

# Perspectives from Spanish infectious diseases professionals on 2009 A (H1N1) influenza: the third half

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## Abstract

The first influenza pandemic in more than 40 years was declared in 2009. We aimed to evaluate the beliefs of Spanish infectious diseases professionals regarding several aspects of 2009 A (H1N1) influenza once the epidemic waned. An online survey was designed and distributed among members of the Spanish Society of Infectious Diseases and Clinical Microbiology (SEIMC). The survey considered hospital organization and preparedness planning and conduct, as well as the opinion of the infectious diseases professionals regarding several key issues. Between 7 March and 22 March 2010, 303 responses, corresponding to 12.8% of the SEIMC membership, were received. Of the respondents, 48.2% were microbiologists and 42.3% were clinicians dealing with infectious diseases. Forty-one per cent of respondents did not believe that 2009 A (H1N1) influenza had a more severe presentation than other seasonal influenzas. Only 5% fully agreed that 2009 A (H1N1) influenza had a more severe presentation. Influenza planning was available in 69.7% of represented institutions before the arrival of 2009 A (H1N1) influenza, and was considered to be useful, to different extents, by most professionals. In most institutions (88.3%), a multidisciplinary team was created to coordinate local pandemic influenza actions. The most successful protocols were those provided by regional healthcare authorities, followed by those from the CDC. The most problematic issues regarding 2009 A (H1N1) influenza were the management of patients in the emergency room and the vaccination and awareness of healthcare professionals (HCPs) regarding infection control. Microbiological diagnosis and the availability of antivirals were the least problematic areas. Although the majority of surveyed infectious diseases professionals did not believe that 2009 A (H1N1) influenza had an especially severe presentation, most of them agreed with the way that this epidemic was managed in their institutions.

**Keywords:** Hospital, influenza, preparedness, survey

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## Introduction

In April 2009, a potentially pandemic influenza virus was discovered [1]. Soon after, widespread transmission among humans in several continents was documented, and on 11 June 2009, the WHO announced phase 6 of the Influenza Pandemic Alert System. Since then, and as of 17 February 2010, at least 15 921 deaths have been declared as related to A (H1N1) influenza, and more than 212 countries and overseas territories or communities have reported laboratory-confirmed cases [2].

At the beginning of the epidemic, both, globally and locally, healthcare authorities faced the first influenza pandemic in more than 40 years, and implemented pandemic preparedness plans, aiming to minimize the impact of the new influenza virus. These plans were multifaceted, and included the design and development of a candidate vaccine and the implementation of specific protocols in healthcare facilities, among others. In addition, there was significant mention of influenza in both the medical and lay literature. Although the final balance of the epidemic is still to be evaluated, its impact might have been lower than initially expected, and the preparedness strategies have been criticized in several countries, questioning the leadership of the WHO. Indeed, the WHO has considered it appropriate to design and conduct an external review of the whole process of surveillance and preparedness [3].

Spain has a population of 45 million, and universal public healthcare coverage offered by 17 autonomous regional healthcare systems. Public health issues are coordinated by the National Ministry of Health. In this setting, we conducted a nationwide survey to explore how Spanish hospitals prepared for the pandemic, and the perceptions of the Spanish infectious diseases community regarding 2009 A (H1N1) influenza.

## Methods

We conducted a survey of the membership of the Spanish Society of Infectious Diseases and Clinical Microbiology (SEIMC). The SEIMC membership consists of individuals with an interest in multiple facets of infectious diseases and clinical microbiology, including both clinicians and microbiologists. The electronic survey was distributed through the E-mail list of the SEIMC, which includes 2366 members, on 5 March 2010. On 17 March, a repeat electronic survey reminder was sent.

The survey collected information regarding the respondents' main professional background and the main characteristics of the institutions that they worked for. Afterwards, respondents were asked how their institution prepared for the pandemic, specifically who coordinated the influenza-related activities, how the course of the pandemic was followed up, and whether institution-specific protocols were elaborated. Respondents were also asked for the main problematic areas concerning the management of inpatients with confirmed or suspected influenza. These areas were: (i) case definition; (ii) microbiological diagnosis; (iii) general management of patients with suspected or confirmed influenza in several hospital departments (emergency room (ER), conventional hospitalization wards and intensive-care units (ICUs)); (iv) availability of personal protection equipment; (v) availability of antivirals; (vi) healthcare personnel vaccination; (vii) awareness of healthcare professionals regarding prevention of transmission; and (viii) transmission of information regarding hospital-specific protocols. Finally, we explored respondents' perceptions about the severity of the epidemic and its impact on future influenza seasons and the credibility of healthcare institutions. The electronic survey was designed and collected in SurveyMonkey.com, and is available at <http://www.surveymonkey.com/s/encuestagripe>.

