Recommended composition of influenza virus vaccines for use in the 2013 southern hemisphere influenza season

September 2012

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 (2013). A recommendation will be made in February 2013 relating to vaccines that will be used for the influenza season in the northern hemisphere (2013-2014). For countries in equatorial regions, epidemiological considerations influence which recommendation (February or September) individual national and regional authorities consider appropriate.

Influenza activity, February – September 2012

Between February and September 2012, influenza was active worldwide and reported in Africa, the Americas, Asia, Europe and Oceania. Activity in individual countries was low or moderate to high and was due to circulation of influenza A(H1N1)pdm09, A(H3N2) and B viruses.

In the northern hemisphere, influenza activity increased in February and March, started to decline in April, and remained low since May. For the southern hemisphere in general, activity increased from May and had declined by September. In tropical areas, activity was variable throughout the period.

Generally, **influenza A(H1N1)pdm09** activity was low, notably so in Africa, Europe and Oceania. In other regions it was reported as the predominant or co-dominant subtype (with A(H3N2) viruses) in some countries. In Asia, regional outbreaks were reported in India in March and April, and China Hong Kong Special Administrative Region in May and June. In the Americas, northern hemisphere countries, areas and territories reporting widespread and/or regional outbreaks in the timeframe February to April were Colombia, French Guiana, Guatemala and the United States of America, while southern hemisphere countries Argentina, Bolivia (Plurinational State of), Brazil, El Salvador and Paraguay reported such outbreaks from June to August.

Influenza A(H3N2) activity was reported in most countries during this period. In the northern hemisphere widespread and/or regional outbreaks were reported in Europe, parts of Asia, northern Africa, Canada and the United States of America in February-April, extending into May in Japan and the United States of America. Regional outbreaks in May and June were reported by China Hong Kong Special Administrative Region and widespread or regional outbreaks were reported by the Dominican Republic for May to July. In many parts of the southern hemisphere, A(H3N2) viruses caused widespread and regional outbreaks between

[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

May and August, notably in Chile (June-August) and Brazil (July). In Australia and New Zealand widespread outbreaks were reported in July to August and August respectively. South Africa reported regional outbreaks in August.

Widespread and regional **influenza B** activity was reported in many countries, areas and territories in the northern hemisphere over the period February to July including the Americas (Canada, Cuba, El Salvador, Panama and the United States of America), Asia (China, Israel, Japan and the Republic of Korea), and Europe (Austria, Belgium, Croatia, Estonia, Hungary and the Russian Federation). For the southern hemisphere, widespread and regional influenza B activity was reported in Bolivia (Plurinational State of), Ecuador, Paraguay and Peru between June and August. Within Oceania, Australia reported regional outbreaks in August. In South Africa, influenza B activity increased from July to become regional in August.

The extents and types of influenza activity worldwide are summarized in Table 1.

Zoonotic influenza infections caused by A(H5N1), A(H3N2) variant (v)[3], A(H1N1)v, A(H1N2)v and A(H7N3) viruses

From 23 February to 18 September 2012, 17 confirmed human cases of A(H5N1), 10 of which were fatal, were reported by Bangladesh, Cambodia, China Hong Kong Special Administrative Region, Egypt, Indonesia, and Viet Nam where highly pathogenic avian influenza A(H5N1) is present in poultry and/or wild birds. Since December 2003, a total of 608 cases with 359 deaths have been confirmed in 15 countries[4]. To date there has been no evidence of sustained human-to-human transmission.

Human cases of influenza A(v) viruses have been detected since February 2012 in the United States of America[5] where a total of 305 infections caused by A(H3N2)v viruses have been reported. One of these infections was fatal. A single case of A(H1N1)v and three cases of A(H1N2)v have also been detected.

Two human cases of conjunctivitis due to A(H7N3) have been reported by Mexico. Both cases had exposure to A(H7N3) infected poultry.[6]

No human cases of influenza A(H9N2) were detected during the period 23 February to 18 September 2012.

