



PROFILE

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In the spring of 1918, a novel H1N1 influenza virus emerged that would go on to kill at least 35 million—and perhaps as many as 100 million—worldwide. It was a time when the global population was a quarter of today’s.

In the spring of 2009, a novel H1N1 virus emerged that, while less lethal, carries striking resonances with its serotype predecessor of 91 years ago. On April 29, the World Health Organization (WHO) issued a Phase 5 pandemic alert for the new infection—one step down from Phase 6, which indicates a full-scale global pandemic.

Perhaps nobody is better prepared to interpret these events than historian John M. Barry. Author of *The Great Influenza: The Epic Story of the Deadliest Plague in History* (Penguin, 2005), Barry has made a literary career of refracting large philosophical and scientific questions through sprawling tales of social disruption. In 2005, the National Academies honored *The Great Influenza* with its Best Book Award. An earlier volume, *Rising Tide: The Great Mississippi Flood of 1927 and How It Changed America*, won the 1998 Francis Parkman Prize from the Society of American Historians for the year’s best book on American history.

In *The Great Influenza*, Barry had initially aspired to write about how science was conducted during an unprecedented emergency. Appearing in the midst of World War I, the virus “created its own killing fields,” he wrote. “For the first time, modern humanity, a humanity practicing the modern scientific method, would confront nature in its fullest rage.” Character-driven and richly descriptive, the book paints an era technologically and politically distinct from our own, but one that contains many policy lessons.

“I’m glad there was as much science in the book as there is—but that wasn’t my purpose,” Barry explained. “When I get into a subject, I like to understand it. I don’t stop researching until I feel that I’ve gotten it.” Indeed, he continues to explore unexamined aspects of the 1918 epidemic—but insists he is not interested in writing a book about the current H1N1 flu epidemic. “I don’t like to go backwards.”

Barry serves on advisory committees at M.I.T.’s Center for Engineering Systems Fundamentals and the Johns Hopkins Bloomberg School of Public Health and was the only nonscientist appointed to a federal government Infectious Disease Board of Experts. He has advised federal, state, and WHO officials on influenza, crisis management, and risk communication.

Barry spoke on May 11, 2009, with contributing writer Madeline Drexler, author of *Secret Agents: The Menace of Emerging Infections* (Penguin, 2003). Drexler holds a visiting appointment at the Harvard School of Public Health.

Q: Your book *The Great Influenza* influenced President George W. Bush's pandemic planning. What did you convey to him in that book that stacks of government reports had not?

A: I wrote the book for a lay audience. I tried to convey what living through the 1918 pandemic was like. To the extent that I succeeded, it may have had more impact than just looking at a statistic—although the statistics are awfully horrifying. The parts of the book that explain the nature of the virus make it pretty clear that influenza remains a threat, even given modern medicine.

I never talked to him. Actually, he had written me a note when he was running for president about my earlier book, *Rising Tide*. But that book certainly didn't seem to influence his response to Katrina.

Q: In general, what insights can a historian offer about flu pandemics that scientists and health officials may miss?

A: Number one: perspective. For example, we need to recognize that the 1918 flu killed between 1.9% and 5.5% of the entire world population.¹ Although the case mortality in developed countries has been widely reported as 2%, that average number, if accurate, masks the intensity of the disease. Even in the West, many large subgroups suffered disproportionately. For example, the Metropolitan Life Insurance Company found that the disease killed 3.26% of U.S. industrial workers aged 25-45 that it insured, meaning case mortality was likely 8% to 12% in that population.² In the developing world, case mortality may have been even higher.

So, perspective is the most important thing—particularly when you're looking at science, because very few scientists look at history. They focus instead on the lab. To a large extent, that does include the past, since everything that has gone before them subsumes the work they are doing at the moment—all the successful experimentation and, for that matter, unsuccessful. The successful stuff is built into where they're at; the unsuccessful stuff has been discarded.

Nonetheless, even to some extent with laboratory science, there is much to be learned from past influenza pandemics. That's even truer for epidemiology and public health and for policymakers in general.

Everybody is familiar with the line from Santayana that those who don't learn from the past are condemned to repeat it. Fewer people are familiar with Hegel's comment: What we learn from history is that we learn nothing from history. It's time we start trying to prove Hegel wrong.

Q: With regard to flu pandemics in particular, where in history would you point scientists and health officials?

