

QUEST #602
Pandemic

Tease

(Michael Sherman) Imagine a world in which tomorrow, your best friends and half of your family disappeared in a twenty four hour period. And you didn't know why that happened and you didn't know what you could do about it, and you didn't know if you would follow them. That's pretty much what the 1918 epidemic looked like to many people.

(Molly Girard) I heard of a story where a brother ran out into the street and he beseeched the cart going by. And they had carts carrying numbers of dead bodies, numbers of influenza victims, taking them away. And he beseeched this cart, "Please can you find room, and take my brother? He died from the flu, and he's been here for 5 days. Can you please take him?" And the driver of the cart was sympathetic, he said "I'm sorry, it's full...I just can't fit one more victim on here!" And the brother continued to beseech him and in the end they struck a deal. The cart would take the brother away, but in return the living brother had to accept a fresher body. And that was the only way they could find room for the long-dead brother.

(Thomas Pistole) I think it's almost inevitable that we'll see other pandemics, hopefully not with the devastation of the past ones because we have many more drugs available for both treatment and vaccines. But a pandemic, I think is almost inevitable.

(Linda Greenlaw) Hi. I'm Linda Greenlaw. The 1918 Influenza Pandemic touched just about everyone's lives. My folks say that's how my grandparents met. My grandfather, Aubrey Greenlaw, was working as a lumberjack in Northern Maine when he became ill. My grandmother, Mattie Robinson, charmed him back to health. And the rest, as they say, is history.

SHOW TITLE: PANDEMIC

(Narrator) It happened in 1918. It was a disease that killed more Americans than all of the wars of the 20th Century combined.

(Narrator) It was a worldwide 'pandemic', spreading across countries and continents as easily as it spread among family members. And it would show no mercy on New England or anywhere else.

(Narrator) They didn't know it at the time, but it was a virus. A virulent, mutant, killer. One that baffled the world's medical community.

(Narrator) It spread among individuals with alarming speed. It could kill even faster. And there was no cure. No disease in human history ever killed so many so quickly. Not AIDS, not tuberculosis, not even the Black Plague.

(Narrator) And remarkably it wasn't some exotic new disease; it was viral influenza, the flu. A disease doctors had known about for years. They called this one the "Spanish Flu".

(Michael Sherman) ...It had several names: it was called "La Grippe" or "The Grip", or just the "flu" sometimes, or influenza.

(Narrator) But it was a devastating flu the likes of which the world had never seen before or since.

(Narrator) Victor Vaughan, then head of the Army's communicable disease unit wrote of the time:

(Character VO) "If the epidemic continues its mathematical rate of acceleration, civilization could easily disappear ... from the face of the earth within a matter of a few more weeks."

(Narrator) Today some medical experts feel we are overdue for another influenza pandemic.

If it does come, nobody knows just how bad it will be. If it's anything like the 1918 flu over 350 million people may be left dead in its wake.

(Dora Mills) ...I believe it is not "if" we will ever have a pandemic, I believe it is "when" we will have a pandemic. It's just a matter of time.

(Narrator) Far smaller than any bacteria, most viruses can be seen only under the powerful magnification of an electron microscope.

Using a beam of electrons thousands of times smaller than visible light, electron microscopes let us see objects less than one billionth of an inch in size.

(Narrator) This is an image of the virus. It is one way Mother Nature humbles us.

Viruses come in many shapes, looking more like geometric forms than life forms; viruses are slow in giving up their many secrets.

Yet these infinitely small microbes have the ability to wipe out entire species.

(Narrator) By clinical definition they are not even considered living organisms. They mysteriously exist somewhere on the border of the living and non-living. Dwelling in a kind of scientific purgatory.

(Thomas Pistole) ... Some virologists get a little bit concerned if we call them living agents. Viruses are entities that are different from all other, I will say, "life forms", because they have only one form of nucleic acid. Virtually all the other life forms, from bacteria, which are another form of micro-organisms, to plants and animals, have two kinds of nucleic acid; deoxyribonucleic acid, or DNA, and ribonucleic acid, or RNA. Viruses are unique in they are either one or the other. They're typically much smaller and they are obligate intracellular parasites, which means the only way that they can grow and make more viruses is if they get inside a cell. They can survive outside but they cannot grow.

