

Short Report

Long-term effect of the influenza A/H1N1 pandemic: attitudes and preventive behaviours one year after the pandemic

Xavier Garcia-Continente^{1,2,3}, Gemma Serral^{1,2,3}, María José López^{1,2,3}, Anna Pérez^{1,2,3}, Manel Nebot^{1,2,3,4,†}

1 Agència de Salut Pública de Barcelona, Spain [Public Health Agency, Barcelona (Spain)]

2 CIBER en Epidemiología y Salud Pública (CIBERESP) (Biomedical Research Centre Network for Epidemiology and Public Health, Spain)

3 Institut d'Investigació Biomèdica de Sant Pau (IIB Sant Pau) (Institute of Biomedical Research, Spain)

4 Departament de Ciències Experimentals i de la Salut, Universitat Pompeu Fabra (UPF) [Experimental and Health Sciences Department, Pompeu Fabra University, Barcelona (Spain)]

Correspondence: María José López, Evaluation and Intervention Methods Service. Public Health Agency, Barcelona (Spain). Pl. Lesseps, 1. PC 08023—Barcelona (Spain), Tel: +34 932027748, Fax: +34 932921443, e-mail: mjlopez@aspb.cat

[†]Dr. Manel Nebot died in October 18, 2012. This work would not have been possible without his conviction, perseverance and dedication.

This study aimed to describe changes in attitudes and behaviours regarding influenza A infection 1 year after the end of the pandemic. A cross-sectional study was performed based on two population-based telephone surveys including 1027 (February, 2010) and 1000 (February, 2011) participants in Spain. The percentages of the respondents who reported that they had adopted preventive measures to avoid Influenza infection declined 1 year after the pandemic. Influenza-related consultations decreased, whereas confidence in vaccination increased. Despite the decrease observed in adopting preventive measures, some behaviours were still being adopted long time after the pandemic in general population.

Introduction

In 2009, a novel strain of influenza A/H1N1 emerged from the USA and Mexico. In a few weeks, the virus spread around the world, becoming the first pandemic of the 21st century.¹ Experts predicted that influenza A/H1N1 would be a highly virulent virus, which created a great social alarm.² Most countries rapidly developed and implemented pandemic influenza plans, and the disease was detected and reported within a suitable time.³

A large number of studies were conducted during the pandemic, showing a wide range in public perceptions⁴ and the adoption of non-pharmacological preventive measures and vaccination.^{5,6} In Spain, a population-based study showed that 73% of respondents adopted at least one of the Spanish Ministry of Health's (MoH) recommended preventive measures (covering the mouth and nose with a tissue when sneezing or coughing—respiratory hygiene—and washing hands regularly using soap and water—hand hygiene) during the pandemic peak. These preventive behaviours persisted among a large proportion of the population (66%) 2 months after, although a significant decrease was observed.⁷ Similar results were obtained in an Italian study in which around 70% of the participants reported washing hands or using hand cleanser more frequently during the pandemic peak.⁴ However, no studies have so far addressed the potential persistence of preventive measures and the long term change in perceptions and attitudes.

The aim of this study was to describe changes in attitudes and behaviours regarding the influenza A/H1N1 virus among the general population between the influenza A/H1N1 pandemic and the seasonal influenza epidemic 1 year later.

Methods

A cross-sectional study was conducted in Spain based on two population-based telephone surveys. The first survey was performed during the declining phase of the influenza A/H1N1 pandemic, in February 2010. The second survey was conducted during the seasonal influenza epidemic 1 year later, in February 2011.

The sample size was estimated as 1000 participants per survey, providing an error of $\pm 3.5\%$ with an alpha error of 5% for an estimated percentage of 50%. Mobile ($n = 200$ in both surveys) and landline telephone ($n = 827$ in February 2010, and $n = 800$ in February 2011) interviews using the computer telephone interview method were performed to avoid non-coverage bias of landline-only surveys. Telephone calls were made by trained interviewers from 10 a.m. to 10 p.m. to avoid over-representation of unemployed persons and students.⁷ Respondents were required to be ≥ 18 years and to speak Spanish.