## Results

Between 7 March and 22 March 2010, 303 responses, corresponding to 12.8% of the SEIMC membership, were received.

The respondents were either laboratory-based microbiologists (48.2%), infectious diseases physicians (31.4%), internal medicine physicians (10.9%) or specialists in critical care (3.3%). They mostly worked in public healthcare institutions (95.1%). The distribution of responses regarding hospital bed number and number of hospitals surveyed is given in Table 1.

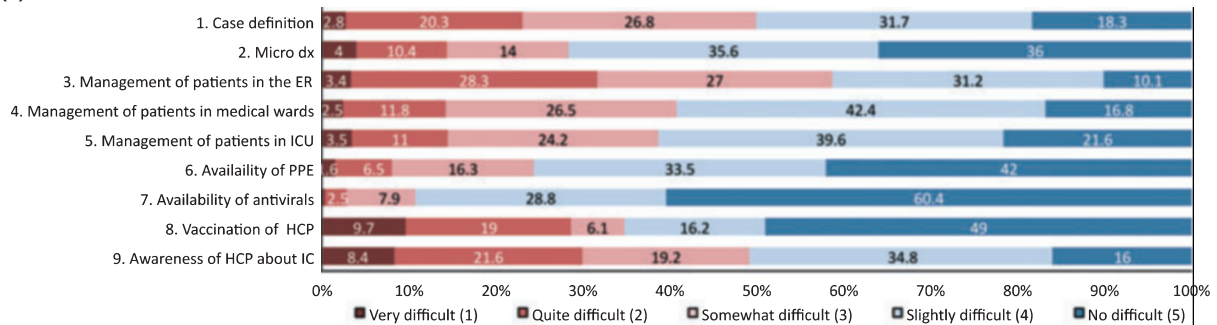
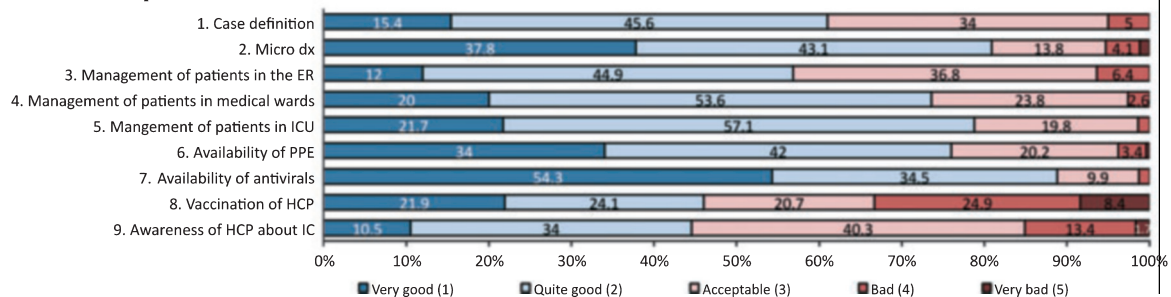
Pandemic influenza contingency plans were available before the arrival of 2009 A (H1N1) influenza in 113 of 162 hospitals (69.7%). In those centres where these plans were available, they were considered to be very or quite useful by 27.2% and 38.5% of participants, respectively. In most of the centres represented in the survey (88.32%), a multidisciplinary team to coordinate the activities related to the pandemic was created. Most of the respondents (80.6%) believed that hospital medical managers acted appropriately, although 12% thought that they overreacted. In 68% of the represented centres, locally adapted influenza protocols were elaborated. Respondents were asked to evaluate the usefulness of the guidance protocols issued by several healthcare institutions (0 = not useful at all; 1 = hardly useful; 2 = significantly useful; 4 = very useful). The most highly rated healthcare institution recommendations were those from the regional healthcare services (mean 2.88), followed by the CDC protocols (2.8). Nevertheless, protocols from other institutions, such as the Spanish Ministry of Health, the WHO and e-CDC, were rated quite close each other and to the previously cited ones (2.74, 2.7 and 2.56, respectively).