(Narrator) Outside a living cell they are nothing more than a collection of inert chemicals. A handful of genetic material wrapped in a protein coat.

Like a grain of sand or a piece of dust they do not grow, eat or age. It's when they come in contact with a living organism that the virus's benign nature changes.

(Narrator) Their attack is sophisticated and cunning.

Finding a suitable living cell they latch on and penetrate. The virus's sole function is to take over the cell and force it to reproduce copies of itself.

The virus releases its genetic material into an unsuspecting cell, keeping the cell alive and intact. This way they avoid detection by the body's immune system, while covertly taking over the cells internal functions.

Instead of the cell performing its normal functions, it is now tricked into manufacturing new copies of the virus.

(Dr. Joel Kase)... "Are you coughing to kind of have to clear your throat?"
"Uh yeah. It feels like post nasal drip"

(Narrator) Dr. Joel Kase is a doctor of Osteopathy, a primary care physician who practices at Second Street Family Practice in Auburn, Maine.

It is dedicated healthcare professionals, like Doctor Kase, that are on the front lines of our struggle against disease.

(Dr. Joel Kase)... The thing that helps people get better when they have a viral infection or a bacterial infection is the patients own body. The body has the innate ability to heal itself. As physicians all that we really do is assist the body in healing itself.

To treat a bacterial infection I utilize all the supportive measures of helping somebody feel better, treating their pain, making sure they're well hydrated. And utilizing antibiotic medication.

“If things are worse or they’re not getting any better, then I would certainly want to have you seen back, okay?”

“How long?”

“I’d give it another week or so.”

As a physician I can utilize a number of things to treat a virus. Mostly symptomatic care including supportive measures to help the patient feel better; treating pain with things like Ibuprofen and Tylenol. Treating other symptoms such as cough, runny nose, nasal congestion.

“Okay all done.”

And most importantly educating the patient to make sure they are maintaining good hydration status.

“Okay and she’s drinking water from the tap?”

“Yes.”

(Narrator) In 1918 the treatment and prevention of disease were not our biggest concerns.

World War I was raging. And President Woodrow Wilson was determined to win it.

(Narrator) When the first wave of the 1918 influenza appears at an army base in Kansas, it comes and goes without much notice.

(Molly Girard)... The flu comes in three waves. The first wave is seen as being unusual because it is, seemed to be more infectious in some ways than previous flues. But it’s not more deadly so it’s nothing to really worry about, and it seems to fade away, this first wave that occurs in late winter, early spring.

(Narrator) It was the War that was to end all wars, and Northern New England was eagerly doing its part.

(Narrator) Many of our young recruits from Maine, Vermont and New Hampshire reported to Fort Devens in Massachusetts, just 16 miles over the New Hampshire border.

The Camp provided training for the new recruits before shipping out on troop ships bound for Europe.

It also provided a place for troops to transition before returning home.

(Michael Sherman)... Well, Fort Devens was the center for Northern New England, that’s where they went and then were sent out and then that’s where the soldiers coming back came and were discharged from. So it was a mustering center and then a decommissioning center.

(Molly Girard)... In general there is a relationship between war and disease. In wartime, you are taking a lot of young men, you're bringing them into contact with a lot of other young men, these groups do not have the same immunities, they haven't been exposed to the same diseases, so there's a problem...you're all of a sudden being exposed to new germs. Troop ships, I think that troop ships have often been extremely crowded, most of the men are in large, fairly large rooms. They're packed very close together, think of multiple bunk beds. There's very little space. Most of their leisure time, their sleeping time, all of this is spent in these rooms. And of course there's not a lot of ventilation there. So the germs are just building up. There's not a lot of fresh air coming in and out and of course if you're very crowded, there's not a lot of space for hospitals on board. What happens is someone gets the flu? What happens if they're vomiting, if they're coughing, if they're bleeding? -which are symptoms of illnesses. Well, their neighbors are just going to have to tolerate this happening. You might not be able to clean up as well as you'd like to, and it just is a terrific breeding ground for something like the flu.

(Narrator) As the troops marched into the bloody battlefields of Europe, the highly infectious influenza went with them.

