

# The 1918 “Spanish Flu” in Spain

Antoni Trilla, Guillem Trilla, and Carolyn Daer

Hospital Clinic, Institut d'Investigacions Biomediques August Pi I Sunyer, University of Barcelona and Centre de Recerca en Salut Internacional de Barcelona, Barcelona, Spain

**The 1918–1919 influenza pandemic was the most devastating epidemic in modern history. Here, we review epidemiological and historical data about the 1918–1919 influenza epidemic in Spain. On 22 May 1918, the epidemic was a headline in Madrid’s ABC newspaper. The infectious disease most likely reached Spain from France, perhaps as the result of the heavy railroad traffic of Spanish and Portuguese migrant workers to and from France. The total numbers of persons who died of influenza in Spain were officially estimated to be 147,114 in 1918, 21,235 in 1919, and 17,825 in 1920. However, it is likely that >260,000 Spaniards died of influenza; 75% of these persons died during the second period of the epidemic, and 45% died during October 1918 alone. The Spanish population growth index was negative for 1918 (net loss, 83,121 persons). Although a great deal of evidence indicates that the 1918 A(H1N1) influenza virus unlikely originated in and spread from Spain, the 1918–1919 influenza pandemic will always be known as the Spanish flu.**

The 1918–1919 influenza pandemic was the most devastating epidemic in modern history. The estimated number of deaths related to the infection worldwide ranged from 20 to >50 million [1–3]. The morbidity pattern (affecting mostly young and healthy persons), together with the rapid disease progression to fatal multiorgan failure and death, were distinct features of the 1918–1919 influenza pandemic [3–6].

Currently, there is consensus surrounding the name given to the pandemic. Some authors [7,8] state that, late in the spring of 1918, the Spanish wire news service Agencia Fabra sent cables to Reuters news service headquarters in London saying, “A strange form of disease of epidemic character has appeared in Madrid. The epidemic is of a mild nature; no deaths having been reported” [8, p. 59]. Since its beginning, the epidemic has been called the Spanish flu (or the “Spanish Lady”), probably because of the misinformation surrounding the news about the origin of the epidemic. It is usually

accepted that, because Spain was a neutral country in World War I, freedom of the press in Spain was greater than that in the allied countries and in Germany. The US and European press, likely for political reasons, did not acknowledge or transmit timely and accurate news about the high number of casualties among their military and civilian population that were attributable to the ongoing influenza epidemic [9–12]. Nearly 90 years later, although virologists and epidemiologists worldwide agree that the influenza virus did not originate in Spain, the name remains: the 1918–1920 influenza pandemic will always be known as the Spanish flu.

Some authors [13] indicate that the influenza epidemic probably started in British Army camps in mainland Europe sometime during the period 1916–1917. However, there are also consistent data about its appearance in US Army training camps during the spring of 1918 [8–10, 14], and even more recent data suggest that the influenza epidemic could have started in New York City [15].

Recently published research results about the origin, recovery, characterization, and molecular biology of the 1918–1919 virus [16], as well as predictions about the likelihood of a new influenza pandemic in the near future [17, 18], provide reminders of how severe and disrupting such an epidemic could be. Despite its name, little is known about the course and consequences of

Received 24 February 2008; accepted 6 May 2008; electronically published 24 July 2008.

Reprints or correspondence: Dr. Antoni Trilla, UASP, Hospital Clinic, Villarroel 170, 08036 Barcelona, Spain (atrilla@ub.edu).

**Clinical Infectious Diseases** 2008;47:668–73

© 2008 by the Infectious Diseases Society of America. All rights reserved.

1058-4838/2008/4705-0012\$15.00

DOI: 10.1086/590567

the Spanish flu in Spain [19, 20]. Here, we review epidemiological and historical data on the 1918–1919 influenza epidemic in Spain.