Antigenic and genetic characteristics of recent seasonal influenza viruses

Influenza A(H1N1)pdm09 viruses

Between February and August 2012, all seasonal influenza A(H1N1) viruses detected worldwide were A(H1N1)pdm09 viruses. Haemagglutination inhibition (HI) tests using post-infection ferret antisera indicated that the vast majority of 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 four genetic groups which were antigenically indistinguishable. A small

[3] http://www.who.int/influenza/gisrs_laboratory/terminology_ah3n2v/en/
[4] http://www.who.int/entity/influenza/human_animal_interface/EN_GIP_20120810CumulativeNumberH5N1cases.pdf
[5] http://www.cdc.gov/mmwr/PDF/wk/mm6132.pdf
[6] http://www.cdc.gov/mmwr/pdf/wk/mm6136.pdf

proportion of viruses showed reductions in reactivity in HI assays with ferret antisera against A/California/7/2009-like reference viruses. Most of these viruses with reduced HI titres had amino acid changes in HA positions 153-157, which is consistent with results obtained since May 2009.

Influenza A(H3N2) viruses

Antigenic characteristics of A(H3N2) viruses collected from February to August 2012 were assessed with panels of post-infection ferret antisera in HI and virus neutralization assays. The vast majority of recently circulating viruses were antigenically closely related to A/Victoria/361/2011, the vaccine virus for the 2012-2013 northern hemisphere season. The HA genes of most recent viruses fell into three phylogenetic subgroups (3A, 3B and 3C) with some viruses in other phylogenetic groups, all of which were antigenically indistinguishable. An increased proportion of the most recent viruses were found in subgroup 3C.

Influenza B viruses

Influenza B viruses of the B/Victoria/2/87 and the B/Yamagata/16/88 lineages have co-circulated. The picture remains mixed with substantial variation from country to country as to which lineage was predominant. Viruses of the B/Victoria/2/87 lineage were prevalent in some countries, while the B/Yamagata/16/88 lineage viruses have increased in some and predominated in others.

In HI tests with post-infection ferret antisera, the majority of viruses of the B/Victoria/2/87 lineage were antigenically closely related to the current vaccine virus B/Brisbane/60/2008 used for the southern hemisphere 2012 season. The HA gene sequences of the viruses predominantly belonged to the B/Brisbane/60/2008 genetic clade.

The majority of viruses of the B/Yamagata/16/88 lineage were antigenically closely related to the vaccine virus B/Wisconsin/1/2010, recommended for the northern hemisphere 2012-2013 season. The HA genes of most viruses were in genetic clade 2 or 3, with the proportion of viruses in clade 2 increasing in recent months. Post-infection ferret antiserum raised against B/Wisconsin/1/2010 reacted with most recent clade 2 and 3 viruses.

Resistance to influenza antiviral drugs

The WHO Collaborating Centres have assessed the antiviral drug sensitivity of influenza type A and type B viruses over the period.

Neuraminidase inhibitors

The majority of A(H1N1)pdm09 viruses were sensitive to oseltamivir. Of the small number (16/1124: 1.4%) of oseltamivir resistant A(H1N1)pdm09 viruses detected, the majority (14) were not associated with use of this drug for prophylaxis or treatment. In all instances, resistance was due to a histidine to tyrosine substitution at amino acid 275 (H275Y) in the neuraminidase (NA); all viruses remained sensitive to zanamivir. Of 2822 A(H3N2) viruses tested one showed highly-reduced inhibition against oseltamivir and reduced inhibition against zanamivir due to NA R292K substitution. Of 1855 influenza B viruses tested, a single virus showed reduced sensitivity to oseltamivir and peramivir due to NA H273Y substitution, but all were sensitive to zanamivir.

M2 inhibitors

M gene sequencing of A(H1N1)pdm09 and A(H3N2) viruses revealed that all 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.

Human serology studies with inactivated influenza virus vaccines

HI assays were used to measure the presence of antibodies to recent virus isolates in one panel of sera from children, four from adults and four from older adults who had received seasonal trivalent inactivated vaccines. In addition, for A(H3N2) viruses, virus neutralization assays were used for a subset of sera. The trivalent vaccines contained the antigens of either the vaccine for the southern hemisphere 2012 (A/California/7/2009 (H1N1)pdm09, A/Perth/16/2009 (H3N2)-like and B/Brisbane/60/2008 viruses) or the northern hemisphere 2012-2013 (A/California/7/2009 (H1N1)pdm09, A/Victoria/361/2011 (H3N2) and B/Wisconsin/1/2010-like viruses) seasons.