The same 16 questions about attitudes and behaviours related to influenza A/H1N1 were asked for both surveys. Two questions were focused on recommended measures by the MoH (hand hygiene and respiratory hygiene). Two other questions asked about purchasing measures (buying face masks and buying hand sanitizer solutions) and some of them were related to avoidance measures (avoiding public places and avoiding contact with people with influenza-like symptoms). Other preventive behaviours such as wearing a face mask and ventilating the household more frequently were also included. The questionnaire also gathered questions about attitudes towards health care services consultation and perceptions about the influenza A/H1N1 vaccine.

Table 1 Attitudes, perceptions and preventive measures adopted at the end of the influenza A/H1N1 pandemic (February 2010 survey) and during the next seasonal influenza season 1 year later (February 2011 survey) in Spain

Variables	Men			Women			Total		
	February 2010 n (%)	February 2011 n (%)	P ^a	February 2010 n (%)	February 2011 n (%)	P ^a	February 2010 n (%)	February 2011 n (%)	P ^a
Preventive measures									
Avoiding public places ^b	51 (9.9)	32 (6.5)	0.050	63 (12.3)	32 (6.3)	0.001	114 (11.1)	64 (6.4)	<0.001
Buying face masks	12 (2.3)	7 (1.4)	0.290	8 (1.6)	6 (1.2)	0.601	20 (1.9)	13 (1.3)	0.250
Buying hand sanitizer solutions	98 (19.0)	47 (9.6)	<0.001	151 (29.5)	85 (16.7)	<0.001	249 (24.2)	132 (13.2)	<0.001
Wearing a face mask at least once	37 (7.2)	19 (3.9)	0.021	36 (7.0)	15 (3.0)	0.003	73 (7.1)	34 (3.4)	<0.001
Covering the mouth and nose with a tissue when sneezing or coughing (respiratory hygiene)	259 (50.3)	159 (32.3)	<0.001	320 (62.5)	206 (40.6)	<0.001	579 (56.4)	365 (36.5)	<0.001
Hand washing more frequently than before the influenza A/H1N1 pandemic (hand hygiene)	180 (35.0)	74 (15.0)	<0.001	201 (39.3)	93 (18.3)	<0.001	381 (37.1)	167 (16.7)	<0.001
Ventilating household more frequently than before the influenza A/H1N1 pandemic	108 (21.1)	76 (15.4)	0.022	140 (27.3)	82 (16.1)	<0.001	248 (24.2)	158 (15.8)	<0.001
Avoiding contact with people with influenza symptoms	86 (16.8)	94 (19.1)	0.333	130 (25.6)	102 (20.1)	0.036	216 (21.2)	196 (19.6)	0.385
Other preventive measures	18 (3.5)	9 (1.8)	0.102	15 (2.9)	14 (2.8)	0.867	33 (3.2)	23 (2.3)	0.210
Attitudes to Seeking Influenza A-Related Information									
Medical consultation for influenza A/H1N1	78 (15.1)	16 (3.3)	<0.001	77 (15.0)	23 (4.5)	<0.001	155 (15.1)	39 (3.9)	<0.001
Pharmaceutical consultation for influenza A/H1N1	32 (6.2)	6 (1.2)	<0.001	25 (4.9)	9 (1.8)	0.006	57 (5.6)	15 (1.5)	<0.001
Health care telephone consultation for influenza A/H1N1	7 (1.4)	1 (0.2)	0.039	6 (1.2)	0 (0.0)	0.014	13 (1.3)	1 (0.1)	0.002
Seeking Influenza A-related information on the Internet	74 (14.4)	32 (6.5)	<0.001	55 (10.7)	21 (4.1)	<0.001	129 (12.6)	53 (5.3)	<0.001
Perceptions about the Influenza A/H1N1 Vaccine									
Vaccines have greater benefits than risks	328 (63.7)	353 (71.8)	0.006	248 (48.4)	320 (63.0)	<0.001	576 (56.1)	673 (67.3)	<0.001
Influenza A/H1N1 vaccine is effective	259 (50.3)	348 (70.7)	<0.001	197 (38.5)	329 (64.8)	<0.001	456 (44.4)	677 (67.7)	<0.001
Influenza A/H1N1 vaccine is safe	247 (48.0)	339 (68.9)	<0.001	176 (34.4)	291 (57.3)	<0.001	423 (41.2)	630 (63.0)	<0.001
Total (N)	515	492		512	508		1027	1000	