A: There is a lot of data on 1918 that has not been explored. It's just sitting there in the archives, unread.

Q: Epidemiological? Case studies?

A: That, and social science as well.

A few months ago I teamed up with some excellent investigators, Lone Simonsen and Cecile Viboud, to publish some of this data (in the *Journal of Infectious Diseases*) about cross-protection in the first and second waves of the 1918 pandemic. I think it does have relevance to the reliability of some of the modeling work that has gone on about 1918, specifically the conclusion that nonpharmaceutical interventions accounted for differences in the experiences of different cities in 1918. Those models need to account for immunity generated by the first wave. So far they don't.

Currently, I'm assembling data from the 1889 and 1918 pandemics and the 1920 outbreak—although it didn't hit everywhere, still it was virtually a fourth wave of the 1918 pandemic—that relate directly to the effectiveness or noneffectiveness of school closings. I thought I was doing this work at my leisure, but recent events have made that work very timely, and I'm trying to finish it quickly.

I think data from 1957 and several seasonal studies, not to mention experience in New York City right now, do suggest that schools tend to spread the disease. However, in seasonal flu the adult population has been exposed to a close cousin of the virus, and, even in recent pandemics with reassorted viruses, there has seemed to be some cross-protection. Schoolchildren are much less likely to have cross-protection from existing strains.

I've always wondered, what happens when everyone's immune system is equal? In 1918, a new virus jumped species as a whole virus, not a reassortant. Everyone's immune system was equal—no one had seen it before. In 1920, again, everyone's immune system was equal—everyone had seen the virus. In those years, it seems so far as if schools played no role in transmitting the disease. The same may be true for 1889, another pandemic year, but I don't know if that virus was a reassortant or not. At any rate, we're trying to figure this out.

But the data are available for anyone to go find, if they want to dig through archives.

Q: You wrote in the book: "Nothing could have stopped the sweep of influenza through either the United States or the rest of the world. But nonetheless interventions and quarantines might have interrupted its progress and created occasional firebreaks." Is that still true today?

A: Let me correct that statement. Quarantine is useless. Since I wrote the book, I've continued to do research. I've spent a lot of time in the last few years looking deeper into historical data. When I wrote that quarantine might have worked, I may have been influenced by what I thought was New York City's experience.

New York City announced a quarantine but didn't do anything else: didn't close schools, didn't ban public gatherings. It didn't do anything. So, I was always very curious as to whether or not quarantine had accounted for its relatively benign experience.

However, after the book came out and after H5N1 surfaced, I continued to look at data and I looked into the quarantine in New York. I also looked into what are very good data from the U.S. Army on quarantine; most of the military camps in the United States had imposed a quarantine.

First, in New York, it's quite evident that there was no quarantine. The health commissioner announced one, but there was never any enforcement of any kind whatsoever. So there was no quarantine in New York, and therefore it had no impact on the course of the disease in New York City. In fact, according to a contemporary epidemiologist, no city did less than New York City in terms of taking large-scale public health actions to contain the disease.

More important, the military data are reliable data. Every major camp in the U.S. had its own camp epidemiologist. If you compare the camps that quarantined with the camps that did not quarantine, it's quite clear there's no difference. And if you cannot successfully quarantine a military camp in the middle of a war, there's no way you can successfully quarantine a civilian community in peacetime.

Q: What does that say about quarantine as a public health tool in 2009?

A: If you're going to have a quarantine, you've got to sustain it. Any action you take has to be sustainable. It's not a one-shot deal like an injection. This is something you have to be disciplined about and keep up day after day and week after week. If it's only imposed for a few days, then it's useless. And if it's not enforced with extraordinary rigor, then somewhere you start getting leakage, and you haven't accomplished anything except inconveniencing people. The models confirm that if you have leakage you might as well have done nothing.

Q: Are there any containment measures that do work?

A: Isolating cases may help slow down an epidemic and may ultimately affect morbidity. Also, in the spring of 1918, Army investigators ran some very good scientific experiments on masking and quickly learned that masks put on sick people protect healthy people. Later, they further concluded that none of the masks that were common in the cities after the second wave erupted did any good. We now know that they were right: masks on sick people do protect healthy people. But there's very little, if any, evidence that masks on healthy people do any good except in fairly narrow circumstances, where you're in close contact with somebody who is sick.

