

# influenza A(H1)pdm circulating strains comparing to seroprevalence for 2009 influenza A(H1)pdm virus

Raquel Guiomar <sup>a</sup>, Patrícia Conde <sup>a</sup>, Paula Cristóvão <sup>a</sup>, Inês Costa <sup>a</sup>, Pedro Pechirra <sup>a</sup>

Portuguese Laboratory Network for the Diagnosis of Influenza Infection

<sup>a</sup> National Influenza Reference Laboratory, Infectious Diseases Department

National Institute of Health Dr. Ricardo Jorge, Portugal

Instituto Nacional de Saúde  
Doutor Ricardo Jorge



REPÚBLICA  
PORTUGUESA  
SAÚDE



raquel.guiomar@insa.min-saude.pt

+351.21.7519216

orcid.org/0000-0002-4563-6315



## Background:

Since 2009, influenza A(H1)pdm is circulating in the human population infecting in different ways specific age groups. The study aims to assess the seroprotection for A/California /07/2009 vaccine strain and evaluate the seroprotection for the circulating A(H1)pdm strains (clade 6B) during 2015/2016 in the Portuguese population. Seroepidemiological data can determine the vulnerable populations to disease and support intervention and action regarding vaccination programmes and other preventive measures, particularly in high-risk groups.

## Methods:

To study influenza immunity a non-probabilistic sample was used. Samples were collected from people attending to hospital laboratories (n=13) for other reasons aside from influenza infection. We developed a cross-sectional study based on a convenience sample of 734 sera collected during July 2016, from all age groups (0–4; 5–14; 15–44; 45–64 and ≥65 years old), both genders, covering mainland and Atlantic islands. Sera were randomly selected. All samples were anonymized and recorded data: district residence/sample collection, gender and age.

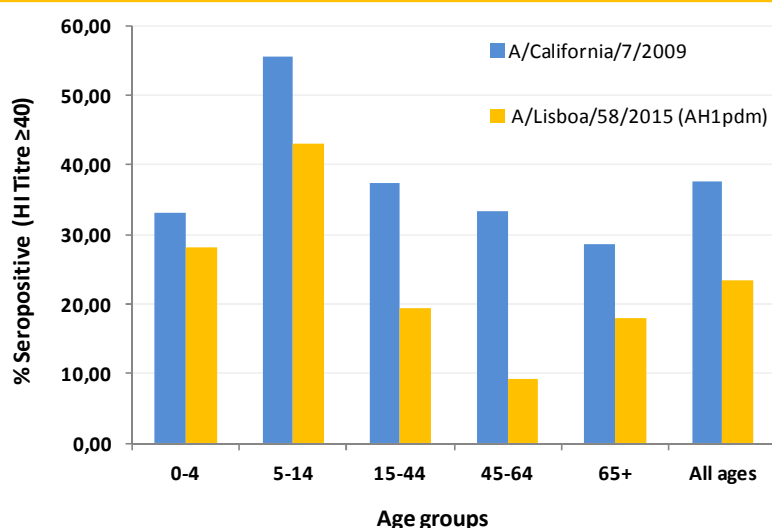
Antibody titers to A(H1)pdm virus strains [A/California /07/2009 and A/Lisboa/58/2015 (clade 6B)] were assessed by hemagglutination inhibition (HI) assay. HI titer ≥40 was considered protective. Seroprevalence estimates, overall and by age group, were calculated with 95% confidence intervals (95% CI). The HA1 subunit of the hemagglutinin gene from A(H1)pdm viruses used in HI were sequenced.

## Results:

In July 2016, the prevalence of protective antibodies for influenza A/California/07/2009 was 38% (95% CI: 34–41) and for A/Lisboa /58/2015 was 23% (95% CI: 21–27).

Seroprotection rates against influenza A(H1)pdm vaccine virus and circulating strain, during 2015/2016 in Portugal, by hemagglutination inhibition assay (HI titre ≥ 40).

Influenza virus A(H1)pdm	HI titre ≥40		
	Number/Total	%	95% CI
A/California/7/2009	272/724	38	34 - 41
A/Lisboa/58/2015	172/734	23	21 - 27



- Highest seroprevalence was observed in 5-14 age group for both strains, 55% (95% CI: 47–63) for A/California/07/2009 and 42% (95% CI: 35–50) for A/Lisboa/58/2015.

- The lowest seroprevalences were detected in the 65+ age group for A/California/07/2009 (28%; 95% CI: 22–36) and in the 45-64 for the A/Lisboa /58/2015 (9%; 95% CI: 6-15).

- Was observed a reduced prevalence of protective antibodies for A/Lisboa /58/2015 for all age groups, although a higher decrease was seen in the adults 45-64 years old (24% drop in seroprevalence).

- The influenza A/Lisboa/58/2015 presented four amino acid substitutions in antigenic sites: S162N e K163Q (Sa), S185T (Sb) and S203T (Ca1), belonging to 6B.1clade.

## Conclusions:

Although 38% of study population have demonstrated to have seroprotection for A(H1)pdm vaccine strain this could not represent seroprotection to the currently circulating A(H1)pdm strains (6B.1 clade). Individuals in the age group of 45-64 years old are more susceptible to infection by currently circulating influenza A(H1)pdm viruses. The presence of K163Q (Sa), S185T (Sb) substitutions are likely to be involved in antigenic drift, as previously described, allowing the virus to escape from immune response namely the one that could be induced by the vaccine. In future this event should be closely monitored, although WHO recommended a new A(H1)pdm strain to be included in the next season flu vaccine.