Recommended composition of influenza virus vaccines for use in the 2012 southern hemisphere influenza season

September 2011

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 (2012). A recommendation will be made in February 2012 relating to vaccines that will be used for the influenza season in the northern hemisphere (2012-2013). For countries in equatorial regions, epidemiological considerations influence which recommendation (February or September) individual national and regional authorities consider more appropriate.

Influenza activity, February – September 2011

From February to September 2011, influenza was active worldwide and reported in Africa, the Americas, Asia, Europe and Oceania. In general, activity was low or moderate in comparison to previous years and was due to circulation/co-circulation of influenza A(H1N1)pdm09[3], A(H3N2) and B viruses. No former seasonal A(H1N1) viruses that circulated before the 2009 pandemic were detected during this period.

In the northern hemisphere, influenza activity continued to be high in February, started to decline in March, and remained very low from April onwards. In the southern hemisphere, activity generally increased from May and had declined to baseline levels by September, except in Australia and New Zealand where regional outbreaks were still reported at that time. In tropical areas, activity was generally reported throughout the period with regional outbreaks in some countries, including Bangladesh, Cambodia, Cuba, Dominican Republic and Honduras.

A(H1N1)pdm09 viruses predominated in many parts of the world with widespread and regional outbreaks reported in February and March in a number of countries in Asia, northern Africa, North America and Europe. Influenza A(H1N1)pdm09 activity increased in the southern part of South America and became regional in May-June in Argentina, the Dominican Republic, Uruguay and South Africa, and declined in August-September. From July onwards, outbreaks of A(H1N1)pdm09 were widespread in Australia and regional in Cambodia and New Zealand.

Influenza A(H3N2) activity was reported in many countries during this period. In the northern hemisphere widespread activity continued to be reported in Canada, the United States of America and Japan in February and March, and declined in April. In many Latin American countries, A(H3N2) virus predominated and caused local to regional outbreaks from June to August.

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[1] http://www.who.int/influenza/vaccines/virus/en/

[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] Referring to pandemic A(H1N1)2009 virus

Widespread influenza B activity continued to be reported in the northern hemisphere during February and March in many countries, including Canada and the United States of America, most countries in Europe, and Japan. Influenza B activity increased in Central America and South Africa in June and July, and declined in August. In several countries of Asia and Oceania, influenza B activity was regional from July onwards.

The extent and type of influenza activity worldwide are summarized in Table 1.

Zoonotic influenza infections caused by avian A(H5N1), avian A(H9N2) and swine A(H3N2) viruses

From 16 February 2011 to 19 September 2011, 45 confirmed human cases of A(H5N1), 24 of which were fatal, were reported by Bangladesh, Cambodia, Egypt and Indonesia, countries in which highly pathogenic avian influenza A(H5N1) is present in poultry. Since December 2003, a total of 564 cases with 330 deaths have been confirmed in 15 countries. To date there has been no evidence of sustained human-to-human transmission.

One human case of influenza A(H9N2) was detected in Bangladesh and four human infections caused by swine A(H3N2) viruses were detected in the United States of America during the same period.

Antigenic and genetic characteristics of recent isolates

Influenza A(H1N1) viruses

Between February and August 2011, all influenza A(H1N1) viruses detected worldwide were A(H1N1)pdm09; no former seasonal A(H1N1) viruses were detected. Haemagglutination inhibition (HI) tests using post-infection ferret antisera indicated that A(H1N1)pdm09 viruses remained antigenically homogeneous and closely related to the vaccine virus A/California/7/2009. Sequence analysis of the HA genes of A(H1N1)pdm09 viruses indicated that the viruses fell into at least seven genetic groups which were antigenically indistinguishable. A small proportion of viruses showed reductions in reactivity in HI assays with some ferret antisera against A/California/7/2009-like reference viruses. Many of the viruses showing reduced HI titres had amino acid changes in HA positions 153-157, which is consistent with data obtained since May 2009.

