Recommended viruses for influenza vaccines for use in the 2011 southern hemisphere influenza season

September 2010

The World Health Organization (WHO) convenes technical consultations[1] in February and September each year to recommend viruses for inclusion in influenza vaccines[2] for the northern and southern hemispheres, respectively. This recommendation relates to the influenza vaccines for the forthcoming influenza season in the southern hemisphere (2011). A recommendation will be made in February 2011 relating to vaccines that will be used for the influenza season in the northern hemisphere (2011-2012). For countries in equatorial regions, epidemiological considerations influences which recommendation (February or September) individual national and regional authorities consider more appropriate.

Influenza activity, February – September 2010

Between February and September 2010, influenza was active worldwide and reported in Africa, the Americas, Asia, Europe and Oceania. In many countries activity was low compared with the same period in 2009 and was due to both pandemic influenza A(H1N1) and seasonal A(H3N2) and B viruses. In general, outbreaks due to pandemic A(H1N1) viruses decreased during this period, leading to the declaration of the post pandemic phase by WHO on 10 August 2010[3].

In the southern hemisphere, influenza activity was variable in the different regions. Pandemic A(H1N1) viruses predominated in some countries, such as Australia, Colombia and New Zealand. In general, activity increased from July and had declined in most countries by September.

In the northern hemisphere, influenza activity generally declined from February and was very low in Europe and North America compared to the same period in the previous year. In Asia, widespread outbreaks of pandemic A(H1N1) occurred in India; regional pandemic A(H1N1) activity was reported in Bhutan, Cambodia, China and Malaysia, and localized activity was reported in Nepal.

Seasonal influenza A(H3N2) or B viruses predominated in some African and South American countries, and regional activity of A(H3N2) and B viruses were experienced in China. Cases of confirmed seasonal A(H1N1) viruses were rare.

In tropical areas, many countries experienced outbreaks of varying intensity of pandemic A(H1N1), A(H3N2) and B influenza. The extent and type of influenza activity worldwide are summarized in Table 1.

[1] http://www.who.int/csr/disease/influenza/vaccinerecommendations/en/index.html
[2] Description of the process of influenza vaccine virus selection and development available at: http://www.who.int/gb/pip/pdf_files/Fluvaccvirusselection.pdf
[3] http://www.who.int/mediacentre/news/statements/2010/h1n1_vpc_20100810/en/index.html

Influenza A(H5N1) and A(H9N2)

From 17 February 2010 to 26 September 2010, 27 human cases of A(H5N1), 12 of which were fatal, were confirmed and reported by Cambodia, China, Egypt, Indonesia and Viet Nam, where highly pathogenic avian influenza A(H5N1) is present in poultry. Since December 2003, a total of 505 cases with 300 deaths have been confirmed in 15 countries[4]. To date there has been no evidence of sustained human-to-human transmission.

No human cases of influenza A(H9N2) were reported during the period of February to September 2010.

Antigenic and genetic characteristics of recent isolates

Influenza A(H1N1) viruses

The vast majority of A(H1N1) viruses detected worldwide during this period were pandemic A(H1N1); only a small number of seasonal A(H1N1) viruses were confirmed. Haemagglutination inhibition (HI) tests using postinfection ferret antisera indicated that pandemic A(H1N1) viruses remained antigenically homogeneous and closely related to the vaccine virus A/California/7/2009. Sequence analysis of pandemic A(H1N1) viruses indicated increasing genetic heterogeneity. A small number of viruses showed reductions in reactivity in HI assays with some ferret antisera, raised against a panel of representative viruses including the vaccine virus, but they did not form distinct genetic subclades.

The small number of seasonal A(H1N1) viruses, from China, were generally antigenically and genetically closely related to A/Brisbane/59/2007.

Influenza A(H3N2) viruses

The majority of A(H3N2) viruses collected between February and September 2010 were antigenically closely related to A/Perth/16/2009, the vaccine virus for the northern hemisphere 2010-2011 season. This was assessed with panels of postinfection ferret antisera in HI assays and was supported by virus neutralization assays. Phylogenetically, the haemagglutinin (HA) genes of recent viruses fell into two distinct genetic clades represented by A/Perth/16/2009 and A/Victoria/208/2009, with the majority falling within the A/Victoria/208/2009 clade. Emergence of phylogenetic subgroups within the A/Victoria/208/2009 clade has been observed but viruses within these clades, and emerging subgroups, were antigenically similar to A/Perth/16/2009.

