at this time
    - There is currently no evidence of widespread infection or human to human transmission.
    - The Murg Market is closed until further notice and we continue to actively search for additional human and animal cases.
- The Government of Pegu is committed to identifying the extent of this outbreak and rapidly controlling it.
    - Steps are being undertaken to ensure that all contacts of the ill child are being traced.
    - Steps are also being taken to ensure that disease does not spread among infected poultry, which at present is the only known source of this infection among humans.
    - For more information about this investigation, or to report suspected cases of influenza A (H5N1) in humans or animals, please do not hesitate to contact the Pegu Public Information Officer at +01-65-244-675.

Question 20—Estimated Time: 5 Minutes

Who are the specific people that must receive regular situation reports from your team? How might this change based on who you are deployed with?

- The Ministry of Health will be the final authority on reporting channels and chain of command in their country.
- Any CDC person that is serving as a short term consultant to WHO must report through the WHO chain of command. Permission must be received from WHO to share official information with its external partners such as CDC.
- If deployed by CDC, then one can report to CDC under the auspices of the MOH.

Question 21—Estimated Time: 15 Minutes

What are the essential components of a situation report?

Instructions: Brainstorm these key categories with the team. For the purposes of time do not have the group fill out a situation report. However it may be helpful to read through it together to critique its content and to also get a sense of the broader response that would occur external to the activities in this case study.

Rapid Response Team Daily Situation Report

Date: July 18th, 5pm Location: Dava Ghar Province, Pegu

1. Rapid Response Team Composition

Name	Affiliation	Role

2. Surveillance/Epidemiology

2a. Update on human cases

There is 1 Confirmed Human Case of Influenza A (H5N1):

As of 18 July there is one confirmed human case of Influenza A(H5N1). This is in an 11 year old boy from Pelu Jaghai. This boy had a symptom onset date of July 12 and had contact with an "unsteady chicken" at the Murg Market on July 8th.

There is 1 Probable Human Case of Influenza A (H5N1):

A 10 year old playmate of the confirmed case who lived in Dava Ghar also had contact with the same chicken at the live bird market on July 8th, died of respiratory illness on July 16th, and was buried by his family before specimens could be collected. This 10 year old decedent remains classified as a probable case.

There is 1 Suspected Human Case of Influenza A (H5N1):

The grandfather of this 10 year old child is now currently hospitalized in Dava Ghar with fever, shortness of breath and myalgias and is also classified as a suspected case.

2b. New cases and changes in classification since the last report

1) Since the last report at 5pm on July 16th, the 11 year old boy from Pelu Jaghai has received PCR confirmation of H5N1 infection and his status has been changed from a "probable case" to a

"confirmed case" according to the WHO case classification.

2) On July 16th The grandmother of the 10 year old probable case from Dava Ghar was classified as a "person under investigation". Since that time her respiratory symptoms have been confirmed to be the result of active tuberculosis and she is now classified as a "contact" below.

3) The grandfather of this 10 year old child is now currently hospitalized in Dava Ghar with fever, shortness of breath and myalgias and is also classified as a suspected case rather than as a contact.

2c. Contacts and exposed persons being monitored

Four contacts are currently being closely monitored for symptoms and are under voluntary quarantine. These contacts include:

1) the grandmother of the 10 year old decedent (probable case from Dava Ghar) that is known to also have active tuberculosis.

2) the mother of the 10 year old decedent (probable case from Dava Ghar), who also attended the live bird market on July 8th

3) the uncle of the 10 year old decedent (probable case from Dava Ghar), who also attended the live bird market on July 8th.

4) the mother of the confirmed case from Pelu Jaghai, and his caretaker while ill.

Workers from the poultry farms and owners of backyard flocks that provided birds to the Murg Market are under surveillance for fever or respiratory symptoms. They are also under voluntary quarantine for 10 days. These flocks were identified through an ongoing joint MOH/MOA investigation.

2d. Update on human surveillance

Active surveillance for suspected human cases is being undertaken in all health care facilities in Pelu Jaghai and Dava Ghar provinces. Active surveillance for fever and respiratory illness is also being undertaken among poultry workers and backyard flock owners that supplied birds to the Murg Market. Door to door active surveillance is being undertaken every other day by local health workers in the villages of the confirmed and probable cases. The community health workers and local health care providers are receiving refresher training in human case definitions and appropriate reporting channels.

2e. Evidence of human-to-human transmission

To date there is currently no evidence of sustained human to human transmission.

3. Pending laboratory results

No clinical specimens could be obtained from clinical specimens taken from the 10 year old probable case from Dava Ghar prior to his burial. RT-PCR analyses confirmed H5N1 infection in the 11 year old child from Pelu Jaghai. Oropharyngeal and nasopharyngeal swabs collected from the grandfather of the probable case from Dava Ghar have been sent to the National Laboratory and are pending. All specimens have also been forwarded to the WHO reference lab for diagnosis of Influenza A/H5N1.

4. Clinical management/Infection control

Non-hospitalized contacts have been advised to remain at home for 10 days after their last contact probable or suspected case. The hospitalized contact is in isolation and has been started on prophylaxis with a neuraminidase inhibitor given her underlying active tuberculosis. Non-hospitalized contacts have been educated about risk factors/risk behaviors of exposure, and the signs/symptoms of AI illness. All contacts have received instructions on how to self-monitor for fever post-exposure. During this period, contacts have been instructed to stay at home voluntarily. If contacts have fever, they have been told to immediately report their symptoms to health authorities and/or the RRT and remain in voluntary home quarantine. All probable and confirmed cases are currently in isolation and are receiving treatment doses of neuraminidase inhibitors.

