

# Influenza Pandemic: A Perspective

Geert Seynaeve, MD, MPH, MMPHR

---

Deputy Editor, *Prehospital and Disaster Medicine*, Brussels, Belgium

Correspondence:  
geert.seynaeve@attentia.be

Web publication: 07 January 2010

Ten years ago, somewhere during January 1999, half of a bucket of transformer mineral oil found its way into the Belgian food chain. A couple of months later, the ingestion of off-odor soft drinks landed a dozen school children in a hospital. Against the background of major police and judicial dysfunction in a highly mediatized pedophile case, both of these incidents triggered the famous “Dioxin and Coca-Cola Crisis” which turned the tiny kingdom of Belgium upside down. There was a nationwide recall of all Coca-Cola products. Worldwide, imports of Belgian meat and dairy products were suspended, with a direct economic cost of 800 million euro. Ministers resigned, careers were broken, the “eternal” Christian-Democratic governmental parties were removed from power—all of this without a single medical casualty.

Thus, we learned that when there is a widespread perception of a major health risk for a community, minor incidents or major non-events can turn into a public health crisis. This is true, especially when there is inadequate information or scientific uncertainty about the causes, nature, or dimensions of (unusual) health hazards against a background of structural problems, unresolved societal tensions, and dysfunctioning or public distrust of state institutions.<sup>1</sup>

Therefore, it is not difficult to understand why similar mechanisms and analogous dynamics can turn the threat for an influenza pandemic into a public health crisis—this time, however, on an international scale. In this context, a numbers of issues can be raised with respect to the roles and responsibilities of health professionals and scientists.

Some 3,000 people died at the Trade Towers and the Pentagon following the Al-Qaeda attacks of 11 September, 2001. The same day, and every single day since, somewhere in the world, >16,000 people died—from hunger or malnutrition. Every 24 hours, several thousand people die of malaria, >8,000 of AIDS, and >5,000 of tuberculosis. These are real human beings, dying from well-known, treatable diseases today, not potential victims in hypothetical scenarios. Every year in the developing world, 12.2 million children <5 years of age die, most of them from preventable causes. One billion people live on <\$1/day. In the 44 countries with average per capita income of <\$500/year, the average health expenditure is \$12 per person per year.<sup>2–5</sup>

The events of September 11 definitely shaped the international political and ideological landscape, that led to wars in Iraq and Afghanistan. Immediately afterwards, in all of the Western countries, hundreds specimens of dust, sand, sugar, etc. from “suspected” letters were examined in specialized laboratories for anthrax. Ultimately six persons died from anthrax. Although suspicions were raised towards a US defense lab expert, no conclusive evidence was published concerning the source of the anthrax strain used.<sup>6</sup> This was followed by an irresistible bioterrorist hype. All over the world, thousands of papers, courses, guidelines, and exercises emerged concerning CBRN agents and rare diseases. “Dark winter”-type scenarios and risk assessments for so-called low probability events that could have apocalyptic consequences were developed. At huge costs, vaccines for anthrax and smallpox were produced and even tested. Reminiscent of cold-war practices, governments started massively stockpiling drugs and medical and other “crucial” supplies. One cannot stop wondering

how much of all of these efforts and the money spent then really has been used or still could be useful. By contrast, no facts, no figures, no calculations, nor catastrophic images could motivate the “international community” even to start to respond to the chronically unattended health needs of countries far away or of underprivileged social groups.<sup>6,7</sup>

It is unlikely that the potential for an influenza pandemic would have received so much attention had the ground not been prepared by the study of potential biological warfare agents.<sup>8,9</sup> Out of the shadow of the smallpox-beast came Cinderella in the form of the Influenza virus. And suddenly, there was SARS, the first emerging epidemic of the 21st century. Starting in November 2002 in Guangdong Province, China, a severe acute respiratory syndrome spread rapidly from Eastern Asia around the globe. But, by 05 July 2003, the chain of transmission was broken. Between November 2002 and July 2003, a total 7,768 cases and 727 deaths were reported from 26 countries.<sup>10</sup>