It was here that the virus changed into something new and extremely lethal.

(Beth Eilers) I'm not sure when the change occurred but at some point the virus mutated to become much more virulent and much more deadly.

(Narrator) An ideal breeding ground for the disease had been created.

(Narrator) Some viruses mutate and reproduce in staggering numbers. In the span of a few days tens of generations of microbes can be produced. It is an evolutionary advantage, especially when compared to that of the plodding evolutionary timetable of their human hosts.

This tendency to quickly change their genetic makeup allows them to rapidly adapt to different environments.

(Narrator) RNA viruses like influenza, are especially adaptable and constantly 'mutate' or change their genetic makeup in order to continue replicating.

(Novotny)... If you think about influenza virus you might make an analogy of going to basic genetics where you would take a red carnation and breed it with a white carnation and end up with a pink carnation. Because the genome is being changed to produce a different color, this virus might be changed to produce a much more pathogenic organism, or a less pathogenic organism.

(Narrator) When the change is a small change in the makeup of the cell's outer protein coat, it is called 'antigen drift'. This new outer layer causes a slightly new strain of the virus to appear, helping to keep it from being detected by the body.

(James Novotny)... An antigenic drift occurs in influenza viruses when a virus changes subtly over a period of time. In other words, if an individual were vaccinated against last year's virus, and had immunity to last year's virus, this virus might change a little bit, and when it comes around this year they may not have total immunity as they did last year. Influenza viruses have a protein coat and on the surface of the virus particle are found two different types of proteins. One of the proteins is known as Hemagglutinin, second protein is known as Neuraminidase. These proteins are antigenic structures on the surface of the virus, and these antigenic structures are what an individual's immune system recognizes if the virus is going to be recognized.

(Narrator) But sometimes a more dramatic genetic change takes place –making a radical change in the outer protein coat.

This is known as 'Antigen Shift'.

(James Novotny)... Antigenic Shift is a much more severe change. It's very abrupt. It occurs very rapidly and suddenly there's an entirely different new type of influenza virus out there that individuals need to be protected against.

(Narrator) Out of the three types of influenza virus – A, B and C – only Influenza A is capable of Antigenic Shift.

This sudden change spawns a completely new strain of the virus. One that does not resemble any other circulating strain.

The result can be a disease for which little or no protection exists. Without a history of the disease our bodies need more time to mount an effective defense against it. We become vulnerable prey.

(Narrator) Influenza did not originate as a human disease.

All influenza virus strains can be carried in birds. Domesticated fowl are a major problem because of the close contact these birds have with humans. Birds, however, very rarely pass the disease onto a human. But it is not impossible. What makes the disease more likely to be passed on to a human, is when the influenza virus from a bird recombines with an influenza virus that can infect humans. This can happen through an intermediary host.

(Narrator) In 1918 humans were not the only species being inflicted with the influenza virus.

Veterinarians of the time noted outbreaks of influenza in other mammals, including pigs.

Like us, the pigs had symptoms we commonly associate with flu. They suffered from fevers, runny noses and even watery eyes.

(Narrator) Both pigs and poultry were important food sources during the war effort. Military camps kept both animals to slaughter and feed to the troops.

(Jeffrey Salloway)... Now, meaning no offense, pigs look a lot, to influenza, like humans. Their immune systems look a lot like humans', they're mammals, and pigs, for

all of their pleasant characteristics, in addition, are very tolerant of viruses. They harbor them, they tolerate them, and they pass them on to humans.

(Narrator) Because to a virus, pigs and humans are similar – a pig becomes a very hospitable environment for recombining different strains of influenza viruses.

By recombining with other influenza viruses in a pig, a virus which once was non-infectious to humans now has the potential to infect them.

Pig cells can be infected by bird, human, and their own influenza viruses. That is because the outer membrane of a pig's cells can bind to both bird and human viruses as well as their own.

The pigs become a “mixing bowl” for viruses – sometimes enabling them to cross species.

One theory of what happened in 1918 is that an individual with the highly contagious strain of influenza that originated in the United States passed the virus along to a pig. That same pig then also became infected with an influenza strain from a bird.