Influenza A(H3N2) viruses

The majority of A(H3N2) viruses collected from February to August 2011 were antigenically closely related to the vaccine virus A/Perth/16/2009. Antigenic characteristics were assessed with panels of post-infection ferret antisera in HI and virus neutralization assays. The HA genes of recent viruses fell into two phylogenetic clades represented by A/Perth/16/2009 and A/Victoria/208/2009, with the vast majority falling within the A/Victoria/208/2009 clade. Phylogenetic subgroups have emerged within both clades, two within the A/Perth/16/2009 clade and at least four within the A/Victoria/208/2009 clade. Viruses within all these subgroups remained 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 co-circulated, with B/Victoria/2/87 lineage viruses continuing to predominate globally. However, in northern China, B/Yamagata/16/88 lineage viruses predominated from February to May 2011 before influenza activity declined.

In HI tests with post-infection ferret antisera, the majority of the B/Victoria/2/87 lineage viruses were antigenically closely related to the vaccine virus B/Brisbane/60/2008. A small proportion of viruses from several countries were antigenically and genetically distinguishable from the vaccine virus. Most recent B/Yamagata/16/88 lineage viruses were antigenically and genetically distinguishable from the previous vaccine virus B/Florida/4/2006 and were more closely related to the reference viruses B/Hubei-Wujiagang/158/2009, B/Wisconsin/1/2010 and B/Sichuan-Anyue/139/2011 which are antigenically similar to each other.

Resistance to influenza antiviral drugs

Neuraminidase inhibitors

The vast majority of A(H1N1)pdm09 viruses were sensitive to oseltamivir. Of the small number of oseltamivir-resistant A(H1N1)pdm09 viruses detected, most were linked to the use of this drug for prophylaxis or treatment. However, in some countries e.g. Japan, United Kingdom of Great Britain and Northern Ireland and the United States of America, and notably in a cluster in Australia, there were increased proportions of resistant cases with no known exposure to oseltamivir. In all instances, resistance was due to a histidine to tyrosine substitution at amino acid 275 (H275Y) in the neuraminidase; the viruses remained sensitive to zanamivir. There were no reports of oseltamivir- or zanamivir-resistant A(H3N2) viruses. The majority of influenza B viruses were sensitive to neuraminidase inhibitors; however a few viruses showed reduced sensitivity.

M2 inhibitors

M gene sequencing of A(H1N1)pdm09 and A(H3N2) viruses revealed that those tested had the serine to asparagine substitution at amino acid 31 (S31N) of the M2 protein which is known to confer resistance to the M2 inhibitors, amantadine and rimantadine.

Studies with inactivated influenza virus vaccines

The presence of antibodies to the HA of recent virus isolates was measured using HI and, in addition for A(H3N2) viruses, virus neutralization assays in two panels of sera from children, five from adults and five from older adults who had received seasonal trivalent inactivated vaccines. The trivalent vaccines contained the antigens of A/California/7/2009 (H1N1)pdm09-like, A/Perth/16/2009 (H3N2)-like and B/Brisbane/60/2008-like viruses.

Vaccines containing A/California/7/2009-like antigens stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and the majority of representative recent A(H1N1)pdm09 viruses.

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

Vaccines containing influenza B/Brisbane/60/2008-like antigens stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and the majority of representative recent B/Victoria/2/87 lineage viruses. Geometric mean HI titres were lower to recent B/Yamagata/16/88 lineage viruses than to the most recent B/Victoria/2/87 lineage vaccine virus, B/Florida/4/2006 (average reductions: adults, 63%; older adults, 60%; children, 83%).

Recommended composition of influenza virus vaccines for use in the 2012 influenza season

A(H1N1)pdm09 viruses co-circulated in varying proportions with A(H3N2) and B viruses during the period of February 2011 to September 2011, with widespread activity in many countries. A(H1N1)pdm09 viruses were antigenically and genetically similar to A/California/7/2009. Vaccines containing A/California/7/2009-like antigens stimulated anti-HA antibodies of similar titres against the vaccine virus and recent A(H1N1)pdm09 viruses.