More cynical people would point to the analogy of 19th century bourgeoisie becoming sensitive to sanitary conditions of the working classes, once they realized the importance of a fit working force and of the threat of communicable diseases for their own skin.<sup>11,12</sup> During two decennia, Western establishments failed to acknowledge and contain the AIDS pandemic, under the pretext of individual responsibility and personal behavior.<sup>13,14</sup> But SARS sounded the alarm and made official experts and agencies aware that, in times of globalization, selective international surveillance and minimal public health services were required in the sake of “national interest”. Quite logically, the attention of “Homeland” Security and the like turned toward influenza, pushing WHO officialdom finally into action.<sup>15</sup> Those still reluctant to follow were reminded of the 1918 Spanish Flu that killed more Americans in one year than were killed during the First and Second World Wars, the Korea War, and the Vietnam War combined.<sup>16–18</sup> The death toll of the influenza pandemic of 1918/1919 was in the order of 50 million persons in less than one year. Government and business circles also began calculating the economic costs of influenza, realizing the potential disruption and wider socio-economic implications of a pandemic. The goals as they are bluntly formulated in the National Strategy for Pandemic Influenza announced by President Bush in November 2005, are threefold: (1) stopping or slowing the spread of a pandemic in the United States; (2) limiting its domestic spread; and (3) sustaining infrastructure and mitigating the impact to the economy and functioning of society.<sup>19</sup>

Despite the boom in the possibilities of electronic media and information technologies, a number of reasons have made it more difficult for individual health professionals to be timely and adequately informed with respect to public health problems. First, there has been a decennia-long trend of hyper-specialization, growing emphasis on productivity and output, increasing social and professional isolation, lack of clinical supervision and steering mechanisms, and insufficient time and possibilities for exchange, learning, and for cultural or social activities in general. For every person nowadays, there is a continuous bombardment with publicity, messages, news items, and communications in all forms and quality. But, it is an even greater challenge

to keep pace with the rapidly expanding scientific data and professional knowledge, or to develop an adequate search and management strategy for essential and reliable information that is widely dispersed and fragmented. Some help really is needed.

However, when we look at pandemic influenza preparedness, many official websites and planning and guidance documents do not meet the essential standards for peer-reviewed scientific publications. Many do not even include a comprehensive list of citations. Basic assumptions or recommendations are poorly referenced. Uncertainties seem to be banned, scientific controversies are seldom mentioned, and minority points of views and their arguments rarely are described. Innumerable meetings and conferences lack transparency and accountability concerning the criteria used to invite specific researchers, experts, or keynote speakers—little real scientific exchange or discussion has taken place.

There are many competent, scholarly, and conscientious individuals working for private companies. Many other factors, beside corporate interest, can filter or bias information. But, there must be absolute transparency about financial ties and strict rules concerning possible conflicts of interest, not only for authors, but also for reviewers and editors.<sup>20–30</sup>

With the wars on terrorism and in Iraq, credibility of the highest officials and governmental institutions in the USA and the UK suffered major blows, from dys-information on weapons of mass destruction to favors for major business interests like Halliburton. But, many questions and serious concerns can be raised with respect to decision-making for pandemic influenza preparedness. When the US government allocated lucrative contracts to pharmaceutical companies, former US defense secretary Rumsfeld had major stakes in Gilead Sciences, Inc., which had the original rights on Oseltamivir (Tamiflu®), later sold to drug giant Roche. No doubt many private enterprises try to use every opportunity offered by changing market conditions and swings in public mood, to sell their products and services. Big corporations know the working of state institutions better than anyone else. Powerful lobby work has influenced many budgets and (de)regulations. But mere conspiracy theories do not explain the influenza-boom since 2004.

It is true that each year, influenza-viruses infect roughly one-fifth of the human population, causing significant mortality and morbidity worldwide.<sup>31,32</sup> For Western industrialized countries, Influenza A strains are the main agent causing fatal viral infections.<sup>33,34</sup> Even before the etiological agent became known and understanding of pathogenesis developed, influenza (“La Grippe”) could be identified as a separate clinical entity, one of 15 acute respiratory syndromes.<sup>35</sup> Although, following advances in virology and immunology, case definitions became more precise, its seasonal incidence was noted, and several epidemics were recognized.<sup>36</sup>

In general, the changing health impact of communicable diseases can be explained by the variable characteristics of three major factors: (1) the infectious agent; (2) the host; and (3) the environment. Remarkably, throughout the 20<sup>th</sup> century until today, the description of clinical symptoms and signs of uncomplicated influenza, as well as the inefficiency of its symptomatic treatment, have remained essentially the same.<sup>37–49</sup> However, during epidemics, death rates even

among healthy young adults can be important. Secondary infection with pathogenic bacteria (as found in post-mortem specimens in 1918) now is thought to be less relevant in the etiology of fatal pneumonia.<sup>35</sup> In case of complications and a highly pathogenic strain, symptomatic and supportive treatment has been the major clinical approach. To date, the outcomes of the prophylactic and therapeutic uses of anti-viral drugs have been disappointing.