Within the pig, the human and bird strains of the virus recombined to produce a new and deadly viral strain.

So it is possible that an entirely new virus, which had never been experienced by humans, could have been created within the pigs.

The pig then transmitted it back through the air to a human being.

This new virus had the highly contagious characteristics of the virus from Kansas.

It was able to be transmitted from person to person through the very air we breathe. And now it came with a new and lethal element.

And because most people had no past history of this particular strain they had no natural or acquired defense against it.

This is one plausible scenario of the way this deadly mystery could have unfolded.

(Molly Girard)... The second wave of the influenza actually seemed to appear almost simultaneously in Brest, in Freetown and in Boston. So as far as coming back from Europe to Boston, that's a real possibility that sailors and soldiers brought it. The fact that the second wave of influenza was much more deadly than the first wave, would seem to suggest that it's a similar flu, especially when people who had been exposed to it the first time seemed to be a little less susceptible to it the second time.

(Narrator) When the troops returned home from the European battlefield the new, mutated virus came with them.

(Narrator) Although the virus had been begun running rampant overseas, up until this point, the American military and medical community were not overly concerned.

Camp Devens was about to change their mind. It would become known as the turning point for the medical community.

Victor Vaughn, the US Army's acting Surgeon General, would witness the carnage first hand.

(VO) – “hundreds or stalwart young men in uniform of their country coming into the wards of the hospital...”

“They are placed on the cots until every bed is full yet others crowd in. Their faces soon wear a bluish cast; a distressing cough brings up the blood stained sputum. In the morning the dead bodies are stacked about the morgue like cord wood.”

(Beth Ellers)... Several of the highest public health officials and physicians in the country visited the camps and they later commented that it was one of the worst situations that they had ever seen. They had never seen anything like it because there were so many sick men, they actually thought it was a new disease because it did not resemble influenza in any way that they ever knew...

(Narrator) The same story began to unfold in army camps around the nation.

But the disease did not stay in the camps.

Soldiers who survived both the war and the camps, returned home.

And the deadly flu went with them.

(Michael Sherman)... In Vermont, the statistics that the Department of Health collected show that there was flu in every town. In the smallest towns as well as the biggest. But there were a few places where the numbers were especially large.

(Narrator) The flu would be ruthless and indiscriminate when it struck. Neither poor nor prospering towns would be spared.

(Narrator) At the turn of the twentieth century the Granite Industry was in full force in all three of the northern New England states.

(Narrator) One town in particular—Barre, Vermont stood above the rest. It was known then as it is known today as, “the Granite Capital of the World.”

And for good reason. Since the early 1800's some of the finest granite, known as Barre Grey, has been pulled from these Quarries.

(Michael Sherman)... They're doing a very brisk trade after the civil war when you have the growth of monument trade, mostly for the dead veterans. The sculpture industry is growing considerably every year, and even the marble industry isn't taking away from it because granite weathers much better than marble. So granite is doing very well.

(Narration) Even today, Barre remains true to its trade.

About 65 percent of people in the Barre region depends on the granite industry for their livelihood.

And there still remains enough high quality granite in this region to keep future generations busy for the next 3500 years.

(Narrator) In the early 1900's, as today, the high quality granite attracts many fine artisans to the area as well as quarry workers.

But as much as the craft has stayed the same, there is a crucial difference.

(Narrator) Water is now applied to the stone and pneumatic suction tubes have been set up to suck the granite dust away from the workers.

(Michael Sherman)... By 1918 they knew that the granite was lethal, and it's interesting because in some ways it was the granite workers who resisted the introduction of pneumatic tools. I am not really sure why that was the case, but it's clear that the granite workers know what they were up against and that they know they're taking a risk, not just in the sheds, but also out in the quarries.

(Narrator) In 1918, the work spaces in which the carvers worked were called Granite Sheds.

In these massive buildings they plied their trade. A trade which was leaving them vulnerable for disease.

(Michael Sherman)... The first problem had to do with the dust in the air. All this granite and all this silica, so you have this very lethal dust, and people talk about the kind of haze that sometimes you couldn't see through it.

(Narrator) They called it "Stonecutters' TB" and "white lung". In actuality, it was an occupational disease that affected the lungs. Its medical name is "silicosis".