Influenza B viruses

Influenza B viruses of both the B/Victoria/2/87 and the B/Yamagata/16/88 lineages circulated but B/Victoria/2/87 lineage viruses continued to predominate. However, in China, B/Yamagata/16/88 lineage viruses have recently predominated although circulating at low levels.

In HI tests with postinfection ferret antisera, the majority of the B/Victoria/2/87 lineage viruses were antigenically closely related to the vaccine virus B/Brisbane/60/2008, while two antigenically distinguishable groups were detected in Asia and South America, represented by B/Philippines/1617/2010 and B/Bolivia/104/2010, respectively. Most recently isolated B/Yamagata/16/88 lineage viruses were antigenically distinguishable from the previous vaccine virus

[4] http://www.who.int/csr/disease/avian_influenza/country/cases_table_2010_08_31/en/index.html

B/Florida/4/2006 and were more closely related to both B/Bangladesh/3333/2007 and B/Wisconsin/1/2010.

Resistance to influenza antiviral drugs

Neuraminidase inhibitors

The vast majority of pandemic A(H1N1) viruses were sensitive to oseltamivir. The small number of oseltamivir-resistant pandemic A(H1N1) viruses detected were mostly linked to use of this drug for prophylaxis or treatment; in all of these cases, resistance was due to a histidine to tyrosine substitution at amino acid 275 (H275Y) in the neuraminidase. There were no reports of oseltamivir-resistant A(H3N2) or B viruses. No zanamivir-resistant viruses were confirmed. Updates are available at http://www.who.int/csr/disease/influenza/h1n1_table/en/index.html

M2 inhibitors

The vast majority of pandemic A(H1N1) viruses and all tested A(H3N2) viruses were resistant to the M2 inhibitors, amantadine and rimantadine. Resistance to these antiviral drugs remained predominantly associated with a serine to asparagine substitution at amino acid 31 (S31N) of the M2 protein.

Studies with inactivated influenza virus vaccines

The presence of antibodies to the HA of recent virus isolates, in 9 panels of sera from children, adults and elderly adults who had received seasonal trivalent inactivated vaccines, was determined by HI assay. The trivalent vaccines contained the antigens of either A/California/7/2009 (pandemic H1N1)-like or A/Brisbane/59/2007 (seasonal H1N1)-like, either A/Uruguay/716/2007 or A/Perth/16/2009-like viruses (H3N2), and B/Brisbane/60/2008. Only panels from recipients who had received vaccines containing A/California/7/2009-like and A/Perth/16/2009-like were considered for the analysis of recent pandemic A(H1N1) and A(H3N2) virus isolates. For all panels of sera, the antibody responses to the seasonal A(H1N1) vaccine component were not considered due to the extremely low circulation of seasonal A(H1N1) viruses in the world.

Vaccines containing A/California/7/2009 (H1N1)-like antigens stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and recent pandemic A(H1N1) isolates. For a small number of pandemic A(H1N1) viruses, the geometric mean HI titres of human post-vaccination sera were lower than to the vaccine virus (average reductions: adults, 68%; elderly adults, 55%).

Vaccines containing influenza A/Perth/16/2009 (H3N2)-like antigens stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and recent A(H3N2) isolates. Similar results were obtained in microneutralization tests using a subset of sera.

Vaccines containing influenza B/Brisbane/60/2008-like antigens stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and recent B/Victoria/2/87 lineage isolates. Geometric mean HI titres were somewhat lower to recent B/Yamagata/16/88 lineage viruses than to the most recent B/Victoria/2/87 lineage vaccine virus for adults and elderly adults (average reductions: adults, 37%; elderly adults, 27%).

Recommended composition of influenza virus vaccines for use in the 2011 influenza season

Pandemic influenza A(H1N1) viruses emerged in March 2009 and continued to circulate, while seasonal A(H3N2) and B viruses circulated at increasing levels in some countries during the period of February to September 2010. Seasonal influenza A(H1N1) viruses were rarely detected.

Pandemic A(H1N1) viruses were antigenically and genetically similar to A/California/7/2009. Vaccines containing A/California/7/2009 antigens stimulated anti-HA antibodies of similar titres against the vaccine virus and recent pandemic A(H1N1) viruses.