Therefore, the core strategy for pandemic influenza preparedness in the industrialized world is based on timely and effective immunization of the population-at-risk. But existing technology and production capacity of influenza vaccines fail to guarantee containment, even for the richest nations. Hence, the campaigns for better hygiene and the plans for social distancing have become increasingly important with the hope of reducing transmission of an emerging virus strain or at least slowing down the waves of human infections.<sup>32,50</sup> All this compels business continuity planning to be extremely flexible and adaptable to the socioeconomic impact of drastic changes in public health.

Although pandemic influenza preparedness has been improving steadily, many key issues remained unanswered. First and foremost, there are enormous disparities in the strategic arsenal and intervention capacity of developing countries. These countries often house the avian and animal reservoirs with the highest risk for viral antigenic shift and increased infectious and pathogenic potential that may result. As "first line" in the global defence, developing countries are supposed to monitor and try to stop the incipient outbreaks, identify the viral strains involved and—cynically enough—make these factors known to the WHO and private producers of vaccines even though their own population will have no access.<sup>51</sup> For example, the US Navy/Army implemented direct control of at least five key Public Health Surveillance Laboratories and networks in other regions (Peru, Egypt, Kenya, Thailand, Indonesia).<sup>52</sup>

In official meetings and planning sessions, at some point drastic social measures like closing schools and airports have been mentioned. As was the case in 1918, their theoretical benefits rapidly are undermined by controversy and uncontrollable secondary effects.<sup>53</sup> Despite huge financial investments, many fundamental knowledge gaps remain. These have had a major impact on pandemic risk assessments and practical preventive interventions. For both, a better understanding of the antigenic variability of influenza viruses on the molecular level is crucial. Insight into cellular and humoral immunology and the mechanisms explaining differences in infectiousness and pathogenicity (including for different age groups and chronically ill persons) remains inadequate.<sup>54,55</sup>

Finally, as long as transparency and assessments are not improved, much uncertainty will remain concerning the efficacy of vaccines and immunization strategies, and the capacity to deliver them to those in need in time for them to be effective.<sup>56–61</sup> Surprisingly, no comprehensive list has been publicized of the (non)matching results between the chosen strains in annual vaccines and the actually predominant virus responsible for seasonal outbreaks. Although specific vulnerable groups are recommended for priority vaccination, the overwhelming majority of clinical trials have been conduct-

ed on healthy, young military recruits. Follow-up studies on efficacy in cases of repeated annual influenza immunization are equally lacking. Also, one should not forget the health risks involved in influenza vaccinations, as was the case in 1976 in the USA when a mass immunization campaign in the USA was interrupted because of liability for side effects, including some high profile cases of Guillian-Barré syndrome.<sup>56</sup> It remains unclear which of these elements is co-responsible for the fact that—surprisingly, <25% of healthcare workers in Europe are covered by seasonal influenza vaccination.<sup>32</sup>

The events following the 2009 H1N1 influenza outbreak cast even more doubt on basic interventional strategies, organisational responsibilities, and critical decision-making processes. Although the strain involved<sup>63</sup> results from what could be called an antigenic pseudo-shift, and inter-personal transmission is rapid, the apparent limited virulence makes it difficult to understand why engagements of resources and money are so disproportionate in relation to the actual morbidity and mortality reported.<sup>64–67</sup> Some already call it "a pandemic of indecency", because of the relative importance given to H1N1 compared to other global health problems.<sup>68</sup>

Adequate risk management of the recent H1N1 outbreak has not been helped by current outbreak modelling nor by official communication strategies. Analyzing, not to say predicting, the outbreak dynamics of a genetically unstable and phenotypically changing virus, poorly understood host immunity, diverse populations, and complex environments requires multi-disciplinary and international collaboration. All too often, uncertain parameters have been replaced by simplistic assumptions. Lack of recent or timely data have been jacked-up by a-historic analogies, failing surveillance by wild speculations.<sup>69</sup> The experience with the avian "cousin" H5NA should have made us more prudent. The WHO projection of 150 million deaths were ventilated, but until today, some 421 human infections were documented and 257 died from highly pathogenic avian influenza. The price has been paid by backyard and subsistence farming—biosafety or zoonotic diseases rarely endanger the practices or profits of agrobusiness.

