

Abstract

Korea 2019-2020 Influenza Laboratory Surveillance Report and Recommendations for the 2020-2021 Influenza Vaccine Strains in the Northern Hemisphere

Kim Heui Man, Lee Namjooe, Kim Eun-Jin

Division of Emerging Infectious Diseases, Bureau of Infectious Disease Diagnosis Control, Korea Disease Control and Prevention Agency (KDCA)

Influenza viruses cause epidemics that result in significant social and economic losses in every year. Since May 2009, the Korea Influenza and Respiratory Viruses Surveillance System (KINRESS) has been in place to strengthen the monitoring of the prevalence patterns of influenza and respiratory viruses in South Korea. From September 1, 2019 to August 30, 2020, respiratory specimens (i.e., throat or nasal swabs) were collected from 52 private clinics in the Republic of Korea (ROK) from patients with influenza-like illnesses and acute respiratory tract infections. Subsequently, multiplex real-time RT-PCR was performed to detect influenza viruses (A, B, A(H1N1)pdm09, A(H3N2), B-Victoria lineage, and B-Yamagata lineage) at 18 Public Health and Environment Research Institutes (PHERIs). Among the real-time RT-PCR positive specimens, 10% of the specimens were randomly selected and cultured for virus isolation. Hemagglutination Inhibition Assay (HIA) or Focus Reduction Assay (FRA) was used to perform antigenic characterisations of the viruses and NA (Neuraminidase) genetic analysis was used to monitor antiviral drug-resistant viruses. During the flu 2019-2020 season, 8,640 specimens were collected and diagnosed by multiplex real time RT-PCR. Findings indicated that 1,171 (13.6%) cases were positive for influenza. Of these positive cases, 1,122 (95.8%) and 49 (4.2%) cases were confirmed to be influenza A viruses and influenza B viruses, respectively. Of the influenza A viruses, A(H1N1)pdm09 was detected in 825 (70.4%) cases and A(H3N2) was detected in 297 (25.4%) cases. A(H1N1)pdm09 isolates were similar with A/Brisbane/02/2018 genetically and antigenically. However, A(H3N2) and B(Victoria) isolates were distinct from the vaccine strains both genetically as well as antigenically. All isolated influenza viruses were susceptible to neuraminidase inhibitors and the cap-dependent endonuclease inhibitor and resistant to ion channel blockers. The recommended influenza vaccine strains for the 2020-2021 season in the northern hemisphere were A/Guangdong-Maonan/SWL1536/2019 (cell) and A/Hawaii/70/2019 for A(H1N1)pdm09, A/Hong Kong/2671/2019 for A(H3N2), B/Washington/02/2019 for B(Victoria) and B/Phuket/3073/2013 for B(Yamagata) respectively. The updated vaccine strains in 2020-2021 flu season have similar genetic and antigenic characteristics to Korea isolates in 2019-2020 flu season. However, due to frequent mutations in influenza viruses it will be necessary to continuously monitor characterisation of influenza in the 2020-2021 flu season through KINRESS.

Keywords: Influenza, Influenza virus, Surveillance, 2019-2020 flu season

Table 1. Number of influenza viruses detected in the 2019-2020 flu season, the Republic of Korea

No. of specimens	Detection rate (%)				
	No. of IFVs detected	A(H1N1)pdm09	A(H3N2)	B(Victoria)	B(Yamagata)
8,640	1,171 (13.6%)	825 (70.4%)	297 (25.4%)	49 (4.2%)	0 (0%)

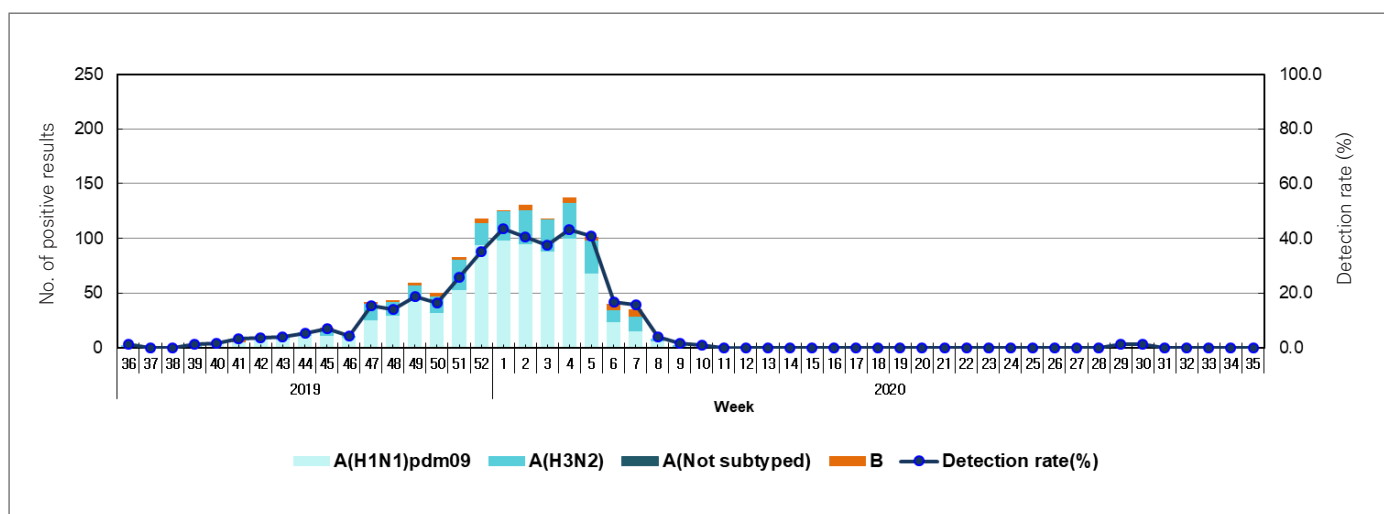


Figure 1. Weekly detection number and the influenza virus rate during the 2019–2020 flu season, the Republic of Korea