When asked for the main problematic areas related to the management of patients with suspected/confirmed influenza (Fig. 1a), respondents pointed to the availability of antivirals as the least complicated issue. The most problematic area was the management of patients with suspected or confirmed influenza in the ER (31.7% considered it to cause great or significant difficulties); in other areas, such as conventional hospitalization wards or ICUs, only 14.5% and 14.3% found great or significant difficulties, respectively. We also asked how the problems found in the same areas were solved (Fig. 1b). The most problematic issues to be resolved

**TABLE 1.** Distribution of responses received and hospitals represented, in relation to the institutions' bed numbers

Number of beds	Number of respondents (%)	Number of institutions (%)
>1000	72 (23.76)	18 (11.25)
500–999	99 (32.67)	40 (25)
<500	131 (43.23)	102 (63.75)
Total	303 <sup>a</sup>	160

<sup>a</sup>One of the respondents worked in the National Microbiology Reference Laboratory.

**(a) Difficulties found****(b) Solutions to the problems found**

**FIG. 1.** (a) Evaluation of the magnitude of the difficulties found in the management of several aspects related to 2009 H1N1. Micro dx, microbiological diagnosis; ER, emergency room; ICU, intensive-care unit; PPE, personal protection equipment; HCP, healthcare professional; IC, infection control. (b) Evaluation of the solutions to the observed difficulties.

were healthcare personnel vaccination and insufficient staff awareness in preventing transmission: 33.3% and 15.3%, respectively, of respondents found that these two issues were resolved very badly or at least poorly.

Most of the respondents believed that 2009 A (H1N1) influenza did not have a more aggressive presentation than other seasonal influenzas. Nevertheless, a majority of them acknowledged that it caused a significant work overload for their institutions, and 38.8% of them thought, at some point in the influenza season, that the institution could be overwhelmed. Most of the professionals who participated in the survey believed that institutional recommendations, both national and international, had been appropriate. Nevertheless, a significant proportion of respondents perceived a loss of credibility of healthcare institutions among professionals (Table 2).

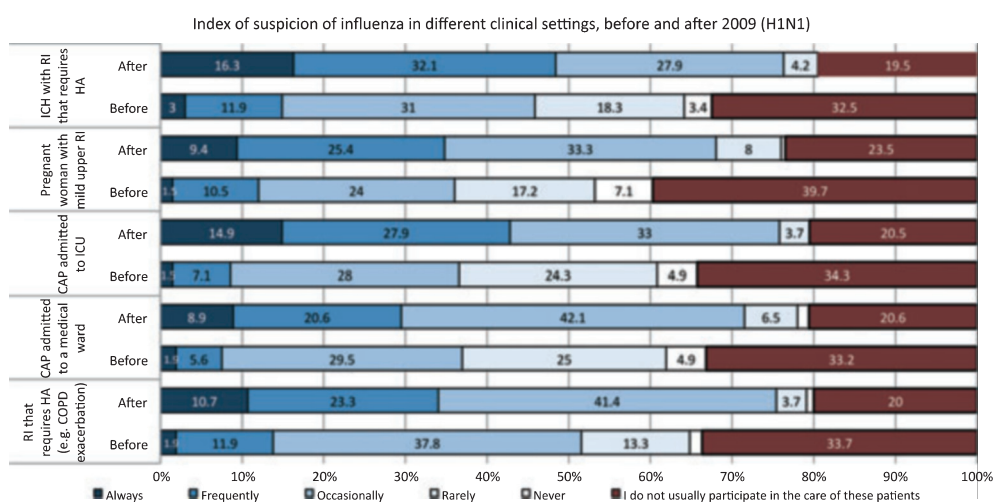
Several clinical scenarios were presented in order to evaluate the grade of suspicion before and after the 2009–2010 influenza season. Infectious diseases professionals broadened their suspicion of influenza after the 2009–2010 influenza season in all of the proposed scenarios, but especially in patients with severe community-acquired pneumonia requiring ICU admission, in patients with chronic obstructive pulmonary disease exacerbations, and in pregnant women with upper respiratory symptoms (Fig. 2).

## Discussion

The 2009 A (H1N1) influenza season has attracted more attention than any other influenza virus season, perhaps, in the last 40 years. Spanish authorities reacted rapidly to the discovery of the new, potentially pandemic, influenza virus and adhered to and adapted to international public health authority, mainly WHO, guidance. Earlier in this season, Lautenbach *et al.* [4] published the results of a cross-sectional survey among the Society of Healthcare Epidemiology of America membership. The survey was distributed during the first pandemic wave (26 May 2009), focused mainly on preparedness and infection control issues, and received 323 responses. In this survey, a majority of respondents believed that US healthcare institutions were heading in the right direction at that moment. We thought that, once the 2009 A (H1N1) season seemed to be very close to exhaustion, it would be interesting to know what Spanish infectious diseases professionals thought of this influenza season and of the process of preparedness at different levels. We therefore designed an online survey, which was distributed among the SEIMC membership, and finally received over 300 responses. Although this represents approximately 12% of all SEIMC members, all Spanish autonomous communities were