Vaccines containing A/California/7/2009 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 A/Victoria/361/2011 antigens stimulated antibodies of similar geometric mean HI titres to the vaccine virus, when measured against cell-propagated A/Victoria/361/2011, and the majority of representative recent A(H3N2) viruses.

Vaccines containing influenza B/Brisbane/60/2008 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. Vaccines containing influenza B/Wisconsin/1/2010-like antigens stimulated anti-HA antibodies of similar geometric mean HI titres to the vaccine virus and the majority of representative recent B/Yamagata/16/88 lineage viruses.

Recommended composition of influenza virus vaccines for use in the 2013 influenza season

A(H1N1)pdm09 viruses co-circulated in varying proportions with A(H3N2) and B viruses during the period of February to September 2012, with widespread activity in many countries. The majority of 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.

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 A/Victoria/361/2011, the virus recommended for the northern hemisphere 2012-2013 season. Vaccines containing A/Victoria/361/2011 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. The proportion of B/Yamagata/16/88 lineage viruses increased in many parts of the world but B/Victoria/2/87 lineage viruses

predominated in some countries. 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 closely related to B/Wisconsin/1/2010-like viruses. 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. Vaccines containing B/Wisconsin/1/2010–like antigens stimulated anti-HA antibodies that had similar titres against the vaccine viruses and recent viruses of the B/ Yamagata/16/88 lineage but titres were lower to recent viruses of the B/Victoria/2/87 lineage. In light of the increase in the proportion of B/Yamagata/16/88 lineage viruses relative to B/Victoria/2/87 lineage viruses over the last 12 months a B/Yamagata/16/88 lineage virus is recommended for the 2013 southern hemisphere season trivalent vaccine.

It is expected that A(H1N1)pdm09, A(H3N2) and B viruses will co-circulate in the 2013 southern hemisphere season.

It is recommended that trivalent vaccines for use in the 2013 influenza season (southern hemisphere winter) contain the following:

– an A/California/7/2009 (H1N1)pdm09-like virus[a];
– an A/Victoria/361/2011 (H3N2)-like virus[b];
– a B/Wisconsin/1/2010-like virus[c].

It is recommended that quadrivalent vaccines containing two influenza B viruses contain the above three viruses and a B/Brisbane/60/2008-like virus[d].

[a] A/Christchurch/16/2010 is an A/California/7/2009-like virus;
[b] A/Ohio/2/2012, A/Maryland/2/2012, A/South Australia/30/2012, A/Brisbane/1/2012 and A/Brisbane/6/2012 are A/Victoria/361/2011-like viruses;
[c] B/Hubei-Wujiagang/158/2009 and B/Texas/6/2011 are B/Wisconsin/1/2010-like viruses;
[d] B/Brisbane/33/2008 is a B/Brisbane/60/2008-like virus

Lists of 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[7]. Candidate vaccine viruses for A(H5N1), A(H9N2), A(H7) and A(H3N2)v 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[8].

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 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

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

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 Biological Standards and Quality Control, 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, email: flu-vaccine@nih.go.jp).

Requests for reference viruses 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 email: whoflu@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 Centre 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/ email: influenzavirussurveillance@cdc.gov); 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/, email: whocc@nimr.mrc.ac.uk) or the WHO Collaborating Centre 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[9].