5. Update on animal health and surveillance

The animal health representative to the RRT has undertaken several field visits in Dava Ghar and Pelu Jaghai Provinces to investigate the occurrence of illness among birds and: To date he has inspected:

• the case patient's home and its surroundings, backyard poultry areas
• local poultry farms (commercial or backyard farms) near the case patient's home
• local places frequented by wild birds (e.g. lakes)

The live bird market has been closed. Farms providing poultry to the marker and all farms within a 10 mile radius of the Murg market are under active surveillance by the Ministry of Agriculture. Respiratory and cloacal specimens are being collected from samples of well birds and all birds with signs of illness. Specimens are being sent to the National Animal Health Laboratory.

6. Planned activities

The team plans to visit (or telephone) each contact daily for at least 10 days following a known exposure to a suspected, probable or confirmed H5N1 case. Investigation and contact tracing will continue and all suspected cases will be reported to the appropriate authority.

Efforts to identify additional cases beyond close contacts will focus on:
• persons who may have been co-exposed to the same source as the case patients
• persons with bird and animal exposures (see section 2)
• clusters of socially and geographically linked persons with respiratory illness
• persons with unexplained severe acute lower respiratory infection with fever

7. Requests for assistance and resources

Request policy on recommendation for prophylaxis of attendees at live bird markets with stated exposure to sick or dying birds.

8. Other

You may want to include your epidemiologic curve and line listing here but take care to maintain the confidentiality of the cases under investigation. In addition, issues you may want to discuss here are the recent press conference, security, and other concerns.

Now that you feel good about yourself for having handled these media coverage and reporting issues, you return to the team on the early evening of July 18 to summarize the investigation to date as you had originally planned. Instead your team says that there is a

problem that has arisen with some of the family members of the little boy (AAJ). You are told that the mother (NJC) and the uncle (JRO) called the MOH from their home telephone and indicated that they have runny noses and "feel a little weak". NJC first began to feel ill (on July 19th) and then about 10 hours later, JRO began to feel ill. Because they live 60 km from the hospital they are worried that if they fall ill they will not be able to obtain timely health care. They want to be hospitalized.

Question 22—Estimated Time: 5 minutes

The mother (NJC) and the uncle (JRO) ask you and the Director of Epidemiology if they can come to the hospital now but the hospital staff is worried that many more people will request the same treatment. How do you respond?

This is a very difficult decision that must ultimately be made by local authorities and the Ministry of health. The answer to this depends on many factors such as patient health, underlying conditions, stability of condition, distance from hospital, mobility, and available hospital beds, supplies, and infection control resources. For example, early in an outbreak when there are few known cases, a decision may be made to allow such cases to come to the hospital. In a situation with more widespread human illness, that policy might quickly become untenable. This question illustrates that such staged contingency planning is very important for the MOH to consider in advance as part of their pandemic influenza preparedness efforts.

Question 23—Estimated Time: 7 minutes

If a person with known exposure to a confirmed human case of influenza A (H5N1) refused to accept voluntary quarantine, how would you respond ?

This is another decision that must ultimately be made by local authorities. The goal of quarantine is to protect the public by separating persons exposed to a communicable disease from the general population. It is based on utilitarian concepts of protecting the common good (the greatest possible good for the greatest number of individuals). Imposition of quarantine or other liberty limiting measures needs to be balanced with protection of individual rights, such as the protection of quarantined individuals' privacy, protection against stigmatization, and avoidance of unequal burden being placed on specific individuals or groups. Whenever possible, voluntary measures should be used.

KEY POINT: Review that quarantine is for asymptomatic persons and isolation is for symptomatic persons. The following points might help you to provide advice in the current situation. Ethical justification of quarantine or isolation requires that:

1) There must be a possibility of person-to person spread of disease and the necessity of quarantine as a containment measure.

2) The least restrictive measures proportional to the goal of achieving disease control

must be used. Voluntary quarantine should be used before more restrictive measures are enacted.

3) Society must be able to provide necessary support services for those in quarantine (e.g., provide, food, water, household and medical supplies, etc) and to ensure the long-term psychological impact and stigmatization of persons quarantined or isolated is minimized.

4) Public health officials must communicate clearly the justification for their actions and allow for a process of appeal (transparency principle).

5) Quarantined individuals should be closely monitored to detect onset of symptoms. Those with symptoms should be moved to isolation or a cohort of symptomatic persons in order to ensure that other persons placed under quarantine are not put at increased risk.

A local temple has been offered as a potential site for quarantine and the mother and uncle agree to move there as it is only 5 kilometers from the hospital. They will self-monitor for presence of fever and alert the local health committee with any change in their health status. When you again ask NJC of any other family members who may have been around the 10 year old (AAJ), she now tells you that there is one 19 year old brother (DKS), who is a university student in the city of Anawrahta and came just to take care of his little brother during the family vigil on July 12-13. He had gone back for his studies on the 14th for exams.