### SPRINGTIME IN SPAIN, 1918

Spain remained neutral during World War I. As the end of the war approached in 1918, the country faced a difficult social and political situation. Alfonso XIII, the King of Spain, ruled a socially divided country with most of its close to 20,000,000 citizens impoverished because of the lack of trade and supplies that resulted from World War I. In Spain, the inflation rate was the highest (20.1%) it had been since the beginning of the 20th century [21], and there was an increasing incidence of social class conflicts, including several general strikes.

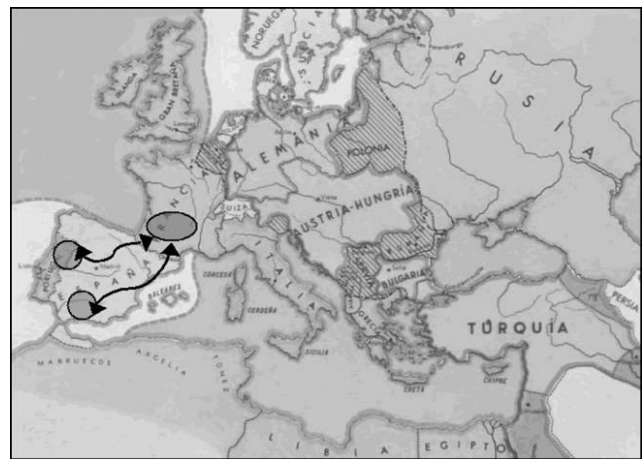
The first public news of the epidemic appeared in Madrid. On 22 May 1918, the influenza epidemic was a headline in Madrid's *ABC* newspaper [22]. News stated that spread of a strange influenza-like illness, which was very mild, had been ongoing since the beginning of May. Because of Madrid's yearly local holidays (Fiesta de San Isidro), a great number of people gathered in ballrooms and popular parties (Verbenas) during the third week of May and, thus, were likely exposed to a high risk of virus transmission [11, 19]. The reported illness was a sudden one; some people even collapsed while walking in the street. The illness presented as a 2–3-day fever, gastrointestinal symptoms, and general malaise and was associated with a very low mortality rate. A week later (28 May), King Alfonso XIII became ill, as did the Prime Minister and some cabinet members. Many workers stayed home from work because of the illness, and some basic services, including the postal and telegraph services, and some banks and saving accounts offices were forced to temporarily close operations [11, 19, 20]. The epidemic was daily news at that time, under the headline "La epidemia reinante" ("The Prevailing Epidemic"). Because of the initial perceived lack of severity of the illness and because of Spanish sense of humor, the influenza was known popularly in Madrid as the "Soldado de Napoles" ("Naples Soldier"), which was the name of a popular song from a highly successful musical, *La canción del olvido*, which was playing at the same time at Madrid's Teatro de la Zarzuela. The song was so popular that it was deemed to be "highly contagious," like influenza [19].

Some observers suggested that the epidemic could have been spread from France because of the heavy railroad traffic of unskilled Spanish and Portuguese workers to and from France who provided temporary replacement for the shortage of young French workers engaged in the war [11, 23]. Aside from a historical rivalry between France and Spain, this is the likely reason why, in Spain, the influenza was also known as the French flu [19]. Because of their seasonal travel by railroad, these migrant workers were a likely source for the introduction