[9] http://www.who.int/influenza
Virological web update: http://www.who.int/influenza/gisrs_laboratory/updates/summaryreport/en/
Epidemiological web update: http://www.who.int/influenza/surveillance_monitoring/updates/latest_update_GIP_surveillance/en/

Table 1. Extent and type of influenza activity worldwide, February – August 2012

Geographical Region / Country, area or territory	February 2012	March 2012	April 2012	May 2012	June 2012	July 2012	August 2012
Africa							
Algeria	****H3	*H1(pdm09), **H3, *B	**H3, *B				
Burkina Faso		*B	*H1(pdm09)	*H3	*H1(pdm09)		*H3
Cameroon	*H3, *B	*B	*H3	*B	*H3, *B		*H3
Côte d'Ivoire	*H1(pdm09), *H3	*H1(pdm09), *H3	*H3, *B	*H1(pdm09), *H3	*H1(pdm09), *H3	*H1(pdm09), *H3	**H1(pdm09), *H3
Democratic Republic of the Congo	**H3	**H3			*H1(pdm09)	*H1(pdm09)	*H1(pdm09)
Egypt	*H3	*H3	*H3		*H3	*H3	
Ethiopia	*H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3	*H1(pdm09)	*H1(pdm09)
Ghana	*H3, *B	*H3	*H3	*H3	*H3, *B	*H1(pdm09), **H3, **B	*H1(pdm09), *H3, **B
Kenya	*H1(pdm09), *H3	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H3, *B	*H3, *B	*H3, *B	*H3, *B
Madagascar	*H1(pdm09), *B	*H1(pdm09), *H3, *B	*H1(pdm09), **H3, **B	*H3, *B	**H3, *B	**H3, *B	*H3, *B
Mali	*H1(pdm09), *H3, *B		*H1(pdm09), *B				
Mauritius	*H3	*H3	*H3	*H3	*H3	*H3, *B	*H1(pdm09), *H3, **B
Morocco	*H1(pdm09), *H3, *B	*H3, *B	*B				
Niger	*H3, *B	*H3		*A	*H3		
Nigeria	*B						

Geographical Region / Country, area or territory	February 2012	March 2012	April 2012	May 2012	June 2012	July 2012	August 2012
Rwanda	*H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09)	*H1(pdm09)	**H1(pdm09), *H3	*H1(pdm09), *H3	*H1(pdm09), *H3, *B
Senegal	*H3	*H1(pdm09), *B	*B	*B			
South Africa	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H3, *B	*H3, *B	*H3, *B	**H3, **B	***H3, ***B
Togo	*H1(pdm09), *B	*H3, *B	*H3, *B	*H3, *B	*H3, *B	*H1(pdm09), *H3, *B	*H3, *B
Tunisia	***H3	**H3, **B	*H3, *B	*B			
Uganda	*B	*H3, *B	*H1(pdm09), *H3, *B		*H3, *B		*H3
United Republic of Tanzania	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*B			*H3
Zambia	*H3	*H3	*H3	*H3			*H3, *B
America							
Argentina	*H1(pdm09), *H3, *B	*H1(pdm09), *H3	*H1(pdm09)	*B	*H1(pdm09), *H3, *B	***H1(pdm09), *H3, **B	****H1(pdm09), *H3, **B
Belize		*H1(pdm09)		*H1(pdm09)			
Bolivia (Plurinational State of)	*H1(pdm09), *B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), *B	****H1(pdm09), *H3, **B	****H1(pdm09), *H3, ***B	*H1(pdm09), *H3, *B
Brazil	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	***H1(pdm09), **H3	***H1(pdm09), ***H3, *B	***H1(pdm09), **H3, *B
Canada	**H1(pdm09), ***H3, ***B	**H1(pdm09), ***H3, ****B	**H1(pdm09), ***H3, ****B	**H1(pdm09), **H3, ***B	*H1(pdm09), *H3, **B	*H3, *B	*H1(pdm09), *H3, *B
Chile	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	**H3, *B	**H3, *B	*H1(pdm09), ****H3, **B	*H1(pdm09), ****H3, **B	***H3, **B
Colombia	*H1(pdm09), *H3, *B	*H3, *B	***H1(pdm09), **H3, *B	**H1(pdm09), ***H3, *B	*H1(pdm09), *H3	*H1(pdm09), *H3, B	

