Water Supplies in a Pandemic

I work for a state agency assisting the water supply industry for my state. As such, I have access to water treatment plant operators and an understanding of water supply systems. My purpose in telling you this is to establish credibility.

I am definitely not authorized to speak publicly for my agency. HOWEVER, as a Civil Engineer (Professional Engineer) in the business, and as a private citizen, I've made an analysis that I'd like to share with you.

Obviously, there are lots of concerns about how people might contract ordinary flu and other diseases. Let me discuss a transmission route that is LIKELY to occur in the event of a pandemic: namely the public water supply systems.

The water supply system

First, let me describe the supply system. The source of public drinking water is typically surface streams and reservoirs. There are communities, most often in rural settings, that get their water primarily from wells and springs. But the great majority of cities and towns in the USA get at least a portion of their water from surface sources.

Water is piped to the water treatment plant where the water is held, temporarily, in large ponds. The water is taken into the treatment plant where large materials are screened out and then the water is put through a series of filters. These include flocculation, and sand filters that remove even small particles down to bacteria sizes.

However, viruses are so small they cannot be filtered out. That's one of the main reasons for chlorination, along with killing any residual bacteria. State law requires there be "log 4" reduction in virus count. That is, 1/10, 1/100, 1/1,000 down to 1/10,000 reduction in virus count. And every treatment plant tests the water to determine that the log 4 reduction is being achieved.

Test results are routinely submitted to drinking water regulatory agencies. Sometimes during normal operation, treatment plants cannot conform and are required to take corrective actions to regain compliance. See concluding comments below.

During normal day-to-day operations the raw water (term used for water before treatment) contains all the stuff that is in rivers and reservoirs. This includes bird and animal fecal droppings, as well as dead and decaying plant and animal matter. Not a pretty sight, but that's the way it is.

Now, in the USA these plants operate quite well and every day provide people with clean, non-contaminated drinking water. Pretty amazing when you consider the volumes of water -- billions of gallons per day. When was the last time you heard about a water-borne disease outbreak??

What happens in a pandemic
Anyway, now let's consider what happens to this system during a pandemic.

Obvously, there is a concern for sufficient numbers of qualified personnel to properly operate all aspects of the system from pumps, valves, and filters to the chlorination equipment. But here's the "pandemic kicker". Ducks and geese having the disease (recall they shed the virus in large amounts even before becoming symptomatic) deposit their droppings in the streams, reservoirs, and in the holding pond right outside the treatment plant. And, of course, when they die their contaminated bodies float and decompose in those surface water sources.

In addition, sewage treatment plants quite commonly discharge to streams and thus some levels of human excrement also end up in surface water supplies. This too, is ongoing day-to-day. Quite simply, sewage treatment plants do not remove all pathogens or chemicals. This is the source of pesticides, herbicides, pharmaceuticals, and other "endocrine disruptors".

We all live downstream
Recall the slogan, "we all live downstream". Well, we really do live downstream. So, flu-contaminated human waste is also in the raw water stream that supplies drinking water treatment plants.

Sewage treatment plant effluent is also used in many areas of the country for "water reuse" such as to water golf courses and other "non-contact" (to humans) uses. On a day-to-day basis these human wastes are removed like the other wastes from the drinking water.

So, during a pandemic, the raw water sources contains both bird and human-generated flu virus.

Speaking to the manager of a large water treatment plant, I find the following. During the summer a typical chlorine stockpile for water treatment is no more than one week. Summer means the greatest water demand during June, July and August. The chlorine is delivered to the drinking water via compressed gas bottles. One bank (say 12 cylinders) is on-line while the other bank of 12 is full and waiting to be put on-line. That's a typical hard plumbing hookup. During the winter, when water demand is lower, the bank may last more than one week.

Not if, but when, there is absenteeism at the chlorine generating plant, the chlorine supply will not be there. MAJOR problem! Without chlorine, the flu virus (along with other infectious agents) could be supplied to the public. Unless the water supply is turned off.

To add to credibility of this scenario, I'd direct you to one water supplier, in Denver, that has made plans to prepare for a pandemic scenario. The article makes good reading up until he talks about chlorine, which is beyond his control. These folks have even taken to stockpiling a 30-day supply of chlorine. After that, they face the decision of supplying contaminated water, or shutting off the supply to the public. See the following, which I think I got from your website.
http://www.rockymountainnews.com/drmn/local/article/0,1299,DRMN_15_4626378,00.html

Another pandemic consideration is the length of the flu pandemic. In 12 to 18 months there will be equipment malfunctions in the vast array of equipment throughout the automated system. What breaks and when it breaks could affect the ability to treat the water (water filters through chlorination dispensing) and deliver it (pumps, valves, control systems).

It could be that, after some critical item (or combination of items) breaks, no water will be delivered during a pandemic.

Well, maybe you already knew this stuff. But this supplies some detail of this industry. In my military survival training I learned that water was the most crucial item to life. Recall also that hydration of flu patients is a key item, crucial to their survival. And clean, uncontaminated water could be in seriously short supply to millions of people during a pandemic. Might I suggest individuals seriously consider stockpiling water along with whatever else they do to prepare for a pandemic.