Masks create problems, too. There's good reason to believe from the SARS experience that many health-care workers seem to have infected themselves when they were taking off their personal protective equipment. That's a danger, particularly for lay people. Let's say you're wearing an N95 mask—which is pretty difficult to wear for any length of time. Let's say you were smart enough to have put it on right. And let's say you're in a room with someone who's sick with influenza. You've got to be very careful when you take off that mask so that you don't contaminate yourself.

There are also interesting data from New Orleans, where after Katrina they had recovery workers going into places where they were afraid there was toxic mold. The workers understood how to wear N95 masks. But well under 50% of these professionals wore their N95s properly. So, the idea that lay people would use masks correctly—I don't find that to be likely.

Q: Are there any other 1918 data that would change how we respond to a pandemic today?

A: There are a few interesting things, though I'm not sure it would change the direction of our response. One example is symptoms. Certain assumptions have been made about the influenza virus based on seasonal flu. The 1918 outbreak was initially misdiagnosed as everything from cholera to dengue to typhoid, because some of the symptoms were unusual for influenza.

Intestinal symptoms are unusual for influenza, but they were very common in 1918, and we're seeing them currently with H1N1. So, when you've got an ILI [influenzalike illness] situation with an unusual symptom, maybe that should be a marker for surveillance, alerting us to possible new emerging viruses. Whether that would have speeded identification in Mexico, I don't know.

Q: In *The Great Influenza*, you wrote that you were interested in epistemological questions that face scientists and policymakers during a health emergency—questions such as “How do you know when you have enough data?” and “How does, or should, a crisis affect the decision-making process?” Do you see those questions playing out today?

A: Absolutely. Anytime you're forming policy, not only are there unknowns—there are unknown unknowns.

The recent school closing question that CDC faced is an example of doing the best that you can do with incomplete information. At one point they issued guidance to close a school for 14 days if it had a single case and to consider closing neighboring schools and feeder schools as well. The reasoning seemed to be that they were attempting to snuff out the outbreaks. This was obviously impossible, and CDC's guidance, to me, seemed an extreme reaction. Fortunately, this guidance was reversed before any school districts were confronted with the choice of whether or not to follow it.

The information still is incomplete. CDC made one decision, then changed their minds when they looked more closely at the information available. The second decision was the right decision.

Q: As soon as the current pandemic started to unfold, did it have disturbing resonances with what you had written in *The Great Influenza*?

A: When I heard the first numbers—which were something like 58 dead and 900 cases—I thought: This is it. There are probably tens of thousands of cases that we don't know about.

I thought that we would be seeing such an explosion that, by the time this interview was taking place, we wouldn't be counting cases anymore. That hasn't happened, which is a good thing, because it gives us time. The bad thing is how much progress the virus has made.

I would expect that it is going to continue to adapt until it becomes a fully explosive pandemic virus. That would be my expectation. But whether that happens this next influenza season or whether it takes 2 or 3 more years, I don't know. I do think it has already reached the pandemic status as defined by WHO, but for extraneous political reasons WHO has not declared stage 6. I guess it's theoretically possible this might never happen. Very, very unlikely but theoretically possible. But I expect it to return in full pandemic fashion, though there's no reason to expect it to be what everyone is terrified of—a 1918-like outbreak.

Q: Is it too early to say whether it will be a highly lethal virus?

A: The fact that it's not lethal so far is reassuring—but certainly not conclusive. By the same token, there is absolutely no reason to believe that it will be virulent and every reason to think that it would not be. However, that doesn't mean that it could not be. The virus is unstable and volatile and, hence, unpredictable.

Q: Is the current stage in the pandemic akin to the ominous first wave in 1918?

A: No. The first wave in 1918 sputtered along in places, but it was pretty explosive in certain communities. And it caused considerably more widespread disease than today's—although we don't have really great information out of Mexico, where the virus may have been widespread.

In the rest of the world, there are no places that I know of where today's virus has caused even 10% morbidity, much less 20% or 30% morbidity. In the spring of 1918, there were areas in the eastern U.S. that had very high morbidity, though in the spring the virus missed more places than it hit. There were a few army camps that actually had higher morbidity in the spring than in the fall. Of course, an army camp is a little bit of an artificial circumstance, because of the barracks situation.

In 1918, there were a couple of cities where influenza was extremely widespread, even in the spring. It was also reasonably lethal in some places, with the signature of young adult mortality in places such as Louisville.