^aP-value for the χ^2 test, ^bavoiding crowded places, hospitals and health centres or cancelling or delaying aeroplane, train or bus use.

Frequencies and percentages were calculated for attitudes and behaviours including missing data in the denominator. Differences between the two surveys were compared using the chi-squared test with significance level of 0.05. All statistical analyses were conducted using STATA v.10.

Results

A total of 1027 participants completed the first survey (a response rate of 50.3%) and 1000 completed the second one (50.6%). No significant differences were found in the distribution of sex, age, educational level or social class between the two surveys (data not shown).

The percentage of respondents adopting preventive measures against influenza A/H1N1 sharply declined from the Influenza A (H1N1) pandemic to the seasonal influenza epidemic 1 year later (table 1). Most changes were statistically significant. Hand hygiene decreased from 37.1 to 16.7%, while respiratory hygiene decreased significantly from 56.4 to 36.5%. Buying hand sanitizer solutions also decreased (from 24.2 to 13.2%). Regarding consultations and information searches about influenza A/H1N1, medical, pharmaceutical and health care telephone consultations, as well as Internet searches, decreased significantly. Otherwise, the percentage of participants who perceived that the influenza A/H1N1 vaccine was safe and effective increased from 41.2 to 63.0% and from 44.4 to 67.7%, respectively.

Discussion

Overall, the adoption of preventive measures and knowledge-increasing behaviours was much lower in the seasonal influenza

survey. Otherwise, perceptions on the safety and efficacy of the vaccine against influenza A/H1N1 markedly increased.

Our results show that the adoption of preventive measures commonly adopted during the influenza A/H1N1 pandemic decreased significantly during the seasonal influenza epidemic 1 year later. These findings were not unexpected and are consistent with those observed in previous studies on the Severe acute respiratory syndrome (SARS) and avian influenza outbreaks. Leung *et al.*⁸ observed a large decrease in the adoption of preventive measures 6 months after the SARS outbreak. Similarly, a study performed in Hong Kong showed that the prevalence of anticipated preventive behaviours, in case a new outbreak of avian influenza appeared, decreased over time.⁹ Specifically, the use of face masks in public areas decreased by 20–30% from November 2005 to February 2008.⁹ Nevertheless, we observed that in February 2011 a high percentage reported adopting some hygienic behaviours yet despite the influenza pandemic had been over 1 year before. Therefore, it could be hypothesized that some hygienic behaviours could still remain as a residual effect of the pandemic (i.e. 36.5% reported respiratory hygiene and 16.7% hand hygiene) when the influenza A/H1N1 pandemic was over. This finding could be important in possible future pandemic threats, although we cannot predict if this positive change will be sustained over time. Further studies focused on analysing differences in adopting preventive measures by socio-demographic characteristics using multivariate analysis should be performed.

Although vaccination is considered one of the most successful public health measures to prevent morbidity and mortality, public acceptance of vaccination is decreasing in many developed countries due in part to disease outbreaks.¹⁰ We found that in February 2010, around 40% of the Spanish population reported that the vaccine was

effective and safe. During the seasonal influenza epidemic the following year, this percentage increased significantly to 67.7 and 63.0%, respectively. The low incidence of adverse effects of influenza A/H1N1 vaccination could explain the greater trust in vaccines 1 year later. However, public confidence in the influenza A/H1N1 vaccine is still low, as one-third of the population do not trust the vaccine. Misinformation about the influenza A/H1N1 vaccine during the pandemic might have affected public trust in vaccines.