JULY 19:

The next day (July 19th) you learn that the 11 year old boy (TMU) is intubated. Later that evening the Director of Epidemiology informs you that both the mother (NJC) of the boy who died (AAJ) and AAJ's uncle, (JRO) have now been admitted to the hospital with cough, fever, shortness of breath, and pneumonia noted on chest x-ray. Additionally the mother also had severe myalgias, diarrhea and mild sore throat. The mother provides more history that she in fact did care for her boy while he was sick at home; she recalls she and her parents (JAM and AWM) being close by the boy at home during the 48 hours prior to his admission to Dava Ghar Provincial Hospital.

JULY 20:

You begin the day getting updates from the MOH team. You are also told that the 19 year old student sibling (DKS) now has fallen sick (onset of symptoms – July 20th) – with fever and cough. He returned to his home province because he was not feeling well. He strongly denied having attended any live-markets and any contact with dead or ill poultry as he was either at his brothers bed-side, or at school.

Later that morning you receive word that the grandfather (AWM) has died with multiple complications, including renal failure, encephalitis and ventricular arrhythmias. You are not surprised to learn that he died of H5N1 – as confirmed from the PCR testing.

Question 24—Estimated Time: 5 Minutes

Update the line list - *as of July 20th afternoon*

KEY POINTS: As of July 20th, this line list shows that the grandfather (AWM) has died and confirmed to be an A(H5N1) CASE. In the interim, the mother (NJC) and the uncle (JRO) of the index case (AAJ) have been hospitalized as probable cases, and a 19 year old sibling of AAJ who is a student from out-of-town (DKS) is also hospitalized as a suspect case.

You don't have the appetite given all the tension but you manage to eat a bowl of rice and vegetables. Before you finish you are approached by some scared health care workers (HCWs), including the respiratory technician (HCW-RT) on duty when the 10 year boy (AAJ) who died. He reports having worn PPE but he thinks he "felt droplets touch his face". He is now running a fever and very worried. Additionally there are two other HCWs who are demanding something be done about their potential exposure to the deadly virus. There was a nurse (HCW-N2) who took care of the grandfather's body during the last hour of his life and helped in taking care of the body post-mortem. She is unsure if she wore all of the required PPE at all times. There was also a traveling nurse (HCW-N3) who recalls how scared she was even though she had adhered to contact and droplet precautions when briefly taking a meal tray into the grandfather's hospital room.

Question 25—Estimated Time: 7 Minutes

The respiratory therapist who took care of the 10 year old (AAJ), Nurse #1 who treated the grandfather (AWM) and handled the body post-mortem, and Nurse #2 who brought the grandfather a meal all request antiviral therapy. Assuming Oseltamivir is available, who do you recommend should receive antiviral therapy and at what doses?

The recommendations below are based on the *WHO Rapid Advice Guidelines on pharmacological management of humans infected with avian influenza A (H5N1) virus*

http://www.who.int/csr/disease/avian_influenza/guidelines/pharmamanagement/en/index.html

1) Respiratory Therapist: The respiratory therapist was likely involved in high-risk procedures, even at a stage when he didn't know that the patient was likely to have influenza A(H5N1). There may have been a breach in his PPE based on his report that he felt droplets touch his face. He also has a fever and should be considered for empiric treatment with neuraminidase inhibitors The recommended dose of oseltamivir for the treatment of influenza, in adults and adolescents 13 years of age and older, is 150 mg per day, given as 75 mg twice a day for five days. Oseltamivir is not indicated for the treatment of children younger than one year of age. The respiratory therapist should undergo

appropriate diagnostic testing.

2) Nurse # 1: The nurse who attended the grandfather and took care of the body may have had exposure to infectious aerosols and secretions and so she should receive prophylaxis doses of Oseltamivir given as 75 mg once per day for 7–10 days after the last exposure. She should self-monitor temperature twice daily and report any febrile event.

3) Nurse # 2: The nurse who took the meal tray into the grandfather's room likely had no significant exposure and cannot be considered a contact given the transient nature of the visit. She should not receive prophylaxis doses of Oseltamivir. In order to give her comfort she could also be asked to self-monitor temperature twice daily and report any febrile event.

KEY POINTS: It is important to point out that anti-virals are not infallible and there is little data on their efficacy. Consistent and appropriate use of PPE is the first line of defense against infection.

Later that evening (July 20th), your colleagues return from Pelu Jaghai having completed their case investigation and contact tracing. You also learn that DKS now has radiographically confirmed pneumonia. The two teams find a room in the hospital to update their line lists and review all of the epidemiologic data.

The complete line listing for these cases and contacts as of July 20th evening: should be provided

Question 26—Estimated Time: 20 Minutes:

Make an epidemic curve of the cases as of July 20th evening. What can be learned from the epidemic curve?

Note: For those in the group who have never made an epidemic curve, get a volunteer to draw the curve of suspect, probable and confirmed cases and to then describe its axes. Coach this person to add arrows that indicate the two known exposure locations (the Murg Market , and the start and end of the 48 hour vigil) on the X-axis.

Provide completed curve to the group after this is completed for further

KEY POINTS: Participants should observe that besides showing the number of cases, the two far left arrows on the timeline indicate the two potentially different exposure sources, initially the live-market on July 8th and the 48 hour family vigil, lasting almost 48 hours from July 11-13th. The former could represent a predominantly zoonotic exposure to A(H5N1); the latter could represent a predominantly human-to-human exposure to the virus.