**TABLE 2.** Position of Spanish infectious diseases professionals with regard to several statements

	Fully agree (1), % (no.)	Significantly agree (2), % (no.)	Agree somewhat (3), % (no.)	Mildly agree (4), % (no.)	Disagree (5), % (no.)
1. 2009 A (H1N1) had a more aggressive presentation than influenza in other seasons	5.9 (13)	9.0 (20)	16.7 (37)	27.5 (61)	41.0 (91)
2. Regardless of organizational tasks, 2009 A (H1N1) caused a significant work overload for my institution	27.5 (61)	31.5 (70)	20.7 (46)	16.2 (36)	4.1 (9)
3. At some time during the epidemic, I thought that my institution would be overwhelmed	11.4 (25)	27.4 (60)	20.5 (45)	25.6 (56)	15.1 (33)
4. I am happy with the organization of the medical attention given to patients with 2009 A (H1N1)	20.9 (46)	49.5 (109)	20.9 (46)	5.0 (11)	3.6 (8)
5. Recommendations from international institutions (CDC, e-CDC, WHO) were appropriate	5.9 (13)	46.2 (102)	27.6 (61)	15.4 (34)	5.0 (11)
6. Recommendations from Spanish institutions were appropriate	9.5 (21)	45.2 (100)	28.1 (62)	12.7 (28)	4.5 (10)
7. Healthcare institutions lost credibility among healthcare professionals	10.9 (24)	21.7 (48)	33.9 (75)	26.7 (59)	6.8 (15)
8. Awareness of prevention of infection transmission increased among healthcare professionals	10.0 (22)	32.1 (71)	31.7 (70)	19.5 (43)	6.8 (15)
9. Preparedness and coordination tasks were positive for my institution	14.0 (31)	51.1 (113)	19.9 (44)	9.5 (21)	5.4 (12)
10. Most of the measures applied will be maintained in subsequent influenza seasons	11.4 (25)	37.3 (82)	24.5 (54)	20.0 (44)	6.8 (15)

**FIG. 2.** Index of suspicion of influenza in different clinical settings, before and after 2009 (H1N1). ICH, immunocompromised host; RI, respiratory infection; CAP, community-acquired pneumonia; ICU, intensive-care unit; HA, hospital admission; COPD, chronic obstructive pulmonary disease.

represented, as well as different-sized hospitals. As is the case for the SEIMC membership, microbiologists and clinicians involved in the management of infectious diseases were almost equally represented. Given that a high proportion of the SEIMC membership was not involved in the management of influenza and could not be motivated to respond, the response rate might not be considered to be particularly low.

The results of the survey provide an interesting perspective, now that the epidemic activity of influenza transmission seems to be at an end. One of the more interesting questions was whether 2009 A (H1N1) had a more severe presentation than other seasonal influenzas. Most of the respondents did not have this perception. This might be because a very large majority of influenza-infected individuals had a mild illness. Nevertheless, it is necessary to keep in mind that clinicians' perceptions about the severity of the disease might not be an accurate indicator, for several rea-

sons. The first of these is that influenza has classically been considered to be a neglected disease in hospitals, with a low rate of microbiological diagnosis or even mention in death certificates or discharge reports [5]. On this basis, it might be difficult to compare the amount of severe influenza disease with that in previous years, when these cases were mostly undiagnosed. Another reason is that the admission threshold for patients with influenza-like illness might have been lower in this season, especially at the beginning, given the existing uncertainties regarding the severity of the diseases and the exhaustive, and sometimes alarming, coverage of the influenza pandemic by the lay press, which could also have influenced clinicians' perceptions. Despite these limitations, traditional methods to estimate the burden of the pandemic might not be significantly better. Healthcare authorities use ecological models to estimate the burden of influenza. One of the most used indicators is the excess of mortality in the winter months, which is attributed to

influenza. Considering the weakness of this indicator, it is also hard to compare the severity of different influenza seasons by these means [6]. As the levels of microbiological diagnosis and awareness were significantly higher in this season, these data might help to validate models that are more consistent than the excess mortality in winter months. Interestingly, despite the fact that the majority of respondents did not find 2009 A (H1N1) influenza to have a more severe presentation, more than 50% of them considered it likely that 2009 A (H1N1) influenza could have overwhelmed the preparation planning at some point. In addition, most of the respondents were in significant agreement with the position adopted by both national and international healthcare authorities during the pandemic, and a significant number of them considered that preparedness tasks and planning were positive for their institutions.