One of the limitations of this study was the low response rate (50%). However, it was higher than that obtained in 2009 and 2010 in previously published studies,⁷ which could be partly due to the inclusion of mobile phones in the sample. Nevertheless, the response rate obtained was within the range of other published telephone-based studies on the subject.⁵ Because cultural factors are strongly related to behavioural responses, caution should be exercised when generalizing these results to other contexts. One of the strengths of the study is the sampling of both mobile and landline telephones to avoid the non-coverage bias of landline-only surveys.

Our results suggest that some preventive measures such as respiratory and hand hygiene could have been adopted as habits to prevent seasonal influenza. Otherwise, public confidence in vaccines seems to be low. The campaign for the recommended non-pharmacological preventive measures by the Spanish MoH seems to have been effective, while the unclear message about the vaccine has led to distrust in the vaccine. The differences observed between the adoption of the MoH-recommended measures and beliefs about the influenza A/H1N1 vaccine show the need for better communication among experts, the government, the media and the general public. These data support the importance of providing transparent and clear messages to the general population in future communicable disease threats.

Acknowledgements

The authors wish to thank Jordi Alonso, Ángela Domínguez, Anna García-Altés, Antonio Daponte for their assistance during the submission phase of the project.

Funding

This work was supported by the 'Instituto de Salud Carlos III' (Ministry of Health, Spain) (ISCIII GR09/0036) and the 'Agència de Gestió d'Ajuts Universitaris i de Recerca de la Generalitat de Catalunya' (AGAUR SGR2009-1345).

Conflicts of interest: None declared.

Key points

- This is the first study that describes long-term changes in attitudes and behaviours related to Influenza A/H1N1.
- Adoption of some hygienic behaviours recommended to prevent influenza A/H1N1 remained as a residual effect when the threat of influenza A/H1N1 pandemic was over.
- Public confidence in influenza A/H1N1 vaccine increased 1 year after the pandemic peak, although it was still low (33%).
- Providing transparent and clear messages to the general population is necessary to prevent infectious diseases.

References

- 1 Centers for Disease Control and Prevention. US outbreak of swine origin influenza A (H1N1) virus infection-Mexico. March-April 2009. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm58d0430a2.htm>. (15 March 2012, date last accessed).
- 2 Pappaioanou M, Gramer M. Lessons from pandemic H1N1 2009 to improve prevention, detection and response to influenza pandemics from a one health perspective. *ILAR J* 2010;51:268–80.
- 3 Fisher D, Hui DS, Gao Z, et al. Pandemic response lessons from influenza H1N1 2009 in Asia. *Respirology* 2011;16:876–82.
- 4 La Torre G, Semyonov L, Mannocci A, Boccia A. Knowledge, attitude, and behaviour of public health doctors towards pandemic influenza compared to the general population in Italy. *Scand J Public Health* 2012;40:69–75.
- 5 Rubin GJ, Amlôt R, Page L, Wessely S. Public perceptions, anxiety, and behaviour change in relation to the swine flu outbreak: cross sectional telephone survey. *BMJ* 2009;339:b2651.
- 6 Lino M, Di Giuseppe G, Albano L, Angelillo IF. Parental knowledge, attitudes and behaviours towards influenza A/H1N1 in Italy. *Eur J Public Health* 2012;22:568–72.
- 7 Agüero F, Adell MN, Pérez A, et al. Adoption of preventive measures during and after the 2009 influenza A (H1N1) virus pandemic peak in Spain. *Prev Med* 2011;53:203–6.
- 8 Leung GM, Ho LM, Chan SK, et al. Longitudinal assessment of community psychobehavioral responses during and after the 2003 outbreak of severe acute respiratory syndrome in Hong Kong. *Clin Infect Dis* 2005;40:1713–20.
- 9 Lau JT, Tsui HY, Kim JH, et al. Monitoring of perceptions, anticipated behavioral, and psychological responses related to H5N1 influenza. *Infection* 2010;38:275–83.
- 10 Larson HJ, Cooper LZ, Eskola J, et al. Addressing the vaccine confidence gap. *Lancet* 2011;378:526–35.