The 1918 pandemic illustrates that influenza does not spread in a vacuum. The macro-environment of war, censorship, malnutrition, mass transport, and gatherings with inadequate hygiene or social distancing, all played an important role. The World population then was something like two billion, with communication and traveling incomparable with the modern era of globalization. It is difficult to imagine how little was known about the agent as it only was in 1931 that a swine "filtrable virus" was isolated. Quite rudimentary notions of immunology prevailed. Serological techniques and sequencing were non-existent. Diagnostic chest x-rays, intravenous fluid therapy, and disposables were not available, antibiotics and artificial ventilation<sup>54</sup> were unknown, as were vaccines and anti-virals. It is not easy to calculate to what extent this would have changed the overall mortality rate of 2% for Americans and Europeans infected in 1918.

Also, at the end of the 20<sup>th</sup> century, health services and research laboratories were conquered by managerial doctrines, with an evidence base matching that of astrology. Not embarrassed by non-existing field experience or scientific illiteracy, managers took over decision-making. Obsessed by

what they called “communication”, spokespersons and spin doctors also invaded the field of crises and emergencies. Influenced by the world of publicity and stardom, packaging and image became more important than content and truth. Communication essentially was seduction, often coming very close to manipulation. Commercial ads target hearts and senses, play with emotions and perceptions, but finally, go for your wallet. However, crisis communication is much more complex and long term, involves values of trust and honesty, requires real information, and sometimes, education. Because, as we have learned, major non-events can sometimes turn into public health crises.

So are scientists and health professionals free of blame and shame? Is it enough to do our utmost best in our daily jobs, treating disease, nursing wounds, comforting patients, managing departments, running experiments, and counting the dead? Scientific progress requires transparency and a critical approach. Best practices in health are not served by complacency and peer nepotism. Can we then stay away from the arena of politics and limit ourselves to damage limitation of

decisions made elsewhere? Can we continue to try canalize part of the resources spent on inadequate priorities towards more essential objectives?

In our own field, much has to be done. There is a need for health practitioners and clinicians to see their activities in a broader perspective, learn to reflect in terms of communities, and stop ignoring societal problems.<sup>71</sup>

But, health practitioners, administrators, and researcher also should become more active and socially responsible citizens, advocating values, informing the public, contributing to debate, and interfering with the way decisions are taken, budgets are fixed, priorities are set, and investments are made, both locally and internationally. Reducing the global burden of disease, tackling the unacceptable health disparities, including those within industrialized nations, cannot depend on charity or the foundations of the billionaires of our planet.

If the threat of an influenza pandemic is worth all the efforts already spent on preparedness, then surely, billions more are needed to start dealing with unattended health needs and neglected risk factors elsewhere.