Now discuss what the minimum and maximum incubation periods associated with each exposure could be by comparing the date of onset of each case with their dates of possible exposure.

1) Live-Market: minimum suggested incubation period is likely 2 days (AAJ), and the potential maximum is 11 days (if NJC or JRO were exposed at live-market). Recall the uncle (JRO) did not attend vigil but had close contact with NJC.

2) Family-vigil: Minimum incubation period is 5 days (AWM), and the potential maximum is 9 days (DKS) - if source of exposure was AAJ.

Use this epidemic curve in conjunction with the line listing to systematically review possible sources of exposure and incubation periods for each case. Draw a schematic outlining each person's exposure if it is helpful to the process.

CASE BY CASE FINDINGS:

- The 10 year old boy who died (AAJ) was likely infected with A(H5N1) at the live-market
- 11 y/o (TMU) is within plausible incubation period for exposure at live-market and likely did not acquire the infection from the 10 year old playmate (AAJ).
- When considering the epidemic curve in the context of known exposure histories, then the following interpretations can be made regarding mode of transmission for additional cases
    - The mother (NJC) may have been exposed to influenza A(H5N1) at either the live-market OR as a result of close contact with her son (AAJ)
    - The grandfather (AWM) was likely exposed to A(H5N1) as a close contact with his grandson (AAJ) as he had no reported poultry exposure
    - The uncle (JRO) was likely exposed to A(H5N1) at the live-market event but given normal incubation periods could possibly have been infected by NJC. He was reportedly not around the boy (AAJ) after onset of symptoms
    - The 19 y/o (DKS) may have been infected at the time of the family vigil.

This being a simulation, it should be noted that in a real-life situation, there may well be many more individuals who could have been exposed to A(H5N1) (e.g., at the live market event, occupational exposures etc...)

Update:

Over the next several days, the mother (NJC), her brother (JRO), and the 19y/o (DKS) are all confirmed positive for influenza A(H5N1) by RT-PCR and specimens are sent to the WHO H5 Reference lab. You also learn that all of the remaining individuals who were considered ‘contacts’ tested negative for influenza A(H5N1). The respiratory therapist tested positive for Influenza A(H3N2).

Question 27—Estimated Time: 20 Minutes

Make a graphical representation of the cases with known onset dates, sources of exposure and incubation periods. Using this and the WHO criteria for determining human-to-human transmission, make an assessment of the likelihood that each case received was infected via human-to-human transmission?

NOTE: Coach the class through making this graphic. After discussion, provide the example graphic included with the final line-listing. Then create a column on the case line list called "human-human transmission". Label each case as "likely", "not likely", or "possible" using the WHO criteria mentioned below, the graphic, and the final line-listing.

There is an uncertain risk of human-to-human spread of avian influenza. Suspicion of human-to-human transmission is increased when the time of onset between two cases falls within the incubation period (~2 to ~8 days), and when no alternative source of exposure is found. In practice it can be very difficult to differentiate between human-to-human transmission and a common source exposure. Human-to-human transmission may be indicated in the setting of:

- Well documented exposure to a confirmed, probable, or suspect human case

and

- The time interval between contact with a human case and illness onset is 7 days or less

and

- Absence of an alternative source of exposure such as exposures to birds, animals,
- feathers, droppings, fertilizers made of fresh bird droppings, contaminated
- environments, or laboratory specimens

OR

- Several generations of transmission linked to a primary case

Thus a comprehensive epidemiologic case investigation is essential to make this determination. In line with the International Health Regulations (2005), WHO should be notified if the investigation suggests that human-to-human transmission is occurring as described above.

HUMAN to HUMAN transmission?

ID #	INITIALS	LOC	STATUS – Case vs. Contact	Human-to-human transmission?	Possible Sources of Exposure
1	AAJ	DG	Probable CASE	**Not likely**	**Live-Mkt: July 8**
3	AWM	DG	Confirmed CASE	**Likely**	**Caretaker of # 1, no reported poultry**

					exposure.
4	NJC	DG	Confirmed CASE	**Possibly**	**Caretaker of # 1; Live-Mkt: July 8**
5	JRO	DG	Confirmed CASE	**Possibly-Likely**	**Live-Mkt: July 8, Exposure to NJC may be more likely source given incubation periods**
6	TMU	PJ	Confirmed CASE	**Not likely**	**Live-Mkt : July 8. Exposed to AAJ, prior to AAJ's symptom onset.**
8	DKS	DG	Confirmed CASE	**Likely**	**Caretaker of # 1. Exposed at vigil, denies poultry exposure.**

KEY POINTS: Review criteria for establishing human to human transmission above. Clearly establishing human-to-human transmission may be possible although difficult. There may be instances in which it is relatively clear but given the common sources of zoonotic exposure, or exposure to unknown fomites that may be present in the environment, it is nevertheless challenging to confidently conclude such modes of transmission.

Over the next 10 days you, the Rapid Response Team, the Director of Epidemiology and the relatives of many of the patients are saddened to see the demise of the mother (NJC) of 10 year old boy (AAJ). The uncle (JRO) and the 19 year old (DKS) survive though they received the same intensity of early intervention and medical care as the mother. The 11 year old boy at Pelu Jaghai (TMU) also dies during this time period.