(Salloway)... Silicosis is a disease of the lungs. It's not an infectious disease and it's one of a number of pulmonary diseases that come from exposure typically, though not exclusively, to mineral fibers. Silicosis in this case is exposure to granite dust, marble dust, and these micro particles lodge in the cells of the lungs, become irritants to the lungs and the lungs become, for lack of a better word, leathery.

(Michael Sherman)... The other thing is that the sheds were open. Day and night, all kinds of weather, so it's very cold in there, it's very damp in there. You put that together with this horrible dust that's lacerating their lungs, and you get an enormous number of people dying of diseases that are essentially occupational diseases.

(Salloway)... Any disease that reduces the viability of lung tissue means that you have less reserve to deal with an outbreak of influenza because you have reduced lung capacity.

(Michael Sherman)... Anybody who worked in the granite sheds already had weak lungs. And this particular flu attacked the lungs. So what you had was a higher proportion of deaths here than almost anywhere else, because you have a population that's already at risk.

(Character VO) September 24th, 1918

"Awoke at 7:00 am. Sick, sick, sick, didn't sleep or try to. Had a high fever and an awful headache ... Tried to call Dr. Watson in the morning but he couldn't come. Tells us instead what to do... There is a tremendous amount of influenza in town."

(Narrator) Dorman Kent was a insurance executive in the Montpelier Community.

He and his family would experience the flu first hand.

(Michael Sherman)... He's one of the best resources that I've found for seeing what was going on with the flu. He got the flu himself, two of his sons got the flu, and while he was knocked out by it, he didn't die, but he was just sort of out of it for about a week. He wrote, when he recovered, he wrote a very long series of diary entries.

(Character VO) Friday, September 27 "Again another day in bed with The Grip...Rich had an awful nightmare and Agnes went in and quieted him and slept there the rest of the night... Bennett has an awful cold but he went on his paper route as usual. ...The Grip rages in town unabated."

(Beth Ellers)... The normal population who suffers severely or dies from influenza tends to be the very young and the very old. With the 1918 epidemic, the people who died were between the ages of 20 and 40, those weren't the only people who died but that age group was hit tremendously hard.

(Character VO) Saturday, September 28th. "More deaths of The Grip and pneumonia during the night. I arose about 7:10 feeling 100%. Rich was in bed all day and Bennett woke this morning with a high fever and he was in bed all day."

(Molly Girard)... As deadly as the influenza seemed, certainly not everyone became sick, nor did everyone who was sick, die.

In fact for the majority of people, it was an awful flu, but in 10 days they were more or less healthy.

(Narrator) The symptoms of the 1918 flu began much like the common symptoms we experience today. High fever, head and body aches.

But in this case, this fast acting disease could quickly take a turn for the worse.

(Michael Sherman)... There were a couple of important symptoms. One was very high fever. The other one was inflammation of the glands. The most important one, I guess, was coughing, coughing up blood. There were also nosebleeds.

(Character VO) Sunday Sept. 29th. “Bennett still has a high fever. I slept in sewing room again and Agnes in boys’ room with Rich. He is much better though badly bothered by nose bleed. Bennett’s temperature tonight was 103.”

(Michael Sherman)... Probably the most common cause of death, which came quite quickly, in some cases 24 hours was enough to kill people off, people would either bleed to death, hemorrhage from the nose, or they would suffocate and that was a complication of the lungs simply filling up with this jelly, massive fluid.

(Narrator) Dorman Kent’s family would survive. But many did not.

(Molly Girard)... For people who died very quickly, they died because essentially they were drowning in their own lungs. Their lungs were just becoming sodden with all sorts of things in there as their body tried to fight off this virus. And so essentially, you’d experience drowning, and all those effects.

Longer term, illnesses where you became much sicker later, you’d often die of pneumonia.

(Salloway)... In 1918 one of the symptoms of the influenza was what’s called cyanosis – in which people developed a bluish cast. As their lungs filled with fluid they were unable to process oxygen, and as a result they turned what’s called cyanotic, or blue in color.