There are some people who believe that the first wave in 1918 was caused by a different virus. It's conceivable they're right. I think the immunity afforded by exposure to the first wave argues strongly against that hypothesis, and for the idea that both waves were caused by the same virus. But it's not an absolutely clear-cut call one way or the other.

Q: One of the striking things in your account of 1918 is that time after time, government officials made decisions completely counter to public health advice.

A: In Philadelphia, they held a Liberty Loan parade, even though the lethal wave had already erupted in Boston and in several military bases. Certainly the Philadelphia public health director knew that. That parade also occurred after the head of the U.S. draft had cancelled the draft—so they were aware of the impact at the national level. Plus, influenza was already in the city. That decision was outrageous.

President Wilson's decision to continue to ship troops to Europe was also outrageous. He had the alternative to send troops who had already suffered through influenza and hence had immunity. Medical people urged him, if he insisted on packing soldiers into troop ships, to at least send those troops. But he wouldn't even do that.

Q: Federal officials, including Wilson, were also silent as hundreds of thousands of Americans were dying. It's hard to imagine that happening today.

A: In 1918, national public health figures, primarily Surgeon General Rupert Blue, did make statements. But they were absurd statements. Blue said, "You have nothing to worry about if proper precautions are followed." He proceeded to advise people to chew their food thoroughly and empty their bowels. Wilson never made a single statement at all about the pandemic.

President Obama has already made many statements about the epidemic. And he found the perfect venue when he addressed the issue before the National Academy of Sciences.

Q: When national leaders say nothing during public health crises, do people feel adrift?

A: Adrift is a good analogy, because you don't have an anchor. You don't know if you're secure. You don't have a reference point of any kind. That's when you're vulnerable to misinformation and fear.

Q: Let's talk about differences between 1918 and today. For example, how does the pathology of the 1918

virus, which killed many victims by triggering acute respiratory distress syndrome, compare to the pathology of today's H1N1?

A: The news that we got out of Mexico is that deaths there were viral pneumonias. There's recent work suggesting the overwhelming majority of 1918 deaths came from bacterial pneumonias, although frankly there's information from animal models using the 1918 version of H1N1 that seems to contradict that. So, it's unclear—like so much else about the disease.

Today, we have intestinal symptoms, and people are worrying about fecal-oral transmission. That's pretty unusual for influenza—although H5N1 also causes intestinal symptoms. And as anybody who understands influenza knows, in birds influenza is primarily an intestinal virus, not a respiratory one.

Q: Unlike in 1918, today we have antivirals and antibiotics. But we also have rising drug resistance. Is it a wash?

A: The current H3N2 is resistant to Tamiflu, which was a surprise to everybody. That resistance seemed to spread almost instantaneously around the world. People don't fully understand why that resistance would have spread so rapidly, since the virus didn't have that much evolutionary pressure on it.

If a virus can become resistant, it will become resistant. That doesn't mean that the drug is not useful in a pandemic. Hopefully, resistance won't become widespread before we need it.

My understanding is that case mortality right now for bacterial pneumonia following influenza is 8%. Now, that's pretty high case mortality. Even without antibiotic resistance, that 8% is a scary number. Much of the immune system is wiped out by the virus. The bacteria could march unimpeded into the lungs and set up there. For bacterial pneumonias following influenza with MRSA, case mortality is 40% or 42%. That's nature. Both those numbers are pretty scary. And staph pneumonias are not uncommon after influenza.

Q: Compared to 1918, there are also many more people today with immune-compromised conditions.

A: That's a point that many people, including myself, make all the time. Most of that is demographics—many more elderly people. But it's not just increases in the elderly population. In 1999, CDC did a study of what a pandemic would do to the population. They were using as a model a not particularly virulent virus. And they came up with the most likely scenario of 89,000-207,000 deaths. They were including vaccine availability at several levels in their model. Those are not reassuring numbers.

Q: One of the signs of progress between 1918 and 2009 is that today we are close to real-time surveillance.

There's a swine flu wiki on the web. We have outbreak reporting everywhere. Scientists can track genetic changes practically in real time. What difference do these capabilities make in the progress of a pandemic?

A: They don't have any impact on the virus itself—which continues to be the most important factor in what happens. But in terms of vaccine production, it's of enormous importance. And in terms of public health measures, it keeps you aware. Around the world, people in public health recognize that this remains a very serious threat. Whether a pandemic will erupt now, during the seasonal influenza outbreak this year, or in another couple of years is not clear. But the tracking and surveillance and genetic information will be very useful in terms of management.