You reflect on the investigation findings and the ongoing passive and active surveillance activities in the region. You are emboldened to realize that no more acute unexplained respiratory infections with an underlying epidemiologic link to cases, contacts or sick poultry have arisen.

Question 28—Estimated Time: 3 Minutes

What would you do at this stage? How long must you wait before you and your colleagues consider this investigation closed and the outbreak(s) over?

You need to wait for at least the passage of 2 incubation periods, i.e., approximately 2 weeks to allow for any sub clinical infection to manifest among those exposed to influenza A(H5N1) either through direct contact with ill poultry and/or ill human cases.

The most important measures at this point are:

- to enhance ongoing active surveillance for influenza A(H5N1) in humans and animals (there is never a stronger indication for active surveillance than at this point in an investigation);
- to enhance biosecurity measures in farms, backyard flocks an dmarkets;
- to provide effective prevention and control measures for managing contacts and cases in both community and health care facilities;
- to continue to offer strong, sustainable public health risk communication messages, and;
- to review and improve pandemic plans for interagency coordination and resource allocation.

By July 31st, you and your team receive information from the WHO H5 Reference Laboratory that all of the H5N1 viral isolates that were obtained from infected patients were identical and were classified as clade 2 virus strains. Sequence analysis also revealed that the H5N1 viruses that were isolated were sensitive to the neuraminidase inhibitors oseltamivir and zanmivir, but resistant to the adamantine drugs amantadine and rimantadine. You finally pack your bags and return home to your family after a long and eventful stay in Pegu.

NOTE: All referenced Line Lists (by date in scenario), Epidemic Curves and Graphics are included on the following pages

July 15th mid-day.

The line list (for the cases and contacts) so far is presented below:

ID #	Initials	LOC	AGE	SEX	EPI relation	OCCUP.	SYX	ONSET - July	POSS. EXPOS.	LAB STATUS	STATUS – Case vs. Contact	OUTCOME
1	AAJ	DG	10	M	Child	Child	F, C, S	10	Live-Mkt: July 8 Grandmother: July 9	No lab specimen	Probable CASE	Hospitalized on ventilator, pneumonia, respiratory failure
2	JAM	DG	65	F	Grandmother (# 1)	Retired	F, C, S	9	Caretaker of # 1	Pending	Person Under Investig.	Hospitalized

F: Fever; C: Cough; D: Diarrhea; S: Shortness of breath; M: Myalgias; URI – upper respiratory syx
DG: Dava Ghar
PJ: Pelu Jaghai

July 16th a.m.

The line list (for the cases and contacts) so far is presented below:

ID #	Initials	LOC	AGE	SEX	EPI relation	OCCUP.	SYX	ONSET - July	POSS. EXPOS.	LAB STATUS	STATUS – Case vs. Contact	OUTCOME
1	AAJ	DG	10	M	'index' case	Child	F, C, D, S	10	Live-Mkt: July 8	No lab specimen	Probable CASE	Died (7/16)
2	JAM	DG	65	F	Grandmother (# 1)	Retired	F, C, S	9	Caretaker of # 1	Pending	PUI/ CONTACT	Hospitalized
3	AWM	DG	70	M	Grandfather (# 1)	Retired			Caretaker of # 1		CONTACT	
4	NJC	DG	36	F	Mother (# 1)	Home-maker			Caretaker of # 1; Live-Mkt: July 8		CONTACT	
5	JRO	DG	27	M	Uncle (# 1)	Farmer			Live-Mkt: July 8		CONTACT	

F: Fever; C: Cough; D: Diarrhea; S: Shortness of breath; M: Myalgias; URI – upper respiratory syx

July 16th p.m.

The line list (for the cases and contacts) so far is presented below:

ID #	Initials	LOC	AGE	SEX	EPI relation	OCC.	SYX	ONSET - July	POSS. EXPOS.	LAB STATUS	STATUS – Case vs. Contact	OUTCOME
1	AAJ	DG	10	M	'index' case	Child	F, C, D, S	10	Live-Mkt: July 8	No lab specimen	Probable CASE	Died (7/16)
2	JAM	DG	65	F	Grandmother (# 1)	Retired	F, C, S	9	Caretaker of # 1	Pending	PUI/ CONTACT	Hospitalized
3	AWM	DG	70	M	Grandfather (# 1)	Retired			Caretaker of # 1		CONTACT	
4	NJC	DG	36	F	Mother (# 1)	Home-maker			Caretaker of # 1; Live-Mkt: July 8		CONTACT	
5	JRO	DG	27	M	Uncle (# 1)	Farmer			Live-Mkt: July 8		CONTACT	
6	TMU	PJ	11	M	Playmate (# 1)	Child	F, C, D, M	12	Live-Mkt: July 8	Pending	Suspect CASE	Hospitalized
7	AMC	PJ	29	F	Mother of # 6	Mother			Caretaker of # 6		CONTACT	

F: Fever; C: Cough; D: Diarrhea; S: Shortness of breath; M: Myalgias; URI – upper respiratory syx
DG: Dava Ghar
PJ: Pelu Jaghai

July 18th p.m.