Geographical Region / Country, area or territory	February 2012	March 2012	April 2012	May 2012	June 2012	July 2012	August 2012
Costa Rica	*H1(pdm09), *H3	**H3	**H3	*B	*H3, * B	*H1(pdm09), **H3, **B	*H1(pdm09), *H3, **B
Cuba	*H3	*H1(pdm09), *H3, *B	*B	*H1(pdm09), *B	*H1(pdm09), ****B	*H1(pdm09), *H3, ***B	*H1(pdm09), **B
Dominica	*H3	*H3					
Dominican Republic		*H1(pdm09)	**H1(pdm09), **H3	*H1(pdm09), ****H3	*H1(pdm09), ****H3	**H1(pdm09), ***H3	*H1(pdm09)
Ecuador	**H1(pdm09), **H3	*H1(pdm09), **H3, *B	*H1(pdm09), **H3, *B	*H3, **B	*H3, ****B	*H3, ****B	*H3, **B
El Salvador	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	**H1(pdm09), *B	****H1(pdm09), *B	****H1(pdm09), ***B	*H1(pdm09), **B
France, French Guiana	*H3	*H1(pdm09), *H3	***H1(pdm09), ***H3	**H1(pdm09), ***H3, *B	*H1(pdm09), **H3, *B	*H3, *B	*H3, *B
France, Guadeloupe	*B	*B	*H3				
France, Martinique		*H3		*H3			
Guatemala	*H1(pdm09), *B	****H1(pdm09), *H3, **B	***H1(pdm09), *H3, *B	**H1(pdm09), *H3, *B	*H1(pdm09), *H3	*H1(pdm09), *B	
Guyana	*H3		*H1(pdm09), *H3, *B	*H3			
Honduras	*H1(pdm09)	*H1(pdm09)	*H1(pdm09)	*H1(pdm09)	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09)
Jamaica	*H1(pdm09)	*H1(pdm09), *H3		*B	*B	*H1(pdm09), *B	
Mexico	**H1(pdm09), **H3, **B	**H1(pdm09), **H3, **B	*H1(pdm09), *H3, *B	*H1(pdm09), **B	*H1(pdm09), *H3, *B	*H1(pdm09), *B	*H1(pdm09), *H3, *B
Nicaragua	*H1(pdm09)	*H1(pdm09)			*H3	*H1(pdm09), *H3, *B	*H3, *B
Panama		*H3	*H3	*H1(pdm09)	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, ***B	*H1(pdm09), *H3, ***B

Geographical Region / Country, area or territory	February 2012	March 2012	April 2012	May 2012	June 2012	July 2012	August 2012
Paraguay	*H1(pdm09), *B	*H1(pdm09), *H3, *B	*H1(pdm09), *B	*H1(pdm09), *B	****H1(pdm09), **H3, ***B	****H1(pdm09), **H3, **B	**H1(pdm09), **H3, *B
Peru	*H3;*B	*H1(pdm09), **H3	**H1(pdm09), **H3, *B	*H1(pdm09), **H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, **B	*H1(pdm09), *H3, ***B
Saint Lucia				*B			
Suriname				*H1(pdm09), *H3			
United Kingdom of Great Britain and Northern Ireland, Anguilla				*B			
United Kingdom of Great Britain and Northern Ireland, Bermuda					*H3		
United Kingdom of Great Britain and Northern Ireland, Montserrat			*B	*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
Uruguay			*H3, *B			*H1(pdm09), *H3, *B	*H3, *B
Asia							
Afghanistan					*B		
Armenia		*H3					
Bahrain	**H1(pdm09), **H3, **B	**H1(pdm09), **H3					