In a large majority of surveyed Spanish hospitals, a multi-disciplinary group coordinated the actions to be taken during the epidemic, and its performance was positively valued. These groups were led most frequently by hospital medical managers, and to a lesser extent by infectious diseases or infection control physicians. In this sense, the role of hospital medical managers was positively valued by infectious diseases professionals. Interestingly, respondents considered the management of patients with suspected/confirmed influenza in the ER to be more challenging than in the ICU. This was somewhat unexpected, but might be partially explained by the mildness of the disease and the increased awareness of the population. Probably, many patients with non-severe disease unnecessarily visited the ER. Reinforcement of the role of the primary-care physicians should be considered for future seasons. It has been shown that the ER patient flow during influenza outbreaks significantly increases, and challenges the routine of these first-line clinical units [7]. The development of specific triage algorithms might improve their performance, as well as the infection control practices [8]. Not surprisingly, the most difficult issues to resolve within Spanish hospitals were the vaccination of healthcare professionals (HCPs) and the low awareness of HCPs regarding infection control and the prevention of influenza transmission [9]. Several barriers have been repeatedly found to influence the unacceptably low rate of influenza vaccination of HCPs. The existence of erroneous beliefs and perceptions about adverse effects are among these [10]. As improvement in this regard is relevant, different strategies, including mandatory vaccination of HCPs, have been tried, but their description and analysis are beyond the scope of this article. By contrast, the least problematic issues were the availability of antivirals and the microbiological diagnoses. Indeed, access to the microbiological diagnosis might have

contributed to facilitate the management of a disease with a non-specific presentation (almost 50% of respondents had significant difficulties with the case definition). Nevertheless, it should be emphasized that microbiological diagnosis is most useful at the beginning of the epidemic, when the disease presentation has not been fully characterized, and in those cases severe enough to require hospital admission.

Our survey was intended to provide a global perspective on the beliefs of Spanish infectious diseases professionals about 2009 A (H1N1) influenza. Although undoubtedly there are limitations resulting from the study design, an online survey of the whole membership of the SEIMC, it would have not been feasible to access these professionals by different means. To summarize, although the majority of respondents did not believe that 2009 A (H1N1) influenza had a more severe presentation, they were mostly happy with the management of the pandemic in their institutions and the guidance provided by local, national and international institutions.

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## Transparency Declarations

All authors have no conflict of interest to declare.

## References

1. Fraser C, Donnelly CA, Cauchemez S *et al*. Pandemic potential of a strain of influenza A (H1N1): early findings. *Science* 2009; 324: 1557–1561.
2. World Health Organization. Global alert and response (GAR). Pandemic (H1N1) 2009—update 88. Available at: [http://www.who.int/csr/don/2010\\_02\\_19/en/index.html](http://www.who.int/csr/don/2010_02_19/en/index.html) (last accessed 21 February 2010).
3. World Health Organization. Global alert and response (GAR). Pandemic (H1N1) 2009. How will the global response to the pandemic H1N1 be reviewed? Available at: [http://www.who.int/csr/disease/swineflu/frequently\\_asked\\_questions/review\\_committee/en/index.html](http://www.who.int/csr/disease/swineflu/frequently_asked_questions/review_committee/en/index.html) (last accessed 1 April 2010).
4. Lautenbach E, Saint S, Henderson DK, Harris AD. Initial response of health care institutions to emergence of H1N1 influenza:

- experiences, obstacles, and perceived future needs. *Clin Infect Dis* 2010; 50: 523–527.
5. Thompson WW, Shay DK, Weintraub E *et al*. Mortality associated with influenza and respiratory syncytial virus in the United States. *JAMA* 2003; 289: 179–186.
  6. Morens DM. Influenza-related mortality: considerations for practice and public health. *JAMA* 2003; 289: 227–229.
  7. Glaser CA, Gilliam S, Thompson WW *et al*. Medical care capacity for influenza outbreaks, Los Angeles. *Emerg Infect Dis* 2002; 8: 569–574.
  8. Rodriguez-Noriega E, Gonzalez-Diaz E, Morfin-Otero R *et al*. Hospital triage system for adult patients using an influenza-like illness scoring system during the 2009 pandemic—Mexico. *PLoS ONE* 2010; 5: e10658.
  9. Hofmann F, Ferracin C, Marsh G, Dumas R. Influenza vaccination of healthcare workers: a literature review of attitudes and beliefs. *Infection* 2006; 34: 142–147.
  10. Clark SJ, Cowan AE, Wortley PM. Influenza vaccination attitudes and practices among US registered nurses. *Am J Infect Control* 2009; 37: 551–556.