#### References

- Seynaeve G: The 1999 dioxin and Coca Cola crisis. A case study in Public Health Crises. Brussels, Belgium. Ecomed 2003.
- Murray CJL, Lopez AD: Evidence-based health policy—Lessons from the global burden of disease study. *Science* 1996;274:740–743.
- World Health Organization: The World Health Report 2008: Geneva: WHO, 2008.
- International Federation of Red Cross and Red Crescent: *The World Disasters Report 2000. Focus on Public Health*. Geneva: IFRC, 2000, p 240.
- World Health Organization (WHO): *The World Health Report 2008: Primary health Care. Now More Than Ever*. Geneva: WHO, 2008.
- Mathers CD, Loncar D: Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med* 2006;3(11):2011–2030.
- Norris JN: Social inequalities undiminished. Amstelveen, The Netherlands. *T Soc Geneeskunde* 1980;58 Suppl:13–18.
- Knobloch J, Finke EJ, Domres B: Seuchenhygienen und Bekämpfung. In: *Schutzkommission beim Bundesminister des Innern. Katastrophenmedizin. Leitfaden für die ärztliche Versorgung im Katastrophenfall*. Berlin: Auflage, 2002, pp 180–223.
- Sasse J: Biologische Gefahren. Beiträge zum Bevölkerungsschutz. Bonn, BBK: Germany: 2005, p 394.
- Oshitani H: Lessons learned from international responses to severe acute respiratory syndrome (SARS). *Environmental Health and Preventive Medicine* 2005;10(5):251–254.
- Monson RR: *Occupational Epidemiology*. 2d ed. Boca Raton, Florida: CRC Press 1990, pp 1–12.
- Lindeboom GA: *Inleiding to de geschiedenis der geneeskunde. [Introduction in the history of medicine]*. 7th ed. Rotterdam, The Netherlands: Erasmus Publishing, pp 251–252.
- Zylberstein JC (ed): *Rapport de la Commission d'Enquête sur l'état des Connaissances Scientifiques et les Actions Menées à l'égard de la Transmission du SIDA*. Paris: Union Générale d'Éditions, 1993, p 559.
- Fan HY, Conner RF, Villareal LP: *AIDS: Science and Society*. Fifth Edition. Sudbury, Massachusetts: Jones and Bartlett Publishers, 2007, p 249.
- Tucker JB: Scourge: *The Once and Future Threat of Smallpox*. New York: Atlantic Montly Press, 2001, p 291.
- Kolata G: *Flu: The Story of the Great Influenza Pandemic of 1918 and the Search for the Virus that Caused It*. New York: Simon & Schuster Adult Publishing Group, 2001, p 352.
- Barry JM: *The Great Influenza: The Epic Story of the Deadliest Plague in History*. Viking Books: New York, 2004, p 546.
- Johnson NP, Mueller J: Updating the accounts: Global mortality of the 1918–1920 “Spanish” influenza pandemic. *Bull Hist Med* 2002;76:105–115.
- US Homeland Security Council: National Strategy for Pandemic Influenza. Implementation Plan. One Year Summary. Washington: DHS, 2007, p 36.
- Gorner P: New England Journal of Medicine Eases Conflict-of-Interest Policy for Authors. *Chicago Tribune*, 13 June 2002.
- Topol EJ, Nurok M, Ratain MJ, Sheridan ME, Lo B, Wolf L, Mccrary SV, Mccullough LB, Brody BA, Martin JB, Kasper DL: Conflict-of-interest policies. *N Engl J Med* 2001;344:1017–1018.
- Parascandola M: A turning point for conflicts of interest: The controversy over the National Academy of Sciences' First Conflicts of Interest Disclosure Policy. *JCO* 2007;25:3774–3779.
- Rothman DJ, McDonald WJ, Berkowitz CD: Professional medical associations and their relationships with industry: A proposal for controlling conflict of interest. *JAMA* 2009;301:1367–1372.
- Tripathi S: Not just for profit, or not just? As the Swiss drug company behind Tamiflu comes under pressure to allow clones, Salil Tripathi asks whether bargain-basement copies really help. *The Guardian* 04 November 2005.
- Russell S: Biotech firm wants to regain control of avian flu drug. Gilead says deal with Roche Inc. threatens Tamiflu's production. *San Francisco Chronicle* 24 June 2005.
- Wachman R: Roche poised for £1 bn deal on bird flu drugs. Companies boost production of anti-virals for national stockpiles. *The Observer UK* 27 October 2005.
- Mathiason N: Roche makes a killing. As panic spreads over the avian flu, the Swiss pharmaceutical giant is accused of putting profits before people. *The Observer UK* 23 October 2005.
- Beaumont P, Hinsliff G: WMD: How it went wrong. Since David Kay's bombshell last week, intelligence experts are revealing the truth behind Saddam's threat to the West. *The Observer* 01 February 2004.
- Lean G, Owen J: Donald Rumsfeld makes \$5m killing on bird flu drug. *The Independent, UK* 12 March 2006.
- Hayden FG, Palese P: Influenza Virus In: Richman DD, Whitley RJ, Hayden FG (eds). *Clinical Virology*. New York: Churchill Livingstone, 1997, pp 911–942.
- Seynaeve G: Pandemic Influenza Preparedness Planning. Report on the 4th Joint EC/ECDC/WHO Workshop on Pandemic Influenza Preparedness. Luxembourg, 25–27 September 2007. Copenhagen, Denmark, WHO Regional Office for Europe, 2007, p 46.
- Assaad F, Borecka I: Nine-year study of WHO virus reports on fatal virus infections. *Bull WHO* 1977;55(4):445–453.
- Assaad F, Cockburn WC: A seven-year study of WHO virus laboratory reports on respiratory viruses. *Bull WHO* 1974;51(5):427–445.
- Christie AB: *Infectious Diseases. Epidemiology and Clinical Practice*. 2d ed. New York: Churchill Livingstone, 1974, pp 316,326–331, 336–338.
- Boix E: Grippe. In: Brissaud E, Pinard A, Reclus P (eds), *Pratique Médico-Chirurgicale*. Tome III. Paris: Masson et Cie Editeurs, 1907, pp 371–394.