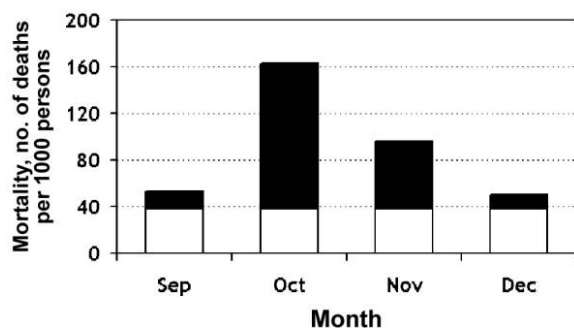
and spread of the influenza virus in Spain. Starting in central and southern France (close to the battlefields and Army camps) and following the railway path from north to east (Portugal) and from north to south (Andalusia), the influenza spread throughout nearly all of Spain's provinces [11, 19, 20, 23, 24] (figure 1). Mortality rates associated with influenza in this first period of the epidemic ranged from 0.04 to 0.65 deaths per 1000 inhabitants [19]. The overall mortality rate increased only slightly during this first epidemic period. The unknown and elusive etiology of the epidemic further hampered and discredited the work of public health physicians, who were challenged daily by the press [25, 26]. However, the first period of the epidemic ended quickly. Nearly 2 months later, everything seemed to be back to normal.

### AUTUMN AND WINTER IN SPAIN, 1918

The second period of the epidemic appeared slowly in many parts of Spain in September 1918, reaching its peak in October and waning in December 1918. It is impossible to confirm whether the A(H1N1) virus was reintroduced to Spain from France or whether the virus was still circulating within the country [19, 20]. Public health authorities acknowledged the important role that the railway transportation system might play in the spread of the epidemic [24–26]. Several infection-control measures in main inland train stations and hubs were enforced. Trains loaded with Portuguese workers were stopped in Spain, midway to Portugal, and passengers were not allowed to exit the train until it departed again to Portugal [19, 20, 24]. Spanish military training camps acted as an efficient diffusion mechanism; sick military personnel with influenza were relieved from duty and sent home by train to rest and receive medical care [19, 23].



**Figure 1.** Map of Spain and Europe in 1918, showing main train routes and destinations from Spain and Portugal to and from southern and central France.



**Figure 2.** Mortality rate in Spain during the second period of the influenza pandemic (1918). White bars show historical mortality based on monthly rates during the period 1913–1917; black bars show excess of mortality during the 4-month period (September–December) in 1918 [19]

Once the influenza virus occurred in a Spanish town or village, probably carried there by migrant workers or by military personnel, there was another factor that fostered its spread. At the end of the summer, thousands of Spanish towns and villages celebrated their traditional holidays with popular parties and highly attended Catholic Mass celebrations. In some instances, influenza was even confused with a foodborne illness, because nearly all of the persons attending these events became ill a few days later.

Influenza-related mortality rates were extremely high, ranging from 0.5 to 14.0 deaths per 1000 inhabitants [19]. The mean monthly number of deaths of all causes was calculated for the period 1913–1917 and was plotted against the observed number of deaths for the period September–December 1918. This calculation provided the excess number of deaths (figure 2) during the second period of the influenza epidemic.

The normal life of Spaniards was disrupted. School and university terms were cancelled, but other public gatherings, such as those at church services or theaters and cinemas, continued [11, 19, 20, 23]. There were hard challenges when trying to implement public health–control measures. Public health officials in Valladolid, Spain, argued with local authorities about officially declaring that there was an ongoing epidemic, because local holidays (and the related business) were at their peak [27]. The argument that finally persuaded the authorities involved the compensation system for health care workers. If a physician died of the infection while on duty and if there was not yet an epidemic situation officially declared, then the widow was not entitled to receive a pension fund from the government. Physicians put heavy pressure on the mayor of Valladolid, and the influenza epidemic was, for the first time, officially declared in Spain [19, 27].

The town Zamora had one of the highest mortality rates in Spain, reaching a peak of 10.1% in October 1918 (overall influenza mortality rate in Spain in the same month, 3.8%). It ranked second to Burgos (influenza-associated mortality rate