Very few seasonal influenza A(H1N1) viruses were reported. Of these, the majority were antigenically and genetically similar to the previous vaccine virus A/Brisbane/59/2007.

Sporadic to widespread influenza A(H3N2) activity was reported in several countries. The majority of recent viruses were antigenically and genetically similar to the vaccine virus A/Perth/16/2009. Vaccines containing A/Perth/16/2009-like antigens stimulated anti-HA antibodies of similar titres against the vaccine virus and recently circulating A(H3N2) viruses.

Influenza B activity was reported in several countries with regional activity being reported in Argentina, Bolivia, Chile, China, Mongolia, Nicaragua, Republic of Korea, Russian Federation and South Africa. While viruses of both B/Victoria/2/87 and B/Yamagata/16/88 lineages co-circulated, B/Victoria/2/87 lineage viruses predominated. The majority of recent B/Victoria/2/87 lineage viruses were antigenically and genetically closely related to B/Brisbane/60/2008. Most recently isolated B/Yamagata/16/88 lineage viruses were antigenically distinguishable from the previous vaccine virus B/Florida/4/2006 and were more closely related to both B/Bangladesh/3333/2007 and B/Wisconsin/1/2010. Current vaccines containing B/Brisbane/60/2008 antigens stimulated anti-HA antibodies that had similar titres against the vaccine viruses and recent viruses of the B/Victoria/2/87 lineage; however, titres were lower to recent viruses of the B/Yamagata/16/88 lineage.

It is expected that pandemic A(H1N1), A(H3N2) and B viruses will co-circulate in the 2011 southern hemisphere season.

It is recommended that the following viruses be used for influenza vaccines in the 2011 influenza season (southern hemisphere):

– an A/California/7/2009 (H1N1)-like virus;
– an A/Perth/16/2009 (H3N2)-like virus;*
– a B/Brisbane/60/2008-like virus.

* A/Wisconsin/15/2009 and A/Victoria/210/2009 are A/Perth/16/2009-like viruses.

As in previous years, national or regional control authorities approve the composition and formulation of vaccines used in each country. National public health authorities are responsible for making recommendations regarding the use of the vaccine. WHO has published recommendations on the prevention of influenza[5].

Status of development and availability of candidate vaccine viruses and potency testing reagents can be found on WHO [6].

[5] http://www.who.int/docstore/wer/pdf/2002/wer7728.pdf
[6] http://www.who.int/csr/disease/influenza/vaccinerecommendations2/en/index.html

Vaccine viruses (including reassortants) and reagents for use in the laboratory standardization of inactivated vaccine may be obtained from: Immunobiology Section, Office of Laboratory and Scientific Services, Monitoring and Compliance Group, Therapeutic Goods Administration, P.O. Box 100, Woden ACT, 2606 Australia (fax: +61 2 6232 8564, email: influenza.standards@tga.gov.au ; web site: http://www.tga.gov.au); Division of Virology, National Institute for Biological Standards and Control, Health Protection Agency, Blanche Lane, South Mimms, Potters Bar, Hertfordshire, EN6 3QG UK (fax: +44 1707 641050, e-mail: enquiries@nibsc.hpa.org.uk , web site: http://www.nibsc.ac.uk/flu_site/index.html); Division of Product Quality, Center for Biologics Evaluation and Research, Food and Drug Administration, 1401 Rockville Pike, Rockville, MD 20892, United States (fax: +1 301 480 9748); or Center for Influenza Virus Research, National Institute of Infectious Diseases, Gakuen 4-7-1, Musashi-Muayama, Tokyo 208-0011, Japan (fax. +81 42 561 6156).

Requests for reference viruses for antigenic analysis should be addressed to the WHO Collaborating Centre for Reference and Research on Influenza, VIDRL, 10 Wreckyn Street, North Melbourne, Victoria 3051, Australia (fax: +61 3 9342 3939, web site: http://www.influenzacentre.org); the WHO Collaborating Centre for Reference and Research on Influenza, National Institute of Infectious Diseases, Gakuen 4-7-1, Musashi-Murayama, Tokyo 208-0011, Japan (fax: +81 42 561 6149 or +81 42 565 2498, web site: http://www.nih.go.jp/niid/index.html); the WHO Collaborating Center for Surveillance, Epidemiology and Control of Influenza, Centers for Disease Control and Prevention, 1600 Clifton Road, Mail Stop G16, Atlanta, GA 30333, United States (fax: +1 404 639 0080, web site: http://www.cdc.gov/flu/); or the WHO Collaborating Centre for Reference and Research on Influenza, MRC National Institute for Medical Research, The Ridgeway, Mill Hill, London NW7 1AA, UK (fax: +44 208 906 4477, web site: http://www.nimr.mrc.ac.uk/wic/). Updated epidemiological information is available on the WHO web site at http://www.who.int/influenza .