(Molly Girard)... People who were seriously ill would often start turning blue, around their lips, around their faces, they said even, it was sometimes hard to tell whether someone was African American or White, because their skin color would change so much, and become so dark. And this is basically as they were failing to get oxygen through their system.

(Narrator) The sickness spread rapidly and the death toll began to rise.

(Character VO) Monday Sept. 30. “Everybody is talking about the grip. 9 died over Sunday and 4 today. It’s awful, awful...”

(Michael Sherman)... I would imagine it was very scary because you were seeing people dying around you all the time and dying quickly.

(Dorman Kent Diary) Thursday, Oct. 3rd.

“After supper went over to Dr. Colton’s today and harvested squashes and pumpkins. He is sick in bed! ... 25 have died in Barre today.”

(Michael Sherman)... I would say most of the doctors in Vermont towns were gone. They had been drafted or they were called to service, so you have a small number of doctors all of sudden having to deal with this big epidemic. Many doctors were called out of retirement, but for the most part the medical force is gone.

(Beth Ellers)... There was a study at the time that revealed patients in a hospital often never even saw a physician or a nurse. Veterinarians and dentists were asked to serve as physicians. They were so desperate and many people were providing medical services who were lay persons who were just volunteering.

(Character VO) Friday, Oct. 4, 1918 ...”The nurse called us at midnight to know where she could get a doctor... Tonight there are 1400 cases in town.”

(Beth Ellers)... If you were able to see a physician there was very little the physician could offer you in terms of health, part of that was they did not know what was causing the disease.

(Joel Kase)... It must have been overwhelming to treat patients who you knew many of whom were going to die. The physicians at that time did not have a lot at their disposal to deal with such a horrific pandemic.

(Beth Ellers)... It is also interesting to note that during the influenza epidemic of 1918 antibiotics were not available. Now if they had been available they would not have treated the influenza itself, but so many people died during that epidemic of a secondary bacterial pneumonia which they caught a few days to a week after the influenza, and if we had had antibiotics at that time many of those patients could have been saved.

(Narrator) Around the nation, funeral homes and morgues became overwhelmed with the dead.

(Molly Girard)... You have undertakers or carts coming around different towns, and instead of picking up one body and taking it to the funeral home and then taking it to the cemetery, you have carts just picking up bodies and people coming out basically to the street, reminiscent of the old stories of what happened with the plague, and putting their loved ones on these carts, and there might not even be room for coffins.

(Dorman Kent Diary) Tuesday, October 8, “Lee Palser died during last night of a cough in Virginia. Hugo Bertobi, 18 years old, died at 2:30 this morning. I had him the 2nd helping us take census of the sick. All the children ill now...”

(Molly Girard)... In one case there was a family who was bringing out a child and they were distraught. And one of the things they were distraught about was not just losing the child, but the idea that the child would not have some sort of coffin. And they asked the driver to wait, "Please just wait while we at least go get a macaroni box, a box that held pounds and pounds of macaroni, and at least put the child in here so there's at least some acknowledgement that this is a dead body, that it deserves the dignity of having some sort of coffin, even a makeshift one."

(Narrator) Children began singing in the streets a nursery rhyme about the disease.

(Children's voices) *I had a little bird.
Its name was Enza
I opened up the window
And in flew enza*

(Beth Ellers)... There was a meeting held between President Woodrow Wilson and his staff to discuss the epidemic and its impact on the military, and to make decisions about troop movements over to Europe. At the conclusion of the meeting it was said that Woodrow Wilson did recite the Nursery Rhyme "I had a little bird and its name was Enza. I opened the window and in flew Enza."

(Dorman Kent Diary) Wed., October 9

"Michael Flannery and wife died this morning leaving 9 children. Mrs. Hattie Hall who served many years for mother, died this morning at 68. I called Dr. Colton, who's still in bed. Some four or five cases today. 18 yesterday in Barre about 10 today..."

(Molly Girard)... The scientist and physicians were so desperate that they were trying enormous numbers of treatments, just on the off chance that something would work. They tried vaccines for other diseases, thinking, "Well, this probably won't work, but you know, it's better than doing nothing!"

(Narrator) Scientists around the world scrambled to find a cure for this menacing scourge. But they were looking in the wrong direction.