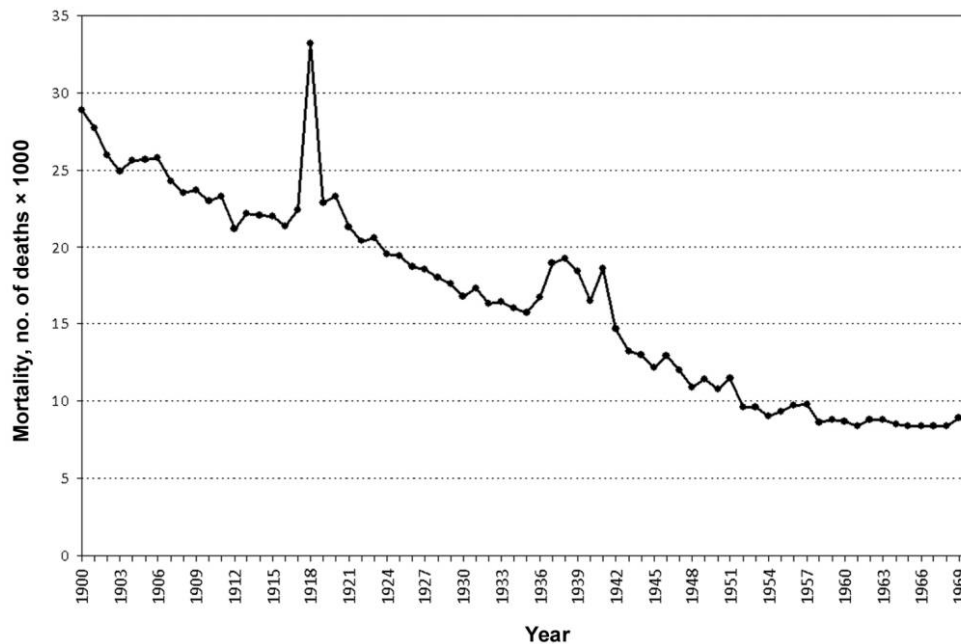
in October 1918, 12.1%). Because of a strong social influence of the Bishop, the Catholic Church authorities in Zamora stated that “the evil upon us might be a consequence of our sins and lack of gratitude, and therefore the vengeance of eternal justice felt upon us” [19, p. 149] and, subsequently, organized a series of Mass gatherings at Zamora’s Cathedral. One of the likely consequences of the events was the easy spread of the virus. The attempts of civil authorities to forbid Mass gatherings were disputed by the Bishop, who accused the political and public health authorities of undue interference with the church. Daily Mass continued with even larger audiences in those times of trouble and sorrow [19]. A common prayer at that time was an ancient one named *Pro tempore pestilentia* (For the Times of Pestilence), which asked God that persons be spared from plague and famine and expressed the people’s belief that it was God’s will that they were afflicted and that God’s mercy would end the affliction.

Public health measures adopted by political authorities included disinfection with phenolic oil or creoline (Zotal, a very popular disinfectant at the time) (figure 3). The Spanish Royal Academy of Medicine questioned the rationale and the effectiveness of these methods [19, 23], but the opinion of local authorities prevailed, and travelers, their baggage, and railway and tramway wagons were disinfected. Theaters, cafeterias, and churches were also disinfected. Even the mail was disinfected. In some Spanish cities, streets were cleaned with a mixture of water and sodium hypochlorite, and spitting was banned. In Madrid, the Congress and the Senate buildings were also disinfected [11, 19, 20, 23].

Physicians and Public Health Officials suggested several measures to prevent influenza transmission. These measures included cleaning and disinfecting the mouth and nostrils with



**Figure 3.** A street advertisement for Zotal, a popular disinfectant of the time, used during the 1918–1919 influenza epidemic in Spain (reproduced with permission of Zotal Industry).



**Figure 4.** Mortality rates in Spain from 1900 through 1970. Original data are from the Spanish Office of Census Bureau (Instituto Nacional de Estadística) and Navarro et al. [30].

hydrogen peroxide or a mixture of oil and menthol, avoiding meetings or gatherings in closed settings, avoiding direct contact with ill people, eating a healthy diet, walking often in fresh open air, ventilating homes, and resting as needed. These seemingly simple measures were often hard to observe, especially for the lowest-income population [11, 19, 23].