Table 1. Extent and type of influenza activity worldwide, February 2010 - September 2010

Country, area or territory	February	March	April	May	June	July	August	September
Africa								
Algeria	*H3,*H1(pdm)			*H1(pdm)	*B			
Angola	*B	*B	*H3,*B, *H1(pdm)	*B,*H1(pdm)				
Cameroon	*H1(pdm)	*H3,*B, *H1(pdm)	*B,*H1(pdm)	*B	*B,*H1(pdm)	*H3,*B	*B	*B,*H1(pdm)
Central African Republic					*B	*H1(pdm)		
Côte d'Ivoire	*H3,*H1(pdm)	*H3, ***H1(pdm)	**H1(pdm)	H3,*B, *H1(pdm)	*H3, *H1(pdm)			
Democratic Republic of the Congo	*H3	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B	*H3,*B	*B		
Egypt	*H3,*B, *H1(pdm)	*H3,B, ***H1(pdm)	*B,*H1(pdm)	*H1(pdm)				
Ethiopia	*B,*H1(pdm)	*H1(pdm)	*A					
France, Réunion			*A	*A,*H1(pdm)	*H1(pdm)	*B,*H1(pdm)	*A,*B, *H1(pdm)	*A,*B, *H1(pdm)
Ghana	*H3, **H1(pdm)	**H3, **H1(pdm)	*H3,*B, ****H1(pdm)	*H3, **H1(pdm)	*H3, **H1(pdm)	*H3,*H1(pdm)	*H1(pdm)	*H1,*B, *H1(pdm)
Kenya	*B,*H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3	*H3,*B, *H1(pdm)	*H3,*H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B
Madagascar	*H3, **H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3	*H3	*H3,*H1(pdm)	*H3,*B, *H1(pdm)	*H3,*H1(pdm)
Mali						*B		
Mauritania					*B	*B	*H3	
Mauritius						*B,*H1(pdm)	*H3,*B, *H1(pdm)	
Guinea-Bissau						*H3,*B, *H1(pdm)		

Country, area or territory	February	March	April	May	June	July	August	September
Rwanda	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*B,*H1(pdm)	*B	*B	*B	*B
Senegal	*H3, ***H1(pdm)	**H1(pdm)		*B	*B	*B	*H3,*B	
South Africa	*B		*B	*B	*H3,*B, *H1(pdm)	**H3,**B, *H1(pdm)	*H3,**B, **H1(pdm)	*H3,**B, *H1(pdm)
Tunisia	*H3,*B, *H1(pdm)	*H3	*B	-				
Uganda	*B, *H1(pdm)	*H3,*B, *H1(pdm)	H3, *H1(pdm)	*H3	*H3,*B	*H3		
United Republic of Tanzania	*H3,*B, *H1(pdm)	*B,*H1(pdm)	*H3,*H1(pdm)	**H3, *H1(pdm)	**H3, *H1(pdm)	*H3,*B	*B	*H3,*B
Zambia	*B	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)					
America								
Argentina	*B	*H3,*B, *H1(pdm)	**H3,**B, *H1(pdm)	*H3,**B, *H1(pdm)	**B, *H1(pdm)	*H3, **B, *H1(pdm)	*A,**B	
Bahamas	**H1(pdm)	***H1(pdm)						
Barbados	**H1(pdm)	***H1(pdm)	**H1(pdm)				***H3	
Belize			*H1(pdm)					
Bolivia (Plurinational State of)	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*H3, *B, *H1(pdm)	***B	***B, *H1(pdm)	***B, *H1(pdm)	
Brazil	*H3, *B, ***H1(pdm)	*H3, *B, ***H1(pdm)	**H3, **B, **H1(pdm)	*H3, *B,**H1(pdm)	**H3, **B, **H1(pdm)	**H3, **B, **H1(pdm)		
Canada	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*H3,*B, *H1(pdm)	*H3	*H3, *B
Chile	*H1(pdm)	*H1(pdm)	*H3,*H1(pdm)	*H3, **H1(pdm)	**H3,*B, ***H1(pdm)	**H3, **B, ***H1(pdm)	****H3, **B, ***H1(pdm)	***H3, ***B, *H1(pdm)
Colombia	*H1(pdm), *B	*H1(pdm), *B	**H3, *H1(pdm)	*H3, *B, ***H1(pdm)	**H3,*B, ***H1(pdm)	**H3,*B, ***H1(pdm)	*H3, *B, **H1(pdm)	*H1(pdm)
Costa Rica	***H1(pdm)	***H1(pdm)	**H1(pdm)	***H1(pdm)	*H3, ***H1(pdm)	***H3, ***H1(pdm)	**H3, *H1(pdm)	**H3