Geographical Region / Country, area or territory	February 2012	March 2012	April 2012	May 2012	June 2012	July 2012	August 2012
Bangladesh	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09)			*H1(pdm09), *B	*H1(pdm09), *B
Bhutan	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *H3, *B	*H1(pdm09), *B	*B	*H1(pdm09), *B	*H1(pdm09), *B
Cambodia	*H1(pdm09), *B	*H3, *B	*B	*H3	*H3, *B	*H3, *B	**H3, *B
China	*H1(pdm09), **H3, ***B	*H1(pdm09), ***H3, ***B	*H1(pdm09), ***H3, **B	**H3, *B	**H3, *B	**H3, *B	**H3, *B
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
Taiwan, China	*H3, *B	*H3, *B	*H1(pdm09), *H3, *B	*H3			
Georgia	*H1(pdm09), ***H3, **B	*H1(pdm09), ****H3, *B	*H1(pdm09), ****H3, *B	*H3, *B			
India	*H1(pdm09), *H3, *B	***H1(pdm09), **H3, **B	***H1(pdm09), **B	*H1(pdm09), *H3, *B	*H1(pdm09), *B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B
Indonesia	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), *B	*H1(pdm09), *H3, *B	*H1(pdm09), *B	*H1(pdm09), *B	*B
Iran (Islamic Republic of)	*H3, *B	*H1(pdm09), *H3, *B	*B	*B	*H1(pdm09), *B		*H3
Iraq	*H3						
Israel	*H1(pdm09), ***H3, ***B	*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	*H1(pdm09), *H3, *B	**H3, *B
Jordan	*H3, *B		*H3	*H1(pdm09)			
Kyrgyzstan	*H3						

Geographical Region / Country, area or territory	February 2012	March 2012	April 2012	May 2012	June 2012	July 2012	August 2012
Lao People's Democratic Republic	*H3, *B	*H3, *B	*B	*B	*H3, *B	*H3, *B	*H3, *B
Malaysia	*B		*B				
Mongolia	*H3, **B	**H3, **B	*H1(pdm09), *H3, *B	*H1(pdm09), *B	*H3	*H1(pdm09)	
Nepal	*H3, *B	*B	*H1(pdm09), *B	*B	*H3, *B	*B	*H1(pdm09), *H3, *B
Oman	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *H3, *B	*H1(pdm09), *B
Pakistan	*H1(pdm09), *H3, *B	*H3, *B	*H3, *B	*H3, *B		*H3, *B	
Philippines	*H3, *B	*H3, *B	*B	*H3		*H3, *B	*H3, *B
Qatar	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	**H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09), *B	*H1(pdm09)	*H1(pdm09)
Republic of Korea	****H3, ***B	***H3, ****B	*H3, ***B	*H3, ***B	*H1(pdm09), *H3	*H3, *B	*H3, *B
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
Sri Lanka	*H3, *B	*H3, *B	*H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, **B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B
Syrian Arab Republic	*H3						
Thailand	*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
Turkey	*H1(pdm09), **H3, *B	*H3, *B	**B	*B	*H3, *B		
Viet Nam	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H3, *B	*H3, *B	*H1(pdm09), *H3, *B	*H3, *B	*H3, *B

Geographical Region / Country, area or territory	February 2012	March 2012	April 2012	May 2012	June 2012	July 2012	August 2012
Europe							
Albania	*H3, *B	*H3, *B	*B				
Austria	****H3, *B	****H3, ***B	****H3, ***B	*B			
Belarus	*B	*H1(pdm09), *H3	*H1(pdm09), *H3, *B	*H3		*A	
Belgium	****H3, *B	****H3, ***B	*H3, *B	*B			
Bosnia and Herzegovina	**A, *B	**B	**H3, **B	*H3, *B	*B		
Bulgaria	****H3, *B	***H3	**H3, *B	*B			
Croatia	****H3, **B	****H3, ***B	****H3, ****B	*H3, *B			
Czech Republic	*H1(pdm09), **H3, **B	***H3, **B	**H3, **B				
Denmark	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H3, *B	*H3, *B	*H3, *B		
Estonia	****H3, *B	****H3, **B	****H3, ****B	*H3, *B	*B		
Finland	*H1(pdm09), ****H3, *B	*H1(pdm09), ****H3, *B	**B	*B			
France	**H1(pdm09), ****H3, **B	**H1(pdm09), ****H3, **B	*H1(pdm09), ****H3, *B	*H1(pdm09), *H3, *B	*H3, *B		
Germany	*H1(pdm09), ***H3, *B	*H1(pdm09), ***H3, **B	**H3, **B	*H3, *B	*H3, *B		*B
Greece	**H3, **B	***H3, **B	*H3, *B	*B			
Hungary	****H3, **B	****H3, ****B	**H3, **B	*H3, *B			
Iceland	****H3	***H3	*H3	*H3			
Ireland	***H3, *B	*H1(pdm09), **H3, *B	**H3, *B	**H3, *B	*B	*B	*B
Italy	***H3, **B	*H3, *B	*H3, *B	*A			