No viruses of the former seasonal influenza A(H1N1) lineage were reported.

Influenza A(H3N2) viruses were detected in many parts of the world with widespread activity 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 the majority of recently circulating A(H3N2) viruses.

Influenza B activity was reported in many countries. B/Victoria/2/87 lineage viruses predominated in many parts of the world but B/Yamagata/16/88 lineage viruses predominated in northern China. 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 B/Hubei-Wujiagang/158/2009, B/Wisconsin/1/2010 and B/Sichuan-Anyue/139/2011. Current vaccines containing B/Brisbane/60/2008-like antigens stimulated anti-HA antibodies that had similar titres against the vaccine virus 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 A(H1N1)pdm09, A(H3N2) and B viruses will co-circulate in the 2012 southern hemisphere season.

It is recommended that the following viruses be used for influenza vaccines in the 2012 influenza season (southern hemisphere):

– an A/California/7/2009 (H1N1)pdm09-like virus;
– an A/Perth/16/2009 (H3N2)-like virus;
– a B/Brisbane/60/2008-like virus.

Candidate influenza vaccine viruses that are available or under development and reagents for vaccine standardization, including those for this recommendation, can be found on the WHO website[4]. Candidate vaccine viruses for the B/Yamagata/16/88 lineage, A(H5N1) and A(H9N2) viruses are also listed on the same website.

As in previous years, national or regional 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].

Candidate vaccine viruses (including reassortants) and reagents for use in the laboratory standardization of inactivated vaccine may be obtained from: Immunobiology, Office of Laboratory and Scientific Services, Monitoring and Compliance Group, Therapeutic Goods

[4] http://www.who.int/influenza/vaccines/virus/en/
[5] http://www.who.int/docstore/wer/pdf/2002/wer7728.pdf

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/spotlight/influenza_resource_centre/reagents.aspx); or 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). Center for Influenza Virus Research, National Institute of Infectious Diseases, Gakuen 4-7-1, Musashi-Murayama, 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/); 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/) or the WHO Collaborating Center for Reference and Research on Influenza, National Institute for Viral Disease Control and Prevention, China CDC, 155 Changbai Road, Changping District, 102206, Beijing, P.R. China. (tel: +86 10 5890 0851, fax: +86 10 5890 0851, email: whocc-china@cnic.org.cn, website: http://www.cnic.org.cn/eng/)

Influenza surveillance information is updated on the WHO web site[6].

[6] http://www.who.int/influenza

Table 1. Extent and type of influenza activity worldwide, February 2011 – September 2011

Country, area or territory	February	March	April	May	June	July	August	September
Africa								
Algeria	***H1(pdm09), *H3,***B	***H1(pdm09)	*H1(pdm09), *H3,*B					
Angola		*H3	*H3	*H3				
Burkina Faso							*H3,*B	*H3,*B
Cameroon	*H1(pdm09), *H3,*B	*H1(pdm09)	*H1(pdm09)	*B	*H1(pdm09), *B	*H1(pdm09), *B	**H1(pdm09), **B	**H1(pdm09), **B
Côte d'Ivoire	*H1(pdm09)				*H1(pdm09)	*H1(pdm09), *H3		
Democratic Republic of the Congo	*H1(pdm09), *H3,*B	*H1(pdm09), *H3	*H3	*H3	*H1(pdm09)	*H3		*H1(pdm09), *B
Egypt	*H1(pdm09)							*H3
Ethiopia	*H1(pdm09)	*H3,*B	*B					
Ghana	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B
Kenya	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H3,*B
Madagascar	**H3,**B	*H1(pdm09), *H3,*B	**H3,**B	**H1(pdm09), **H3,**B	**H1(pdm09), **H3,**B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H3
Mali	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *H3,*B	*B				
Mauritius		*H1(pdm09), *B			*B	*H3,*B	*B	*H3,*B
Morocco	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B						
Nigeria	*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H3,*B	*H1(pdm09), *B	*H1(pdm09), *B		