It would be another 15 years before they would discover the cause-- long after the "Spanish Flu" disappeared.

(Molly Girard)... There were numerous opinions about what was causing the Spanish Influenza, but one of the popular ones was that it was from a bacteria, specifically something that was known as Pfeiffer's bacillus.

(Narrator) In 1892 Dr. Friedrich Johann Pfeiffer announced that he had isolated a bacterium which he wrongly identified as the influenza microorganism. It became known as Pfeiffer's Bacterium.

(Molly Girard)... Viruses were a fairly new concept, many people thought that the flu was caused by bacteria; very few even considered that it might be viruses, and even those thought the likelihood was that it was caused by bacteria, so they'd focus on bacteria, on searching for the bacteria that was causing this influenza. But not much was known about a virus. It's even smaller, it's in many ways even a simpler particle, it's not really even an organism, than the bacteria is. There's even less you can do for it, to try and treat someone who has a virus, as we know today. And so, in many ways it was probably even more comforting to think that it was a bacteria, maybe they could at least do more about it, they knew more about bacteria.

(Narrator) Unlike 1918, we now have antibiotics to treat bacterial infections.

(Salloway)... In treating bacteria, as opposed to treating viruses, we have large numbers of antibiotics. The antibiotics are variously effective against, variously effective, against bacteria. The reason I say variously effective is that the bacteria are learning to outwit the antibiotics.

(Thomas Pistole)... Antibiotics are substances that are produced by other living forms. So they are produced often times by fungi, or other microorganisms and they are designed to kill microorganisms without doing a lot of damage to us, so there is a lot of selection, as you can imagine, to find that right mix and to find that substance, but when you do, they can just do wonders. Of course if we use them too much then they begin to lose their effectiveness.

(Narrator) While viruses lack even the most basic machinery for cellular metabolism, bacteria in contrast are fully living organisms.

Surrounded by a thin cell wall to protect their internal structures, bacteria eat, reproduce, and perform all of the functions of living cells.

And because their internal metabolism differs substantially from human cells, drugs targeting these differences can be deadly to bacteria and completely safe to us.

(Narrator) An antibiotic is a chemical that works by attacking chemical pathways unique or critical only to bacteria. It selectively disrupts a metabolic process necessary for the bacteria to function.

Acting as a poison, an antibiotic can directly kill bacteria, or cripple them long enough for the body's natural defenses to take over.

Because viruses use our own cells, there are far greater challenges in trying to create drugs that will only affect the virus.

(Novotny)... The challenges of creating antiviral drugs are really quite great and one of the most significant challenges is to develop a drug that can specifically target the virus

replication cycle without harming normal cells with an individual who might be taking the drugs.

(Narrator) For most viruses the best tools we have are preventive measures like vaccination and proper hygiene.

(Narrator) New influenza vaccines have to be produced every year because each year presents a potentially different strain.

(Novotny)... One might ask as to how one decides what type of virus to start growing for an ultimate epidemic that might occur. The epidemiologists, the public health people, that are studying outbreaks for instance in the Far East, have a good handle as to what viruses are out there and what might be spread to this particular country.

(Salloway)... The Centers for Disease Control in Atlanta, GA and the World Health Organization, headquartered in Geneva, Switzerland, have a monitoring system in which they attempt to make early identification of influenzas as they show up. Every year, they take a look at the influenzas that are present in Asia, they type them and they pick the 3 most likely candidates for an influenza outbreak during the flu season.

(Novotny)... The fact that these viruses can produce antigenic shift and antigenic drift one has to really take a best shot guess as to what's going to be coming to this country or to Europe from, for instance, Asia.

(Salloway)... Now there are two difficulties: one is that occasionally the CDC, the WHO bet wrong. Occasionally, the three viruses that they identify as the most likely culprit are not the ones that show up. This happened in the 2003-2004 flu season. We guessed wrong. The other possibility is that we'll vaccinate the wrong group. In 1918 it was not the elderly who were most at risk of dying from influenza. It was people who were young and people who were strong.

(Narrator) The experts agree that another influenza pandemic is inevitable. But no one knows how bad it will be.