The Spanish Health System was overwhelmed and did not provide an efficient response [11, 19, 20, 23–25, 28]. Many small villages scattered around the country lacked medical assistance; their physicians died, and replacement was not easy (some volunteer medical school students were deployed).

The small array of treatments prescribed included symptomatic therapy with salicylates and quinine and codeine for cough. For persons who developed pneumonia, the therapeutic options were even fewer and included intramuscular or intravenous treatment with silver or platinum colloid solutions, digitalis, alcanthor oil, or adrenaline. Bleeding was often used. Some experimental vaccines were also tried, notably those including mixtures of pneumococci, streptococci, and Pfeiffer bacillus (*Haemophilus influenzae*). All efforts proved to be nearly useless, and Spaniards started wondering again whether medical researchers and scientists had any idea of what was really happening.

Because of the high mortality rate, funeral homes and churches were besieged. Some Spanish cities ran out of coffins. The mayor of Barcelona requested the army's help for the transportation and burial of the dead, because the city hall workers on duty were scarce [29]. Some special laws were approved,

including the suspension of the usual 2–3-day funeral ceremonies that lead to the Dead Mass (*Corpore insepulto*), which ends with the burial of the corpse in accordance with the Catholic rites. Corpses were ordered to be buried as soon as possible, without the usual long ceremonies. Even the common church bell's toll for the dead from the 16th century (*Toque de difuntos*), characterized by its increasing speed, was banned in some villages to avoid further panic and demoralization of the inhabitants [11, 19]. The Spanish newspapers of that time usually devoted the front page or pages to obituaries; during the peak of the second epidemic period, as many as 4 or 5 pages were used for obituaries.

### WINTER AND SPRING IN SPAIN, 1919

The third and final period of the influenza epidemic in Spain occurred from January through June 1919. The severity and duration of this period was milder than those of the second epidemic period. It primarily affected the areas of Spain where the first epidemic occurred, and it spared the majority of the areas that were most affected by the second period. Mortality rates ranged from 0.07 to 1.40 deaths per 1000 inhabitants [19]. The total numbers of persons who died of influenza in Spain were officially estimated to be 147,114 in 1918, 21,235 in 1919, and 17,825 in 1920 [23].

If the common epidemiological index for deaths due to pneumonia and influenza is used, based on official morbidity and mortality figures, it is likely that >260,000 Spaniards died;

close to 75% of these persons died during the second period of the epidemic, and 45% died in October 1918 [19]. The mortality pattern associated with the Spanish influenza that was seen elsewhere was also seen in Spain; mortality rates were higher among persons aged <1 year and among those aged 25–29 years [19, 30–32].

Overall, the mortality rate in 1918 was the highest in Spain in the 20th century (figure 4) [30–32]. The population growth (net gain of inhabitants) was negative in Spain only twice during the 20th century: in 1918 (related to the influenza epidemic; net gain, –83.121 persons) and in 1939 (related to the Spanish Civil War; net gain, –50.266 persons) [30]. Recently, Murray et al. [33] estimated that the excess mortality associated with the 1918–1920 influenza pandemic in Spain was 1.49% (95% CI, 1.47%–1.50%).

Some reports suggested that >8 million Spaniards developed influenza, but several Spanish authors clearly dismissed this figure as exaggerated [20, 23]. On 13 July 1918, the *British Medical Journal* cautioned about this figure: “The influenza that we read so much about in the daily papers...appears to have been particularly widespread in Spain during the month of May; that there were 8 million cases of the disease in that country, as it was alleged by the French press at the time, is a statement requiring perhaps a grain of salt for deglutition, but certainly pointing to a very heavy incidence” [34, p. 39]. Given the transmission rate in the 1918–1919 Spanish flu pandemic [35], it is not surprising that a high number of persons developed the illness; however, most experienced a mild and more common clinical presentation. The lack of highly reliable morbidity statistics precludes any further refined analysis of these data.