Country, area or territory	February	March	April	May	June	July	August	September
Rwanda	*H1(pdm09)	*H1(pdm09), *H3,*B	*H3	*H3	*H3,*B	*H1(pdm09), *H3	*H3	
Senegal	*H1(pdm09), *H3	*H1(pdm09), *H3,*B	*H1(pdm09)	*H1(pdm09)	*H1(pdm09)	*H1(pdm09), *H3	*H3,*B	
South Africa	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	****H1(pdm09), *H3,*B	****H1(pdm09), ***H3,***B	***H1(pdm09), ***H3,**B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B
Togo	*H1(pdm09)	*H1(pdm09), *B	*H1(pdm09), *B	*H3,*B	*H1(pdm09), *B	*H1(pdm09), *H3,*B	**H1(pdm09), **H3,**B	
Tunisia	****H1(pdm09), **B	****H1(pdm09), **B	**H1(pdm09), **B			0		
Uganda	*B		*H1(pdm09)		*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B
United Republic of Tanzania	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3	*H1(pdm09), *H3	*H1(pdm09), *H3
Zambia			*H1(pdm09), *H3,*B			*B	*B	*B
Americas								
Argentina	*H3	*H1(pdm09), *H3,*B	*H3	**H1(pdm09), **H3,*B	***H1(pdm09), ***H3,***B	***H1(pdm09), ***H3,**B	***H1(pdm09), ***H3,**B	**H1(pdm09)
Barbados	*H3	*B						
Bolivia (Plurinational State of)	*H1(pdm09), *H3	*H3	*H3	***H3	*H1(pdm09), ***H3	**H1(pdm09), **H3,**B	**H1(pdm09), **H3,**B	*H1(pdm09), *H3
Brazil	*H3,*B	*H3,*B	*H3	*H3,*B	*H1(pdm09), **H3,**B	*H1(pdm09), **H3,**B	*H1(pdm09), *H3,*B	*B
Canada	***H1(pdm09), ****H3,****B	***H1(pdm09), ****H3,****B	**H1(pdm09), **H3,****B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,**B	*H3,*B	*H3	
Chile					*H1(pdm09), *H3	**H1(pdm09), **H3,**B	**H1(pdm09), **H3,**B	**H1(pdm09), **H3,**B
Colombia	*B	*H1(pdm09),*B	*H1(pdm09),*H3	*H1(pdm09),**H3	**H1(pdm09),**H3	**H1(pdm09)	**H1(pdm09)	

Country, area or territory	February	March	April	May	June	July	August	September
Costa Rica	*H1(pdm09), *H3,*B	*H3,B	*H1(pdm09)	*H1(pdm09)		*H1(pdm09)	*H3	
Cuba	*H1(pdm09), *H3,*B	*H1(pdm09), *H3	*H3	*H3	*H3,*B	***H3	***H3	***H3
Dominican Republic	*B	*H1(pdm09), *B	*H1(pdm09)	**H1(pdm09)	***H1(pdm09), ***B	***H1(pdm09), **B	*H1(pdm09), **B	*H1(pdm09), *B
Ecuador	*H1(pdm09), *H3	*A						
El Salvador		**H1(pdm09), *B	*B	***B	***B	*H3,*B	**H3	
France, French Guiana	*B	*H1(pdm09), *H3					*H3	
France, Guadeloupe	*B	*H1(pdm09), *B						
France, Martinique	*H1(pdm09), *H3							
Guatemala	*H1(pdm09), *H3	*H3	*H3	*H3	*H3	*H3	*H3	
Honduras	*B	*H1(pdm09), *H3,*B	*B	*H1(pdm09), *B	*B	**H1(pdm09), ***H3,**B	**H1(pdm09), ***H3,**B	*H1(pdm09), **H3,**B
Jamaica	*H3,*B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09)	*B			
Mexico	**H1(pdm09), **H3,**B	**H1(pdm09), *H3,**B	**H1(pdm09), **H3,**B	*B	*H1(pdm09), *H3,*B	*H3,*B	*H3	
Nicaragua	*B	*B						
Panama			*H1(pdm09)		*H1(pdm09)	*H1(pdm09)	*H1(pdm09)	*H1(pdm09)
Paraguay	**H3	*H3					*H3	
Peru	*H3	*H1(pdm09), *H3		*H1(pdm09), *H3	*H1(pdm09), **H3,*B	*H3	**H1(pdm09), ***H3	**H3
Saint Kitts and Nevis						*B		
Suriname	**H1(pdm09)	*H3						