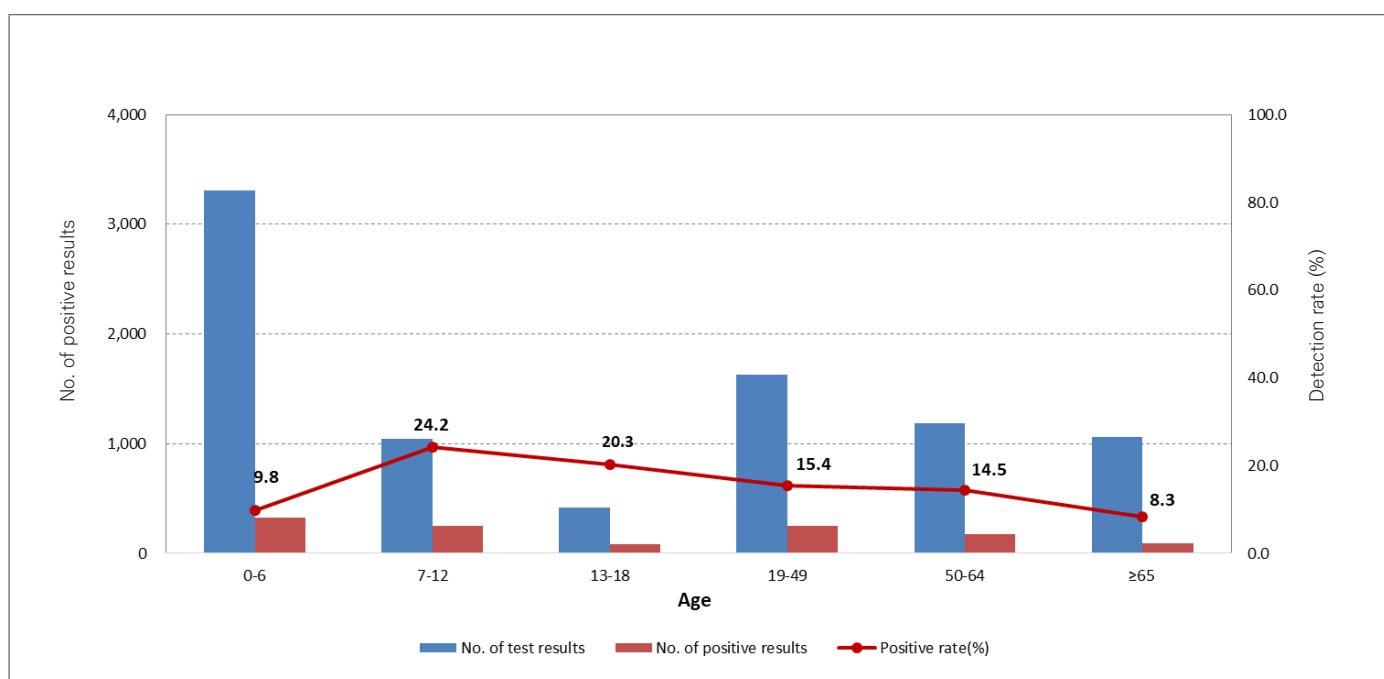


Figure 2. Influenza virus detection rate by age group during the 2019–2020 flu season, the Republic of Korea

Table 2. Characterisation of the isolated influenza virus during the 2019–2020 flu season, the Republic of Korea

Virus	Vaccine strains during the 2019–2020 flu season	Characterisation	
		Genetic	Antigenic
A(H1N1)pdm09	A/Brisbane/02/2018	6B.1a (100%)*	100%
A(H3N2)	A/Kansas/14/2017	3C.2a.1 (100%)	52%
		3C.3a (0%)*	
		1A–3Δ (100%)	
B(Victoria)	B/Colorado/06/2017	1A–2Δ (0.0%)*	64%
		1A (0.0%)	
B(Yamagata)	B/Phuket/3073/2013	3 (0.0%)*	–

* Genetic clade of the vaccine strain during the 2019–2020 flu season

Table 3. Drug resistance of the isolated influenza virus during the 2019–2020 flu season, the Republic of Korea

No. of	Neuraminidase inhibitor				Cap-dependent endonuclease inhibitor				Ion channel blocker		
	Total	A(H1N1)pdm09	A(H3N2)	B	Total	A(H1N1)pdm09	A(H3N2)	B	Total	A(H1N1)pdm09	A(H3N2)
Analysis	323	191	107	25	313	188	100	25	290	188	102
Resistance (%)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	290 (100.0)	188 (100.0)	102 (100.0)

Table 4. Recommended influenza vaccine strains for the 2020–2021 flu season in the northern hemisphere

Virus	Influenza vaccine strains for the northern hemisphere	
	2020–2021 flu season (Genetic)	2019–2020 flu season (Genetic)
A(H1N1)pdm09	A/Guangdong–Maonan/SWL1536/2019 (Egg) A/Hawaii/70/2019 (Cell) (6B.1A–5A)	A/Brisbane/02/2018 (6B.1A)
A(H3N2)	A/Hong Kong/2671/2019 (3C.2a1b)	A/Kansas/14/2017 (3C.3a)
B(Victoria)	B/Washington/02/2019 (1A–3Δ)	B/Colorado/06/2017 (1A–2Δ)
B(Yamagata)	B/Phuket/3073/2013 (3)	B/Phuket/3073/2013 (3)