36. Rubin EH: *Diseases of the Chest. With Emphasis on X-Ray Diagnosis*. Philadelphia: WB Saunders, 1948, pp 102–108.
37. Friedwald WF: Influenza. In: Harrison TR (edit), *Principles of Internal Medicine*. Second Edition. New York, Toronto, London: McGraw-Hill Book Co, 1954, pp 1079–1081.
38. Lyght CE (ed): *The Merck Manual of Diagnosis and Therapy*. 9th edition. Rahway, NJ: Merck & Co Inc., 1956, pp 866–870.
39. Horsfall FL: Influenza. In: Cecil RL, Loeb RF: *A Textbook of Medicine*. 9th Ed. Philadelphia, London: W.B. Saunders, 1957, pp 9–13.
40. Lilington GA, Jamplis RW: *A Diagnostic Approach to Chest Diseases: Differential Diagnoses based on Roentgenographic Patterns*. Baltimore: Williams & Wilkins Co, 1965, pp 163–164, 206–207, 299–301, 309–311, 791–794.
41. *Mosby's Comprehensive Review of Nursing*. 7th Ed. Saint Louis: The C.V. Mosby Co, 1969, pp 443, 458.
42. Beland IL: *Clinical Nursing: Pathophysiological and Psychosocial Approaches*. 2d Ed. London: Collier-Macmillan Ltd, 1970, pp 110–149, 297.
43. Brainerd H, Krupp MA, Chatton MJ, Margen S: *Current Diagnosis and Treatment*. Los Altos, California: Lange Medical Publications, 1970, pp 677–678.
44. Wagner RB: Influenza. In: Wintrobe MM (ed): *Harrison's Principles of Internal Medicine*. 6th Ed. New York, Toronto, London: McGraw-Hill Book Co, 1970, pp. 956–959.
45. Daven Port FM: Influenza Viruses. In: Evans AS: *Viral Infections of Humans. Epidemiology and Control*. London, New York, Sydney, Toronto: John Wiley & Sons, 1976, pp 273–296.
46. Parlemuter L, Cenac A: *Dictionnaire pratique de Médecine Clinique*. Paris: Masson, 1977, pp 52–60.
47. Simon HV: Respiratory Viral Infections. In: *Medicine*. Scientific American, 1994, pp 1–8.
48. Tierney LM, McPhee SJ, Papadakis MA (ed): *Current Medical Diagnosis and Treatment*. 39th Ed. New York: Lange Medical Books/McGraw-Hill, 2000, pp 1321–1323.
49. Hampton T: Drug, vaccine research target avian flu. *JAMA* 2007;297:1179–1180.
50. MacDonald N: H1N1 influenza vaccine: Global access for a global problem. *CMAJ* 2009;181(3–4):123.
51. National Strategy for Pandemic Influenza: *Implementation Plan. One Year Summary*. Homeland Security Council, July 2007, p 36.
52. De Goojer AC: *De Spaanse griep van '18. [The Spanish Flu of '18]*. Amsterdam, The Netherlands: Philips-Duphar, 1978, p 235.
53. Plotkin JB, Dushoff J: Codon bias and frequency-dependent selection on the hemagglutinin epitopes of influenza A virus. *Proc Nat Acad* 2003;100(12):7152–7157.
54. Palese P, Tumpey TM, Garcia-Sastre A: What can we learn from reconstructing the extinct 1918 pandemic influenza virus? *Immunity* 2006;24(2):121–124.
55. Shann F: Pneumococcus and Influenza. In: [Need authors or editors] *Modern Vaccines. Current Practice and New Approaches. A Lancet Review*. London, Melbourne, Auckland: Edward Arnold, 1990, pp 87–90.
56. Aijan N: *La vaccination*. 2d Ed. Paris: Institut Mériex, 1985, pp 64–65, 124–126, 136–137, 263–276.