Country, area or territory	February	March	April	May	June	July	August	September
Trindad and Tobago	*H1(pdm09)							
United Kingdom of Great Britain and Northern Ireland, Cayman Islands	*H1(pdm09), **H3		*H1(pdm09), *H3					
United Kingdom of Great Britain and Northern Ireland, Turks and Caicos Islands	*H1(pdm09), *H3,*B							
United States of America	****H1(pdm09), ****H3,****B	****H1(pdm09), ****H3,****B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3
Uruguay				*H1(pdm09)	***H1(pdm09), *H3	***H1(pdm09), *H3,*B	*H1(pdm09), *H3	
Venezuela (Bolivarian Republic of)	*H1(pdm09), *H3	*H1(pdm09), *H3						
Asia								
Afghanistan	*H1(pdm09)			*H1(pdm09)				
Armenia	**H1(pdm09), **B	*H1(pdm09)						
Bangladesh	*H1(pdm09)	*H1(pdm09), *B	*H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	**H1(pdm09), ***H3,***B	**H1(pdm09), ***H3,**B	
Cambodia	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	**H1(pdm09), **B	***H1(pdm09), ***B	***H1(pdm09), ***B	***H1(pdm09), *H3,***B
China	***H1(pdm09), ***B	**H1(pdm09), *H3,**B	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,*B

Country, area or territory	February	March	April	May	June	July	August	September
China, Hong Kong SAR	**H1(pdm09), **H3,**B	**H1(pdm09), *H3,**B	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,*B
Taiwan, China	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,**B	*B	*H3,*B				
Georgia	****H1(pdm09), *H3,****B	***H1(pdm09), ***B	**H1(pdm09), **B					
India	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,**B	*H1(pdm09), *H3,*B
Indonesia	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H3,*B	*H3	*H3,*B	*B	
Iran (Islamic Republic of)	**H1(pdm09), **B	**H1(pdm09), *H3,**B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H3,*B	*H3,*B	*H3,*B	*B
Israel	***H1(pdm09), *H3,***B	*H1(pdm09), *H3,*B						
Japan	****H1(pdm09), ****H3,****B	****H1(pdm09), ****H3,****B	*H1(pdm09), **H3,***B	*H1(pdm09), *H3,*B	**H3,**B	*H3,*B	*B	
Kazakhstan	*H1(pdm09), *H3,*B	*H1(pdm09)						
Kyrgyzstan	*H1(pdm09), *H3,*B	*H3,*B						
Lao People's Democratic Republic	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09)	*B	*H3,*B	*H3,*B	*H3
Mongolia	*H1(pdm09), *H3	*H1(pdm09), *B						
Nepal					*H1(pdm09), *B			
Oman	*H1(pdm09), *H3,**B	*H1(pdm09), *B	*H1(pdm09), *H3,*B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09)		
Pakistan	***H1(pdm09), *B	*H1(pdm09), *B		*B		*H1(pdm09)		
Philippines	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *B	*H1(pdm09)	*H1(pdm09), *B	*H1(pdm09), *H3,*B		