Country, area or territory	February	March	April	May	June	July	August	September
Cuba	**H1(pdm), *H3	**H1(pdm), *H3	*B, ***H1(pdm)	***H1(pdm)	*H3,*H1(pdm)	*H3,*H1(pdm)	*H3, *B, *H1(pdm)	**H3, *B
Dominican Republic	*B	*H1(pdm), *B	*B	*B	*H3,*B	*H3, *B	* H3,*B	*A
Ecuador	***H1(pdm)	***H1(pdm)	**H1(pdm)					
El Salvador	*B	*B, **H1(pdm)	*B,*H1(pdm)	**B, **H1(pdm)	**H3,***B, *H1(pdm)	***H3, **B,*H1(pdm)	***H3	***H3, **B
France, French Guiana	*B, *H1(pdm)	*B, *H1(pdm)	*B, *H1(pdm)	*'B, *H1(pdm)	**B,*H1pdm	**B,*H1pdm		
France, Guadeloupe	*H1(pdm)							
France, Martinique					*H3			
France, Saint Martin				*H1(pdm)				
Guatemala	*B,*H1(pdm)	*H1(pdm)	*B,**H1(pdm)	*B,*H1(pdm)	**H1(pdm)	*H3,*B, *H1(pdm)	*B	*H3,*B
Guyana	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)					
Honduras	*B, ***H1(pdm)	*B, ***H1(pdm)	*B,**H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*H3, *B	**H3, *B	*H3
Jamaica	**H1(pdm)	*A					*B	*H3
Mexico	***H1(pdm)	*B,**H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*H3,*B, *H1(pdm)	**H3,*B, *H1(pdm)	**H3,*B, *H1(pdm)	**H3,*B
Nicaragua	**H1(pdm)	*H3, ***H1(pdm)	*B, ***H1(pdm)	***H3, *B	***H3, *B	***H3,*B	***B	***B
Panama	*H1(pdm)	*B	*H3, *B	*H3	***H3, *B, *H1(pdm)	***H3, *B	*B	
Paraguay	**H1(pdm)			*H1(pdm)	*B,*H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B	
Peru	*A,**H1(pdm)	*H1(pdm)	*H1(pdm)	*A,*H1(pdm)	*A,*H1(pdm)	*A,*B, *H1(pdm)	*B	
Suriname	*H1(pdm)		*B		*B			
United States of America	*H3,*B, **H1(pdm)	*H3,*B, **H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H1(pdm)
Uruguay			*H3	*H1(pdm)		**B	**B, **H3	