The line list (for the cases and contacts) so far is presented below:

ID #	Initials	LOC	AGE	SEX	EPI relation	OCCUP.	SYX	ONSET - July	POSS. EXPOS.	LAB STATUS	STATUS – Case vs. Contact	OUTCOME	
1	AAJ	DG	10	M	'Index' case	Child	F, C, D, S	10	Live-Mkt: July 8	No lab specimen	Probable CASE	Died (7/16)	
2	JAM	DG	65	F	Grandmother (# 1)	Retired	F, C, S	19	Caretaker of # 1	Negative H5N1	CONTACT	Hospitalized	
3	AWM	DG	70	M	Grandfather (# 1)	Retired	F, S, M	18	Caretaker of # 1	Pending	Suspect CASE	Hospitalized	
4	NJC	DG	36	F	Mother (# 1)	Home-maker			Caretaker of # 1; Live-Mkt: July 8		CONTACT		
5	JRO	DG	27	M	Uncle (# 1)	Farmer			Live-Mkt: July 8		CONTACT		
6	TMU	PJ	11	M	Playmate (# 1)	Child	F, C, D, M	12	Live-Mkt: July 8	Positive H5N1 - PCR	Confirmed CASE	Hospitalized	
7	AMC	PJ	29	F	Mother of # 6	Mother			Caretaker of # 6		CONTACT		

F: Fever; C: Cough; D: Diarrhea; S: Shortness of breath; M: Myalgias; URI – upper respiratory syx **DG: Dava Ghar** **PJ: Pelu Jaghai**

July 20th afternoon

The line list (for the cases and contacts) so far is presented below:

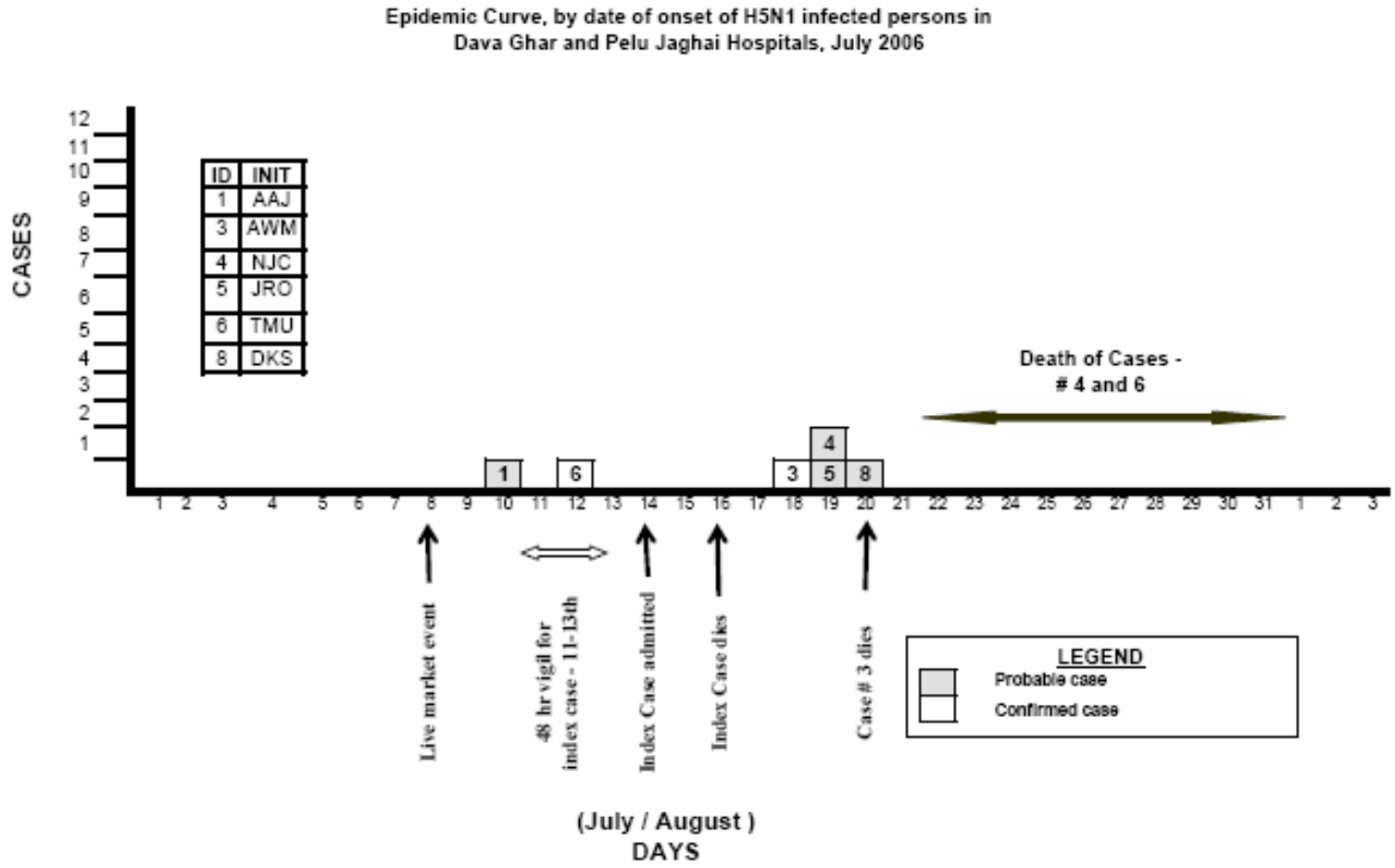
ID #	Initials	LOC	AGE	SEX	EPI relation	OCCUP.	SYX	ONSET - July	POSS. EXPOS.	LAB STATUS	STATUS – Case vs. Contact	OUTCOME
1	AAJ	DG	10	M	'Index' case	Child	F, C, D, S	10	Live-Mkt: July 8	No lab specimen	Probable CASE	Died (7/16)
2	JAM	DG	65	F	Grandmother (# 1)	Retired	F, C, S	9	Caretaker of # 1	Negative H5N1	CONTACT	Recovered
3	AWM	DG	70	M	Grandfather (# 1)	Retired	F, S, M	18	Caretaker of # 1	Positive H5N1 - PCR	Confirmed CASE	Died (7/20)
4	NJC	DG	36	F	Mother (# 1)	Home-maker	F, C, S, M, D, URI	19	Caretaker of # 1; Live-Mkt: July 8	Pending	Probable CASE	Hospitalized
5	JRO	DG	27	M	Uncle (# 1)	Farmer	F, C, S	19	Live-Mkt: July 8, NJC	Pending	Probable CASE	Hospitalized
6	TMU	PJ	11	M	Playmate (# 1)	Child	F, C, D, M	12	Live-Mkt: July 8	Positive H5N1 - PCR	Confirmed CASE	Hospitalized
7	AMC	PJ	29	F	Mother of # 6	Mother			Caretaker of # 6		CONTACT	
8	DKS	DG	19	M	Sibling (#1)	Student	F, C	20	Caretake	Pending	Suspect	Hospitalized