(Salloway)... Influenza tends to be cyclical. Pandemics tend to come in twenty year cycles. We had a pandemic in approximately 1957. We had another one in 1968. We expected one in 1976, we expected the Swine Flu Epidemic.

(Thomas Pistole)... If you look at the history of the past pandemics, almost all of them are arising from Southeast Asia, so past influenza pandemics have been labeled the Hong Kong Flu or the Asiatic Flu, and it makes you think there's something unique there. Certainly one of the possible explanations is the intense association between human and certain animal forms in that part of the world. That's an intriguing model, who knows if that's really the explanation. But I think what we'll see from some place, perhaps Southeast Asia, but maybe not necessarily, something that looks a bit unusual, and before we even blink an eye, we begin to see it just spiraling out.

(Salloway)... What happened in the outbreak of 2002 was that we had an avian influenza that was transmissible from birds to humans. And we had a fist full of cases, particularly in Hong Kong, where people in contact with birds developed the influenza. It had a very high fatality rate. People died from it. However, that particular avian influenza was not transmissible human to human. We missed a bullet by that much. Might the next attack of avian influenza be human to human transmissible? Might very well. Perhaps through amplification in a pig host, perhaps through recombination in a human host, perhaps because for whatever reason that particular virus is transmissible human to human. Could it happen? Yes. Will it happen? Eventually, probably yes.

(Narrator) And if the scientists guess wrong as to which strain of the vaccine should be produced it will leave us particularly vulnerable.

(Novotny)... It would normally take somewhere between 3 and 4 month to produce, to mass produce enough vaccine to begin protecting the American public or the public in general.

(Narrator) That's 3 to 4 months after the correct strain was isolated. By then the disease could spread to millions.

(Narrator) The lessons of the 1918 pandemic has harden the resolve of scientist, doctors, and health officials to try and prevent the same events from reoccurring.

We now have different tools at our disposal both in treatment and in detection.

(Novotny)... The scientific efforts that we have in this country now have lead to the development of chemotherapeutic's agent that are used. The popular one in the news this past year has been something called Tami flu. This is a drug that can be taken and if taken within the first few days of influenza virus infection can shut off the virus infection.

(Narrator) It's frightening to know that the current Avian virus strains in the Far East are resistant to 2 out of the 3 drugs that can be used to prevent the viral infection.

(Thomas Pistol)... I think when we look at a disease like influenza from an individual perspective, we can say we are in a better position now because we have antivirals we can use, we have a much better supportive health care system. When we look at influenza from a population, from a society perspective, I think we are in a worse situation just because we are much more mobile in our lifestyle.

(Salloway)... In 1918 the transit time from New York to Paris was 10 days on a steam ship. Today that transit time is 10 hours, in an airplane, packed with people, all breathing the same air. So the ecology in which we live has changed. It's changed in favor of the virus.

(Narrator) Those favorable factors are multiplied through the prevalence of war.

(Salloway)... What we don't calculate is that as troops move around they bring their diseases with them. Africa is rent by war. HIV in Africa is as much a product of war as of any other single factor. We have brought diseases to places like Afghanistan, and Iraq, we will bring diseases from Korea, from Afghanistan, from Iraq, back to the United States. War and disease are co-conspirators.

(Narrator) We have learned to live in a culture of fear.

The media constantly bombards us with warnings about the next deadly threat, without giving us the slightest idea of just how real the risks are.

(Narrator) Astounding advances in science and technology have resulted in the ultimate paradox - living in the safest, yet the most volatile time in history.

(Narrator) But to place it in perspective, you are more likely to die from conditions you can control like tobacco use or obesity, than the flu or any other infectious disease.

(Thomas Pistole)... We come in contact with the organisms that cause infectious diseases all the time. There is just no way that we can avoid them, and it is probably not in our best interest to avoid them, because that low level exposure is exactly just what the body's immune system needs to build up that level of resistance. So every time we touch a handle on a door, every time we walk up and down in that supermarket aisle, we are exposing ourselves to potentially disease causing microorganisms, but we don't know it because we have such a wonderful defense system that is taking care of it without us having to do anything.

(Beth Ellers)... One of the things that we can learn from the epidemic of 1918, is that it reminds us that life is unpredictable, and that we should every day appreciate our lives and those we love.