Geographical Region / Country, area or territory	February 2012	March 2012	April 2012	May 2012	June 2012	July 2012	August 2012
Latvia	*H1(pdm09), **H3, *B	*H1(pdm09), ***H3, *B	***H3, *B	*B			
Lithuania	*H1(pdm09), **H3	*H1(pdm09), **H3, *B	*H1(pdm09), **H3	*H1(pdm09), *H3			
Luxembourg	****H3, *B	*H1(pdm09), ****H3, *B	**H3, *B	*B			
Malta	**A						
Netherlands	*H1(pdm09), ***H3, **B	*H1(pdm09), ****H3, *B	*H1(pdm09), **H3, *B	*H1(pdm09), **H3, *B	*B		
Norway	*H1(pdm09), ***H3, **B	*H1(pdm09), ***H3, **B	*H1(pdm09), ***H3, **B	*H3, **B	*H3, *B	*H3, *B	*H3
Poland	*B	*B	*H3, *B	*B			
Portugal	****H3, *B	****H3, *B	**H3				
Republic of Moldova	*H3	*H3, *B	*H3, *B	*H3			
Romania	***H3, *B	***H3	***H3, *B	*H3			
Russian Federation	*H1(pdm09), ****H3, ****B	*H1(pdm09), ****H3, ****B	*H1(pdm09), **H3, ****B	*H1(pdm09), **H3, **B			
Serbia	*H3	***H3	**H3, *B	*H3, *B			
Slovakia	*H3, *B	*H3, *B	*H3, *B	*H3, *B	*B		
Slovenia	*H1(pdm09), ***H3, *B	*H1(pdm09), ****H3, *B	**H3, *B	*H3, *B			
Spain	*H1(pdm09), ****H3, **B	****H3, **B	*H3, *B	*H3, **B	*H3, *B	*B	*B
Sweden	*H1(pdm09), ****H3, **B	**H1(pdm09), ****H3, **B	**H1(pdm09), ****H3, **B	*H1(pdm09), *H3, *B	*B	*H3, *B	*H3, *B
Switzerland	*H1(pdm09), ****H3, **B	**H1(pdm09), ****H3, **B	*H1(pdm09), **H3, **B				
Ukraine	*H3	***H3, *B	***H3, *B	*H3			

Geographical Region / Country, area or territory	February 2012	March 2012	April 2012	May 2012	June 2012	July 2012	August 2012
United Kingdom of Great Britain and Northern Ireland	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), **H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H3, *B	*H1(pdm09), *H3, *B
Oceania							
Australia	*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
Fiji						*H3	*H3
France, New Caledonia	*H1(pdm09), *H3, *B	*H3, *B	*H3		*B	*H3, *B	**H3, *B
Micronesia (Federated States of)					*H3		
New Zealand				*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	*H1(pdm09), *H3, *B	**H1(pdm09), ****H3, **B
Papua New Guinea		*H3		*H3	*H3		
United States of America, Guam	*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	H3 = Influenza A(H3N2)

Annex

Declarations of interests

The WHO recommendation on the composition of influenza virus vaccines for the southern hemisphere 2013 was made through a technical consultation with relevant WHO Collaborating Centres for Influenza (CCs) and WHO Essential Regulatory Laboratories (ERLs).

In accordance with WHO policy, all Directors of the 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 (Significant) in the company CSL
WHO CC Memphis	Dr Richard Webby	None
WHO CC and ERL Tokyo	Dr Masato Tashiro	None
WHO ERL Canberra	Dr Gary Grohmann	None
WHO ERL London	Dr Othmar Engelhardt	Travel cost (flights and hotel) to a conference related to influenza vaccine development under GAP[10] program as invited speaker by the vaccine manufacturer BIRMEX
WHO ERL Washington	Dr Zhiping Ye	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 beginning 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.

[10] http://www.who.int/influenza_vaccines_plan/objectives/en/