Country, area or territory	February	March	April	May	June	July	August	September
Republic of Korea	*H1(pdm09), *H3	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H3,*B	*H3	*H3,*B	*B	*H3
Singapore	**H1(pdm09), *H3,*B	**H1(pdm09), *H3,*B	**H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), **H3,*B	*H1(pdm09), **H3,*B	*H1(pdm09), **H3,*B	*H1(pdm09), **H3,*B
Sri Lanka	*H1(pdm09), **B	*H1(pdm09), **B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B		*B
Thailand	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H3,*B	*H3,*B
Viet Nam	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B
Europe								
Albania	**H1(pdm09), *H3,**B	*H1(pdm09), *B	*H1(pdm09), *B	*H3		*H1(pdm09), *B		
Austria	****H1(pdm09), **H3,****B	***H1(pdm09), *H3,***B	*H1(pdm09), *B	*B				
Belarus	**H1(pdm09), **B	**H1(pdm09), *B	*H1(pdm09), *B					
Belgium	****H1(pdm09), ****B	*B	*B					
Bosnia and Herzegovina	****H1(pdm09)	**H1(pdm09)						
Bulgaria	***H1(pdm09), ***B	**H1(pdm09), **B	*H1(pdm09), *B					
Croatia	****H1(pdm09)	***H1(pdm09), ***B	**B	*B				
Czech Republic	****H1(pdm09), *H3,****B	**H1(pdm09), **B	*H1(pdm09), *B					
Denmark	****H1(pdm09), *H3,****B	**H1(pdm09), **B	*H1(pdm09), *B	*H3,*B	*H1(pdm09)	*H3		
Estonia	****H1(pdm09), ****B	**H1(pdm09), **B	*H1(pdm09), *B	*H1(pdm09), *B				
Finland	****H1(pdm09), ****B	***H1(pdm09), ***B	**B					

Country, area or territory	February	March	April	May	June	July	August	September
France	****H1(pdm09), *H3,****B	**H1(pdm09), *H3,***B	*H1(pdm09), *H3,*B	*H3,*B	*H3			
Germany	***H1(pdm09), *H3,***B	***H1(pdm09), *H3,***B	**H1(pdm09), **B				*H1(pdm09)	
Greece	****H1(pdm09), *H3,**B	***H1(pdm09), *H3,**B	*H1(pdm09), *B	*B				
Hungary	****H1(pdm09), *B	**H1(pdm09), *B	*B					
Iceland	**H1(pdm09), *H3,****B	**H1(pdm09), **B	*B	*B				
Ireland	****H1(pdm09), *H3,****B	*H1(pdm09), *H3,*B	*H3,*B	*B			*H3	
Italy	***H1(pdm09), *H3,***B	**H1(pdm09), *H3,**B	*H1(pdm09), *H3,*B					
Latvia	****H1(pdm09), *H3,****B	**H1(pdm09), ***B	*H3,*B	*B				
Lithuania	****H1(pdm09), ****B	***H1(pdm09), ***B						
Luxembourg	****H1(pdm09), ****B	**H1(pdm09), **B						
Malta	**H1(pdm09)	**B	*B					
Netherlands	****H1(pdm09), *H3,****B	***H1(pdm09), ***B	*H1(pdm09), *B					*H3
Norway	***H1(pdm09), *H3,***B	**H1(pdm09), *H3,**B	*H1(pdm09), *H3,*B	*H3,*B	*H3	*H3	*H3,*B	
Poland	***H1(pdm09), ***B	**H1(pdm09), **B	*H1(pdm09), *B	*B				*B
Portugal	****H1(pdm09), ***B	*H1(pdm09)						
Republic of Moldova	**H1(pdm09), *H3,**B							
Romania	****H1(pdm09), ****B	**H1(pdm09), *H3,**B	*H1(pdm09), *B	*H1(pdm09), *B				