57. Vogt D: Schutzimpfungen. In: Theopold W (editor), *Präventive Medizin*. Frankfurt Am Main, Germany: Umschau Verlag, 1970, pp 153.
58. De Wit GA, Verweij A, Van Baal PHM, Vijgen SMC, Van Den Berg M, Busch MCM, Barnhoom MJM, Schuit AJ: Economic evaluation of prevention: Further evidence. RIVM Report 270091004/2007. Available at <http://rivm.openrepository.com/rivm/bitstream/10029/16478/1/270091004.pdf>. Accessed 18 December 2009.
59. US Preventive Services Task Force: *Guide to Clinical Preventive Services*. 2d Ed. Baltimore: Williams & Wilkins, 1996, pp 791–794.
60. Turner D, Wailoo A, Nicholson K, Coopers N, Sutton A, Abrams K: Systematic review and economic decision modelling for the prevention and treatment of influenza A and B. *Health Technol Assess* 2003;7(35):286.
61. Benenson AS: Infectious Diseases. In: Levine S, Lilienfeld AM (edit), *Epidemiology and Health Policy*. New York-London: Tavistock Publications, 1987.
62. Gatherer D: The 2009 H1N1 influenza outbreak in its historical context. *Journal of Clinical Virology* 2009;45:174–178.
63. Chowell G, Bertozzi SM, Colchero MA, Lopez-Gatell H, Alpuche-Aranda C, Hernandez M, Miller MA: Severe respiratory disease concurrent with the circulation of H1N1 influenza. *N Engl J Med* 2009;361:674–679.
64. Centers for Disease Control and Prevention: Swine influenza A (H1N1) infection in two children—Southern California, March–April 2009. *MMWR* 2009;58:400–402.
65. Zimmer SM, Burke DS: Historical perspective—Emergence of influenza A (H1N1) viruses. *N Engl J Med* 2009;361:279–285.
66. Shinde V, Bridges CB, Uyeki TM, Shu B, Balish A, Xu Xiyang, Lindstrom S, Gubareva LV, Deyde V, Garten RJ, Harris M, Gerber S, Vagasky S, Smith F, Pascoe N, Martin K, Dufficy Deborah, Ritger K, Conover C, Quinlisk P, Klimov A, Bresee JS, Finellie L: Triple-Reassortant Swine Influenza A (H1) in Humans in the United States, 2005–2009. *N Engl J Med* 2009;360:2616–2625.
67. Pariente J: Pour Marc Gentilini, on assiste à une "pandémie de l'indécence". *Le Monde*, France, August 6, 2009.
68. Hak E, Meijboom MJ, Buskens E: Modelling the health-economic impact of the next influenza pandemic in The Netherlands. *Vaccine* 2006;24:6756–6760.
69. Sondervorst FA: *Geschiedenis van de geneeskunde in België. [History of Medicine in Belgium]*. Brussel, Belgium: Elsevier, 1981, p 230.
70. Kovner AVR, Martin SP: *Community Health and Medical Care*. New York, San Francisco, London: Grune & Stratton Inc., 1978, p 483.

Note: This editorial was written on 20 August 2009, during the preparatory phase during the mounting hype of H1N1.



# IT IS IN YOUR HANDS

## JOIN THE WORLD ASSOCIATION FOR DISASTER AND EMERGENCY MEDICINE

and your esteemed colleagues throughout the world who are working together to forge a new direction for this, the most exciting and humanitarian branch of health care. Be a part of the solution for the future of the world!



# WADEM

PO BOX 55158 • MADISON, WI 53705-8958 USA  
FAX: 608-265-3037 • <http://www.wadem.org>