Q: How do they improve management?

A: You're likely to have a decent sense of what the virus will be like, its virulence and explosiveness, at a certain point in time, when you're going to need a vaccine, what you're going to have to stockpile. We're already beginning to learn that it looks like middle-aged and older people may have some protection from prior exposure to the H1N1 virus. This may influence setting priorities for vaccination and antivirals.

Another of the issues with pandemic planning is cost. The idea of stockpiling large quantities of material—nobody has the money to do that for some sort of vague pandemic threat at some point in the future. And you have drug expiration dates.

With what we're facing now, people will begin to stockpile stuff in anticipation that this is going to happen in the next couple of years. They will stockpile vaccines, drugs, surgical masks, everything else that's important. Perhaps they'll be building up a supply of respirators. Surveillance is useful in that regard.

Business continuity planners may be in the process of doing this. Perhaps they couldn't get any money assigned to them earlier for stockpiling. Let's say you're making widgets and your assembly line depends on a certain number of parts that are absolutely crucial. And for one of those parts, there's only one supplier in the world. That supplier is in a small factory somewhere, and your whole production line comes grinding to a halt if you don't have that part. In the normal course of events, you may rely on just-in-time inventory. Maybe in this event, you would stockpile those parts in anticipation that that small factory, if it gets hit with, say, 40% morbidity, is not going to be able to meet its production.

Q: Today, we also have instant communications. Do you see cell phones and texting as a boon, a way of keeping people informed and less panicked?

A: I see that as a knife that cuts both ways: it also spreads rumor. The analogy in 1918 is street gossip. It's certainly

a means of conveying information more rapidly. The question is whether it's accurate information.

That's why it's so important for places like WHO and CDC to retain their credibility, so that people look to them for the information. If they don't retain credibility, then people are going to believe whatever nonsense someone texts.

Q: Do you have confidence in the federal pandemic flu plan?

A: We'll find out. I'm not confident in any plan. I used to coach football. And I worked pretty hard developing game plans. I think I was pretty good at it. I certainly enjoyed designing game plans. But I laugh to think about how good some of those game plans actually worked out to be. Personally, one of my weaknesses as a coach was that I had so much fun designing game plans, and was so confident of my intellectual capacity, that I was probably way too slow to move away from the plans when they weren't working as well as I thought they might or should.

It may seem we're wasting a lot of time talking about football, but the analogy holds. In war, the military calls it "situational awareness": being ready to respond and react when things change. Similarly, any plan anyone makes has to be as flexible as the virus; people need to be willing to turn on a dime—for example, making sure young people are vaccinated first if current trends of the virus continue.

Q: In their book *The Swine Flu Affair*, about the 1976 H1N1 outbreak, Harvey Fineberg and Richard Neustadt analyzed how federal officials launched a mass vaccination plan, which turned out to be not only unnecessary but also harmful. One of their broad conclusions was that you have to be able to change your plan when new information comes in.

A: That's true of anything, not just influenza. I think everybody would agree it was the right decision to produce the 1976 vaccine. Administering the vaccine was the wrong decision.

Q: You have urged that more money go into vaccine research. But it's an area that remains underfunded. What are your concerns about vaccine manufacture?

A: I have to give the Bush administration a lot of credit. They tried and succeeded in increasing the investment in those things. Congress was a reluctant partner and kept cutting their requests. That's about the only thing I give the Bush administration credit for—particularly since I live in New Orleans.

Since H5N1 surfaced, there has been a lot more money going into it. There has been enough work done on producing a vaccine targeting conserved portions of the virus to suggest that it is possible to develop a universal influenza vaccine that will work

against all influenza viruses. Obviously, that's the holy grail. When we will get that, who knows—10 years, 20 years, I don't know. Or some very, very recent work may pan out that suggests we might be much closer than we think.

If influenza had been taken seriously for the past 30 years, you would certainly have cell-based production technologies today. Whether or not we would have a universal vaccine, I don't know.

Q: If this virus explodes in the southern hemisphere in the 2009-2010 flu season, will we have vaccine in time?