									r of # 1		CASE	

F: Fever; C: Cough; D: Diarrhea; S: Shortness of breath; M: Myalgias; URI – upper respiratory syx

DG: Dava Ghar
PJ: Pelu Jaghai

Epidemiologic Curve of Cases



The complete line list for cases and contacts—July 20th, Evening:

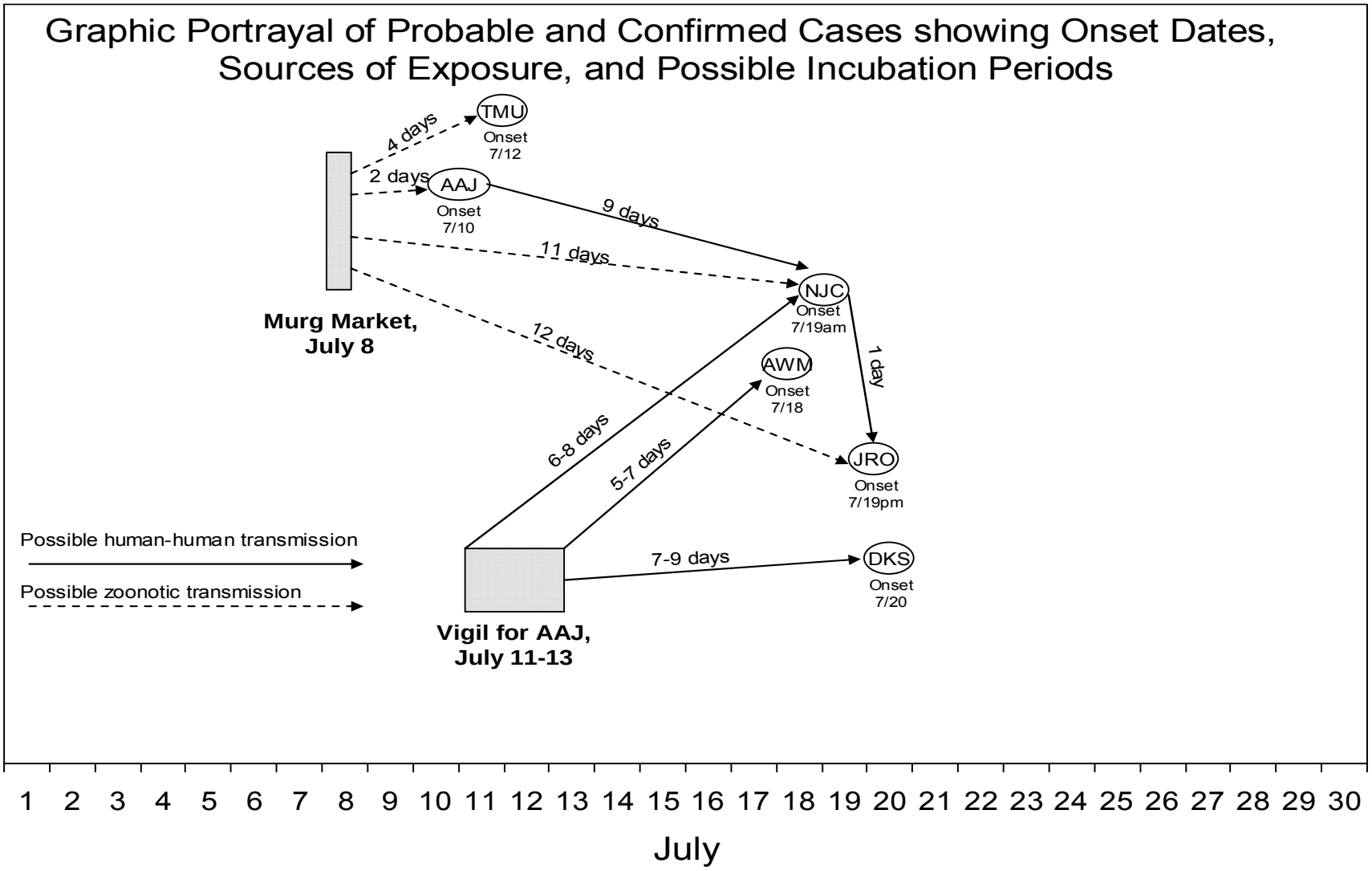
ID #	INITIALS	LOC	AGE	SEX	EPI relation	OCCUP.	SYX	ONSET - July	POSS. EXPOS.	LAB STATUS	STATUS – Case vs. Contact	OUTCOME
1	AAJ	DG	10	M	'index' case	Child	F, C, D, S	10	Live-Mkt: July 8	No lab specimen	Probable CASE	Died (7/16)
2	JAM	DG	65	F	Grandmother (# 1)	Retired	F, C, S	9	Caretaker of # 1	Negative H5N1	CONTACT	Survived
3	AWM	DG	70	M	Grandfather (# 1)	Retired	F, S, M	18	Caretaker of # 1	Positive H5N1 - PCR	Confirmed CASE	Died (7/20)
4	NJC	DG	36	F	Mother (# 1)	Home-maker	F, C, S, M, D, URI	19	Caretaker of # 1; Live-Mkt: July 8	Pending	Probable CASE	Hospitalized
5	JRO	DG	27	M	Uncle (# 1)	Farmer	F, C, S	19	Live-Mkt: July 8, NJC	Pending	Probable CASE	Hospitalized
6	TMU	PJ	11	M	Playmate (# 1)	Child	F, C, D, M	12	Live-Mkt : July 8	Positive H5N1 - PCR	Confirmed CASE	Hospitalized
7	AMC	PJ	29	F	Mother (# 6)	Home-maker	-----	n/a	Mother of # 6	Pending	CONTACT	Survived
8	DKS	DG	19	M	Sibling (# 1)	Student	F, C	20	Sibling of # 1	Pending	Probable CASE	Hospitalized
9	HCW-RT	DG	34	M	Not relative	HCW-RT	-----	n/a	Caretaker of # 1	Pending	PUI	Survived
10	HCW-N	DG	23	F	Not relative	HCW-nurse	-----	n/a	Caretaker of # 3	Pending	CONTACT	Survived