Country, area or territory	February	March	April	May	June	July	August	September
Venezuela (Bolivarian Republic of)	*H1(pdm)	**H1(pdm)	**H1(pdm)	*H1(pdm), **H3	**H3	***H1(pdm)		
Asia								
Afghanistan	*H1(pdm)	*H1(pdm)			*H1(pdm)			
Bangladesh	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*H3,*B, **H1(pdm)	*H3,*B, *H1(pdm)	*B,*H1(pdm)
Bhutan				**H1(pdm)	***H1(pdm)	**H1(pdm)		
Cambodia	*H3,*B, *H1(pdm)	*B,**H1(pdm)	*B		*H3,*B, *H1(pdm)	*H3,*B, ***H1(pdm)	*H3,*B, ***H1(pdm)	*B,***H1(pdm)
China	*H1,*H3, ***B, **H1(pdm)	*H1,*H3, ***B, ***H1(pdm)	*H1,*H3,***B ,*H1(pdm)	*H1,**H3, ***B, *H1(pdm)	*H1,*H3, ***B, *H1(pdm)	*H1,**H3, ***B, *H1(pdm)	*H1,***H3, **B,*H1(pdm)	**H3,**B, *H1(pdm)
China, Hong Kong SAR	*H3,*B, **H1(pdm)	*H3,**B, **H1(pdm)	*H1,*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)
Taiwan, China	*H1(pdm)	*B, *H1(pdm)	*B	*B, *H3				
Democratic People's Republic of Korea		*H1(pdm), *B	*H1(pdm), *B					
Indonesia	*H3,*B	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*B	
India	*B, ****H1(pdm)	*B, ****H1(pdm)	*B, ****H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*H3,*B, ****H1(pdm)	*H3,*B, ****H1(pdm)	*H3,*B, ****H1(pdm)
Iran (Islamic Republic of)	*H3,*B, *H1(pdm)	*B,*H1(pdm)	*B	*B	*H3,*B	*B	*B	*B
Israel		*H1(pdm)						
Japan	*H3,*B	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3, *B, *H1(pdm)
Kazakhstan		*B,*H1(pdm)	*B	*B				
Kyrgyzstan				*B				
Malaysia		**H1(pdm)	***H1(pdm)	***H1(pdm)	**H1(pdm)	*H1(pdm)		
Maldives						*H1(pdm)		
Mongolia	**B,*H1(pdm)	****B, *H1(pdm)	*B					

Country, area or territory	February	March	April	May	June	July	August	September
Nepal						**H1(pdm)	**H1(pdm)	*B, *H1(pdm)
Oman	*H1(pdm)	*B,*H1(pdm)	*H3,*B, *H1(pdm)	*B				
Pakistan	*B	*H1(pdm)	*H3		*H3,*B			*A
Philippines	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)		
Republic of Korea	*H3,*B, **H1(pdm)	**B,*H1(pdm)	*H3,***B, *H1(pdm)	**B,*H1(pdm)	*H3,*B, *H1(pdm)	-		
Singapore		*H3,*B, **H1(pdm)	*H3,*B, **H1(pdm)	*H3,*H1(pdm)	**H3, *H1(pdm)	**H3, *H1(pdm)	**H3, **B, *H1(pdm)	**H3, **B, *H1(pdm)
Sri Lanka	*H3,*H1(pdm)	*H3,*H1(pdm)	*H3,*H1(pdm)	**H3	*H3	*H3,*B		
Tajikistan	*B,*H1(pdm)							
Thailand	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, ***H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B
Viet Nam		*B						
Europe								
Austria	*H1(pdm)			-				
Belarus	*H1(pdm)	*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)				
Belgium	*B,*H1(pdm)	*B,*H1(pdm)	*B	*B				
Bosnia and Herzegovina	*H1(pdm)	*H1(pdm)						
Bulgaria	*B,*H1(pdm)							
Croatia	*H1(pdm)	*H1(pdm)						
Cyprus		*H1(pdm)	*B,*H1(pdm)					
Czech Republic	*H1(pdm)	*H1(pdm)		*B,*H1(pdm)				
Denmark	*H1(pdm)	*H1(pdm)	*H1(pdm)	*B		*B		
Estonia	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*H1(pdm)		*H1(pdm)		
France	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*B	*H3	*B	*B
Georgia	***H1(pdm)	***H1(pdm)	*B,*H1(pdm)	*B				
Germany	*B,*H1(pdm)	*B,*H1(pdm)	*H1(pdm)	*B				