A few months after its onset, the existence of the epidemic was clearly recognized outside Spain: “Influenza exists apparently in every country in Europe, and also in North, West, and South Africa; in India; and in the North American Continent. Epidemic prevalence this year was heard of first in Spain in May” [36, pp. 439–40]. The *Canadian Medical Association Journal* published, “Under the name of Spanish influenza, an epidemic is sweeping over the North American Continent. It is said to have made its appearance first in Spain, hence Spanish influenza” [37, p. 1305].

The 1918–1919 influenza pandemic was the worst pandemic that has occurred in Spain. It placed extraordinary stress on the public health and medical systems [38] and on medical professionals [9, 19, 20]. The pandemic was probably responsible for >260,000 deaths (1% of the Spanish population), with an excess mortality of close to 1.5% [23, 33].

The influenza pandemic was known worldwide as the Spanish flu [39]. Since the pandemic, Spain has been added to a historical short list of countries with disease-associated names. Although several nations are now claiming Spanish influenza as their own [40] and virologists and epidemiologists agree that

the virus probably did not originate in Spain, the 1918 influenza pandemic will always be known as the Spanish flu pandemic. Spain and the rest of the world must never forget the warning that was received.

## Acknowledgments

We thank the staff of the Biblioteca de la Real Academia de Ciencias Exactas y Físicas y Naturales; Biblioteca de la Facultad de Medicina de la Universidad de Barcelona; Hemeroteca de l'Arxiu Històric de la Ciutat de Barcelona; Laboratoris Zotal, Mariola Morales, and Ramón Navarro, for their help; and Marta Giol, for administrative support.

**Potential conflicts of interest.** All authors: no conflicts.

## References

1. Johnson NPAS, Mueller J. Updating the accounts: global mortality of the 1918–1919 “Spanish” influenza pandemic. *Bull Hist Med* **2002**; 76: 105–15.
2. Patterson DK, Pyle GF. The geography and mortality of the 1918 influenza pandemic. *Bull Hist Med* **1991**; 65:4–21.
3. Taubenberger JK, Morens DM. 1918 Influenza: the mother of all pandemics. *Emerg Infect Dis* **2006**; 12:15–22.
4. Luk J, Gross P, Thompson WW. Observations on mortality during the 1918 influenza pandemic. *Clin Infect Dis* **2001**; 33:1375–8.
5. Kilbourne ED. Influenza pandemics of the 20th century. *Emerg Infect Dis* **2006**; 12:9–14.
6. Nguyen-Van Tam JS, Hampson AW. The epidemiology and clinical impact of pandemic influenza. *Vaccine* **2003**; 21:1762–8.
7. PBS. A science odyssey: people and discoveries. Worldwide flu pandemic strikes, 1918–1919. Available at: <http://www.pbs.org/wgbh/aso/databank/entries/dm18fl.html>. Accessed 22 March 2008.
8. Davies P. *The devil's flu*. New York: Henry Holt & Co, **2000**.
9. Barry JM. *The great influenza: the epic story of the deadliest plague in history*. New York: Viking, **2004**.
10. Kolata G. *Flu: the story of the great influenza pandemic of 1918 and the search for the virus that caused it*. New York: Simon and Schuster, **1999**.
11. Bertran JL. *Historia de las epidemias en España y sus colonias (1348–1919)*. Madrid: La Esfera de los Libros, **2006**.
12. Collier R. *The plague of the Spanish Lady*. London: Allison & Busby, **1996**.
13. Oxford JS, Sefton A, Jackson R, Innes W, Daniels RS, Johnson NPAS. World War I may have allowed the emergence of “Spanish” influenza. *Lancet Infect Dis* **2002**; 2:111–4.
14. Reid AH, Taubenberger JK, Fanning T. The 1918 Spanish influenza: integrating history and biology. *Microbes Infect* **2001**; 3:81–7.
15. Olson DR, Simonsen L, Edelson PJ, Morse SS. Epidemiological evidence of an early wave of the 1918 influenza pandemic in New York City. *Proc Natl Acad Sci U S A* **2005**; 102:11059–63.
16. Tumpey TM, Basler CF, Aguilar P, et al. Characterization of the reconstructed 1918 Spanish influenza pandemic virus. *Science* **2005**; 310: 77–80.
17. Horimoto T, Kawaoka Y. Influenza: lessons from past pandemics, warnings from current incidents. *Nat Rev Microbiol* **2005**; 3:591–600.
18. Belshe RB. The origins of pandemic influenza—lessons from the 1918 virus. *N Engl J Med* **2005**; 353:2209–11.
19. Echeverri B. *La gripe española: la pandemia de 1918–1919*. Colección Monografías (132). Madrid: Centro de Investigaciones Sociológicas, **1993**.
20. Rico-Avello C. La epidemia de gripe: 1918–1919. *Gaceta Medica Española* **1964**; 38:1–4.
21. García-Ruiz, JL. La inflación en la España del siglo XX: teorías y hechos. *Boletín Económico del ICE* **2000**:2667.
22. Resumen de Noticias. ABC (Madrid). 22 May **1918**:24.