Country, area or territory	February	March	April	May	June	July	August	September
Russian Federation	****H1(pdm09), ***H3,****B	***H1(pdm09), **H3,***B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *B			
Serbia	***H1(pdm09), *H3,**B	**H1(pdm09), *H3,**B	*H3,*B					
Slovakia	***H1(pdm09), **B	**H1(pdm09), **B	*H1(pdm09)				*H1(pdm09), *B	
Slovenia	****H1(pdm09), ****B	**H1(pdm09), **B	*H1(pdm09), *B					
Spain	***H1(pdm09), *H3,***B	**H1(pdm09), *H3,**B	*H1(pdm09), *H3,*B	*H3,*B	*B		*B	
Sweden	****H1(pdm09), *H3,****B	***H1(pdm09), *H3,***B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H3,*B	*H3,*B	*B	
Switzerland	****H1(pdm09), *H3,****B	***H1(pdm09), ***B	*H1(pdm09), *B	*B				
Turkey	***H1(pdm09), **H3,***B	**H1(pdm09), *H3,**B	*H1(pdm09), *H3,*B	*B				
Ukraine	**H1(pdm09), *H3,**B	**H1(pdm09), *H3,**B	*H1(pdm09), *B					
United Kingdom of Great Britain and Northern Ireland	**H1(pdm09), *H3,**B	*H1(pdm09), *H3,*B	*H1(pdm09), *B	*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	
Oceania								
Australia	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3,*B	*H1(pdm09), *H3	**H1(pdm09), *H3,**B	****H1(pdm09), **H3,****B	***H1(pdm09), ***H3,***B	***H1(pdm09), ***H3,***B
Fiji		*H1(pdm09), *B						
France, New Caledonia	*H3	*H3		*H3	*H1(pdm09)		*H1(pdm09)	**H1(pdm09)
Micronesia (Federated States of)				*H1(pdm09)				

Country, area or territory	February	March	April	May	June	July	August	September
New Zealand				*H1(pdm09), *B	*H1(pdm09), *H3,**B	***H1(pdm09), ***H3,***B	***H1(pdm09), ***H3,***B	***H1(pdm09), ***H3,***B
United States of America, American Samoa	*H1(pdm09)	*H1(pdm09)						
United States of America, Guam	*H1(pdm09)	*H3,*B						

Data in table 1 were provided by the Global Influenza Surveillance and Response System and other partners.

* = Sporadic activity	A = Influenza A (not subtyped)
** = Local activity	B = Influenza B
*** = Regional outbreaks	H1(pdm09) = Influenza A(H1N1)pdm09
****= Widespread outbreaks	H1 = Former seasonal influenza A(H1N1)
	H3 = Influenza A(H3N2)

Annex

Declarations of interest

The WHO recommendation on composition of influenza vaccines for the southern hemisphere 2012 was made through a technical consultation with relevant WHO Collaborating Centres on Influenza (CCs) and WHO 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 3 years) financial or other interests relevant to the subject of work:

Institution	Representative	Personal interest
WHO CC Atlanta	Dr Nancy Cox	None
WHO CC Beijing	Dr Yuelong Shu	None
WHO CC London	Dr John McCauley	None
WHO CC Melbourne	Dr Anne Kelso	Shareholdings (with a value above USD 10,000) in the company CSL
WHO CC Memphis	Dr Richard Webby	None
WHO CC Tokyo	Dr Masato Tashiro	None
WHO ERL CBER	Dr Zhiping Ye	None
WHO ERL NIBSC	Dr Othmar Engelhardt	Travel cost (flights and hotel) to a conference related to influenza vaccine development under GAP* program as invited speaker by the vaccine manufacturer BIRMEX
WHO ERL NIID	Dr Masato Tashiro	None

Based on the WHO assessment of the interest declared by Dr Kelso, it was concluded that Dr Kelso should continue to serve as an Adviser, considering that the interest was disclosed at the beginner of the consultation, and that, in accordance with the conditions required of all WHO CC Melbourne staff, Dr Kelso has agreed to refrain from acquiring additional shares in influenza vaccine manufactures.

The interest declared by Dr Engelhardt was reviewed by WHO and determined not to present a conflict of interest with the objectives of the technical consultation.

In view of the foregoing, Dr Kelso and Dr Engelhardt participated in the consultation as Advisers.

* http://www.who.int/influenza_vaccines_plan/objectives/en/