F: Fever; C: Cough; D: Diarrhea; S: Shortness of breath; M: Myalgias; URI – upper respiratory syx
DG: Dava Ghar
PJ: Pelu Jaghai

Final Line List:

ID #	INITIALS	LOC	AGE	SEX	EPI relation	OCCUP.	SYX	ONSET - July	POSS. EXPOS.	LAB STATUS	STATUS – Case vs. Contact	OUTCOME
1	AAJ	DG	10	M	'index' case	Child	F, C, D, S	10	Live-Mkt: July 8	No lab specimen	Probable CASE	Died (7/16)
2	JAM	DG	65	F	Grandmother (# 1)	Retired	F, C, S	9	Caretaker of # 1	Negative H5N1	CONTACT	Survived
3	AWM	DG	70	M	Grandfather (# 1)	Retired	F, S, M	18	Caretaker of # 1	Positive H5N1 - PCR	Confirmed CASE	Died (7/20)
4	NJC	DG	36	F	Mother (# 1)	Home-maker	F, C, S, M, D, URI	19	Caretaker of # 1; Live-Mkt: July 8	Pending	Confirmed CASE	Hospitalized
5	JRO	DG	27	M	Uncle (# 1)	Farmer	F, C, S	19	Live-Mkt: July 8, NJC	Pending	Confirmed CASE	Hospitalized
6	TMU	PJ	11	M	Playmate (# 1)	Child	F, C, D, M	12	Live-Mkt : July 8	Positive H5N1 - PCR	Confirmed CASE	Hospitalized
7	AMC	PJ	29	F	Mother (# 6)	Home-maker	-----	n/a	Mother of # 6	Pending	CONTACT	Survived
8	DKS	DG	19	M	Sibling (# 1)	Student	F, C	20	Sibling of # 1	Pending	Confirmed CASE	Hospitalized
9	HCW-RT	DG	34	M	Not relative	HCW-RT	-----	n/a	Caretaker of # 1	Pending	PUI	Survived
10	HCW-N	DG	23	F	Not relative	HCW-nurse	-----	n/a	Caretaker of # 3	Pending	CONTACT	Survived

F: Fever; C: Cough; D: Diarrhea; S: Shortness of breath; M: Myalgias; URI – upper respiratory syx
DG: Dava Ghar
PJ: Pelu Jaghai


Graphic Portrayal of Probable and Confirmed Cases showing Onset Dates, Sources of Exposure, and Possible Incubation Periods
TMU
Onset
7/12
4 days
2 days
AAJ
Onset
7/10
9 days
11 days
12 days
NJC
Onset
7/19am
1 day
AWM
Onset
7/18
6-8 days
5-7 days
JRO
Onset
7/19pm
Murg Market,
July 8
Possible human-human transmission
Possible zoonotic transmission
7-9 days
DKS
Onset
7/20
Vigil for AAJ,
July 11-13
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
July

Appendix 5 Photos