23. Rico-Avello C. Historia de la sanidad Española (1900–1935). Madrid: Gimenez, **1969**.
24. de Prado A. La epidemia de gripe de 1918 en Palencia. Palencia Publicaciones de la Institucion Tello Tellez de Meneses **1987**;56:157–216.
25. Anales de la Real Academia de Medicina. Madrid: Real Academia de Medicina, 25 May **1918**.
26. Anales de la Real Academia de Medicina. Madrid: Real Academia de Medicina, 28 June **1918**.
27. Garcia-Duran R. Memoria descriptiva y datos estadísticos de la epidemia gripal padecida en la provincia de Valladolid en el año 1918. Valladolid: University de Valladolid, **1919**.
28. Marañón G, Pittaluga G, Ruiz-Falco A. Informe sobre el actual estado sanitario de Francia y su identidad con la epidemia gripal en España. El Siglo Medico **1918**;3387:916–21.
29. El estado sanitario: La Epidemia Reinante. La Vanguardia (Barcelona). 15 October **1918**:9.
30. Navarro R. Analisis de la sanidad en España a los largo del siglo XX. Madrid: Instituto de Salud Carlos III (Ministerio de Sanidad), **2002**.
31. Instituto Nacional de Estadística. Boletín Mensual de Estadística Demográfica-Sanitaria, 1917–1919. Madrid: Instituto Nacional de Estadística, **1919**.
32. Instituto Nacional de Estadística. Fondo documental del INE: coeficientes de natalidad, nupcialidad y mortalidad, años 1910–1920. Madrid: Instituto Nacional de Estadística, **1920**.
33. Murray CJL, Lopez AD, Chin B, Feehan D, Hill KH. Estimation of potential global pandemic influenza mortality on the basis of vital registry data from the 1918–1920 pandemic: a quantitative analysis. Lancet **2006**;368:2211–8.
34. The influenzal pandemic. BMJ 13 July **1918**:39.
35. Mills C, Robins JM, Lipsitch M. Transmissibility of 1918 pandemic influenza. Nature **2004**;432:904–6.
36. The pandemic of influenza. BMJ 19 October **1918**:439–50.
37. The present epidemic. CMAJ **2003**;168:1305.
38. Schoch-Spana M. “Hospital’s full-up”: the 1918 influenza pandemic. Public Health Rep **2001**;116(Suppl 2):32–3.
39. Potter CW. A history of influenza. J Applied Microbiol **2001**;91:572–9.
40. Oxford J. Nature’s biological weapon. Nature **2004**;429:345–6.