Country, area or territory	February	March	April	May	June	July	August	September
Greece	***H1(pdm)	*H1(pdm)	*H1(pdm)	*H3,*H1(pdm)				
Hungary	*H1(pdm)	*H1(pdm)	*H1(pdm)	*H1(pdm)				
Iceland	*H1(pdm)							
Ireland	*A	*A	*A	*A				
Italy	*B,*H1(pdm)	*B	*B	*B, H3	*H1(pdm)			
Latvia	*B,*H1(pdm)	*B,*H1(pdm)	*B	*B				
Lithuania	*H1(pdm)		*B	*H1(pdm)				
Luxembourg	*H1(pdm)	*H1(pdm)	*B,*H1(pdm)	*H1(pdm)				
Malta	*H1(pdm)	*H1(pdm)	*H1(pdm)	*B				
Montenegro	*H1(pdm)							
Netherlands	*H1(pdm)	*H1(pdm)	*B	*H1(pdm)				*B
Norway	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*B	*B,*H1(pdm)	*B,*H1(pdm)	*H3	
Poland	*B,*H1(pdm)	**H1(pdm)	*B	*B,*H1(pdm)	*H1(pdm)			*H1(pdm)
Portugal	*H1(pdm)	*H1(pdm)	*H1(pdm)					
Republic of Moldova	**H1(pdm)	*H1(pdm)						
Romania	*B,*H1(pdm)	*H1(pdm)	*H1(pdm)	*H3				
Russian Federation	*H3,***B, ***H1(pdm)	*H3,***B, **H1(pdm)	*H3,**B, **H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)			
Serbia	*H1(pdm)	*H1(pdm)	*H1(pdm)					
Slovakia	*H1(pdm)	*H1(pdm)	*H3,*H1(pdm)					
Slovenia	*H1(pdm)		*B	*B	*B			
Spain	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*B	*B		
Sweden	**B,*H1(pdm)	**B,*H1(pdm)	*H3,**B, *H1(pdm)	*B,*H1(pdm)				
Switzerland	*B,*H1(pdm)	*H1(pdm)	*B,*H1(pdm)	*B			*H1(pdm)	
The former Yugoslav Republic of Macedonia	*H1(pdm)							
Turkey	*B,*H1(pdm)	*B						

Country, area or territory	February	March	April	May	June	July	August	September
Ukraine	*B,**H1(pdm)	**B,*H1(pdm)	**B,*H1(pdm)	**B				
United Kingdom of Great Britain and Northern Ireland	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*B,*H1(pdm)	*B		*H1(pdm)	*H3
Oceania								
Australia	*H3,*B, *H1(pdm)	*H3, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, *H1(pdm)	*H3,*B, **H1(pdm)	*H3,*B, ****H1(pdm)	****H1(pdm)
France, New Caledonia						**B,*H1pdm	**B	**B
New Zealand				*H1(pdm)	*H3,*B, *H1(pdm)	*B,***H1(pdm)	*H3,*B, ***H1(pdm)	**H1pdm

Footnote for Table 1:

Data in table 1 were provided by the Global Influenza Surveillance Network and other partners.	
*** = Sporadic activity**	**A = Influenza A (not subtyped)**
**** = Local activity**	**B = Influenza B**
***** = Regional outbreaks**	**H1(pdm) = Pandemic Influenza A(H1N1) 2009**
******= Widespread outbreaks**	**H1 = Influenza A(H1N1)**
	H3 = Influenza A(H3N2)

Annex

Declarations of interest

The WHO recommendation on composition of influenza vaccines for the southern hemisphere 2011 was made through a technical consultation with relevant WHO Collaborating Centers on Influenza (CCs) and Essential Regulatory Laboratories (ERLs).

In accordance with WHO policy, all Directors of WHO CCs and ERLs, in their capacity as representatives of their respective institutions ("Advisers") completed the WHO form for Declaration of Interests for WHO experts before being invited to the consultation. At the start of the consultation, the interests declared by the Advisers were disclosed to all consultation participants.

The Advisers declared the following personal current or recent (past 4 years) financial or other interests relevant to the subject of work:

Institution	Representative	Personal interest
WHO CC Atlanta	Dr Nancy Cox	None
WHO CC London	Dr John McCauley	None
WHO CC Melbourne	Dr Anne Kelso	Shareholdings in a vaccine manufacturer
WHO CC Memphis	Dr Richard Webby	None
WHO CC Tokyo	Dr Masato Tashiro	None
ERL CBER	Dr Zhiping Ye	None
ERL NIBSC	Dr John Wood	None
ERL TGA	Dr Gary Grohmann	None

The interest declared by Dr Kelso was reviewed by the WHO Secretariat and determined not to present a conflict of interest with the objectives of the technical consultation. Furthermore, the interest was disclosed to all consultation participants. In view of the foregoing, Dr Kelso participated in the consultation as an Adviser.