A: All I know about that is what I hear: that in 4 to 5 months we should have some vaccine. How long after that we will have enough to inoculate basically the entire population, I'm not sure. I don't believe the 4- to 5-month figure includes that many doses. And we also don't know whether we will need 2 doses. We're still not sure how well the adjuvants will work, although all the work on H5N1 vaccines certainly provides some reason for optimism.

There's a lot that goes into making a vaccine under enormous pressure. It almost guarantees that some mistakes will occur—not only in the sense that the vaccine might be dangerous, but that it might not be the best possible vaccine that could be produced.

Q: Taking everything into account, if the 1918 virus unfolded today, how would the pandemic turn out differently than it did in 1918?

A: Based on what's happened in the past few weeks, the communications would be better. The truth would be told. I think you would have plenty of panic and fear if you had a virulent virus—and rightfully so. The medical establishment is not capable of addressing it.

Obviously, we'd be in a race to get vaccines distributed. The just-in-time inventory system and the efficiency that every institution in society relies on is an Achilles heel when your supply chain is interrupted. So, whether it's a lethal virus or a mild virus, there will be more economic disruption than we probably now recognize.

Even if the next pandemic is fairly mild, people are going to be told to telecommute, which is appropriate advice. But that will cause another set of problems. I know nothing about information or communication technologies, but people who do know about that say there just is not enough capacity to handle any of that. Servers crash, people can't get online, they can't get messages across. I wouldn't be surprised if capacity on cell phones is not great enough.

But going back to the main point: certainly at WHO and in the U.S. it looks like political leaders will be candid and honest. This will go a long way toward keeping society functioning as well as possible. But that doesn't mean if a virus with 1918-like virulence

hit, there won't be fear and even panic, there won't be enormous economic and social disruption, and there won't be a terrible death toll.

Q: During the London bus bombings of 2005, cell phones were useless.

A: That fact in itself is disconcerting and, to a certain extent, alienating. You don't need the 1918 virus to add a lot of disruption. People need to take any pandemic virus seriously—that's part of the messaging. In 1918, the telephone systems in most cities collapsed. The combination of increased demand from people wanting to communicate and calling each other and saying, "Are you OK? How's everybody in the family?" and the fact that operators were out sick meant that the telephone systems crashed. People were being ordered not to make calls unless there was a life-or-death situation. And, as I say, the inability to communicate contributed to alienation and fear.

Q: Can you imagine that happening today?

A: I can see something like that. People would be asked to stay offline unless they really needed to be on. Or they would be asked to stagger their use of cell phones and internet. It would be frustrating at best, alienating at worst.

Q: In writing *The Great Influenza*, you narratively planted clues that impart a gathering sense of doom. As the details of this current pandemic unfold, are you sensing, in a forward way, the same feeling of doom?

A: Fortunately, it's too early to say. Fortunately, we have a lot more weapons than we had then. Fortunately, the virus at this point doesn't look like the 1918 virus. Several people have already said that its molecular structure doesn't seem to have the markers of virulence that the original H1N1 had. That doesn't mean it's not possible for it to acquire it, but there's no evolutionary reason for it to do so.

Q: You write in the book: "Those in authority must retain the public's trust. The way to do that is to distort nothing, to put the best face on nothing, to try to manipulate no one." As this current H1N1 unwinds, is that the response you're seeing?

A: I think so. People are criticizing health officials for having blown it out of proportion. If you understand the virus, you recognize that's not the case. But it's an indication that they were trying to be completely forthright and communicate just how serious the potential is.

Q: You've advised state and federal and WHO officials on their responses to a flu pandemic. What was the essence of your advice?

A: The number one message was tell the truth. Because you've got to manage society at large. To do that, you need credibility.

It's not that public health agencies don't tell the truth—it's that they try to shape the message. Someone I regard highly refers to departments of public health as "departments of public reassurance." That's always a mistake in something likely to be a sustained crisis, trying to shape information to convey a particular message. But in something like this, it's particularly a mistake. The truth will catch up to you anyway.

I think most people who deal with risk communication would say the same thing. But I don't even like the term "risk communication," because it implies management of information. You don't *manage* the truth, you *tell* the truth.

REFERENCES

1. Johnson N, Mueller J. Updating the accounts: global mortality of the 1918–20 "Spanish" influenza pandemic. *Bull Hist Med* 2002;76(1):105-115.
2. Jordan EO. *Epidemic Influenza*. Chicago: American Medical Association; 1927:251.

