Chapter 6
“The Wrong Bat Met the Wrong Pig”: Pandemic Ethics in Contagion (2011)

It’s hard to find great films about pandemics that are not “zombie” films, such as 28 Days (2000), its sequel, 28 Days Later (2002); or World War Z (2013). Contagion is a fast-paced thriller with an ensemble cast, brilliantly directed by Steven Soderbergh. It opened in theaters on September 9, 2011—two days before the tenth anniversary of 9/11. Contagion is an original screenplay for which its source material was science and medical news about recent pandemic threats, such as Severe Acute Respiratory Syndrome (SARS) in 2003 and the 2009 H1N1 flu. It has fresh relevance in light of the COVID-19 coronavirus pandemic of 2020. The novel flu virus in the film is called MEV-1—“a deadly, highly communicable strain that strikes the brain and lung, triggering dramatic convulsions for the camera” (Hall 2011). MEV-1 devastates the body within days of infection, transmitting like the flu—droplets and fomites. Throughout the film, no one ever really knows how it all starts except that “the wrong bat met the wrong pig”. But in the final two brilliant minutes of the film, it all plays out for the viewer. Deforestation forces a fruit bat to leave a treetop; it flies over a nearby pig pen, dropping its feces onto the ground that one of the pigs ingests. That same pig is next sent to slaughter, shipped to a fine restaurant in Hong Kong, in which the chef is slicing it open raw to begin a fine pork dish; he is then interrupted mid-raw slice to be introduced to an American restaurant guest: the lovely Beth Emhoff (played by Gwyneth Paltrow). The chef wipes his hands on his apron without washing them and then goes into the dining room to shake hands with Beth. He goes back to prepare his pig. Beth then becomes the human superspreader—infecting several people in Hong Kong before she gets on a plane and brings it to the United States.

Experts from the World Health Organization (WHO) and professors of infectious disease were consultants on the script. Contagion is not just a great thriller, but praised by scientists for its accuracy. Three years after its release, Contagion resonated in light of the Ebola pandemic of 2014, and was absolutely prescient during the COVID-19 pandemic of 2020 (see Afterword). When you’re looking at the myriad of healthcare ethics issues that arise in a pandemic, this is the film to view. This chapter discusses
the production aspects of the film, its social location, the history of medicine context and the justice and pandemic ethics issues raised in the film.

Making a Film Go Viral: Production of Contagion

*Contagion* is an original screenplay by Scott Burns (see further) and Director Steven Soderbergh (see further), who also was the cinematographer under the pseudonym Peter Andrews (Douglas 2011). The germ of the idea arose when the two collaborated on the 2009 film *The Informant*, starring Matt Damon, who was also in *Contagion*. *The Informant* was about an agribusiness whistleblower (based on the real story of Mark Whitacre), featuring a scene in which Whitacre is germaphobic (Douglas 2011). Soderbergh and Burns were planning to collaborate on a different film when they decided to rethink the project and do something else. Burns recalled in an interview (Douglas 2011) that when Soderbergh asked him:

> Do you have any other ideas?” I said, “Well, I always thought it would be cool to do a pandemic movie but a pandemic movie that was more rooted in reality.” I was certainly aware there were other pandemic movies, but I wanted to do one that really felt like what could happen. There’s a scene in “The Informant!” where Matt (Damon) is watching Scott Bakula’s character talk on the phone and Scott coughs on the phone, and there’s this whole ramp that Matt goes off on of “Oh, great, now what happens? He gets sick and then I’m going to get it, my kids are going to get it.” I’ve always been fascinated by transmissibility, so I said to Steven, “I want to do an interesting thriller version of a pandemic movie” and he said, “Great! Let’s do that instead.”

Burns began the project about six months prior to the 2009 H1N1 virus news, and began thinking about ramifications of social distancing and social media. He noted (Douglas 2011):

> “Well, do you close the schools and if you close the schools, then who stays home with the kids? And will everyone keep their kids at home?” Things happening online, which is where the Jude Law character came from, that there’s going to be information that comes out online where people want to be ahead of the curve, so some people will write things about anti-virals or different treatment protocols, and so there’s always going to be information …[with] sort of a viral pulse. So it’s not just the disease that you have to track, it’s how the disease is interpreted by the population. It was great, because while I was writing this, it was playing out in real time.

Burns’ script was informed by experts at the Centers for Disease Control (CDC), and the WHO; several scenes were shot at the CDC in Atlanta, with one scene shot at the WHO headquarters in Geneva. Experts included Lawrence Brilliant, a virologist and pandemic expert, W. Ian Lipkin, an expert in diagnostics, microbial discovery and outbreak response, as well as science journalist, Laurie Garrett, author of *The Coming Plague* (1995). The experts on the film praised the film for its realism. Says Burns (Douglas 2011):

> …Dr. Lipkin and Laurie Garrett were in Hong Kong for the SARS outbreak and they’ve seen the movie and they were like, “Yeah, this is what it felt like.” You walk around and you
are paranoid and you look at social gatherings and you look at the world and you think as animals we are messy and we do eat from the same bowl and touch the same knobs and we hug each other and touch each other and that’s part of the great thing about being a human being. It’s also dangerous.

Burns’ screenplays included several partnerships with Soderbergh. Prior to *Contagion*, he wrote *The Bourne Ultimatum* (2007), and also produced Al Gore’s *An Inconvenient Truth* (2006), which won an Academy Award (see Chap. 4).

Each storyline in *Contagion* was shot in different locations, comprising the storyline of the index patient’s saga; the WHO epidemiologist, played by Marion Cotillard; the CDC experts played by Laurence Fishburne (see Chap. 1) and Kate Winslet. There is also the storyline surrounding the virologists, played by Jennifer Ehle and Elliot Gould; and finally, the social media and the spreading of misinformation online by a menacing blogger played by Jude Law (a scenario far less severe in 2009 than it was to become by 2016 and beyond). The script was prescient surrounding the worst virus of all: the spread of misinformation in a pandemic event. Burns noted (Douglas 2011):

Steven and I have talked about this for a long time and my view is… Look, that line that I wrote about blogging as being graffiti with punctuation, I feel like there’s a lot of unfiltered content in the world now. It is both a great freedom and a huge danger. I don’t think we spend enough time talking about that… But we’re living in the Wild West on the internet…and again, like a virus, it’s one of these things where it can get outta control really, really quickly. I think Steven and I share a concern. On the one hand, I think we applaud the openness of media and the exchange of ideas; on the other hand, if you’re going to live in a world where everyone has a microphone and that big a loud speaker, it’s a scary world. It can get pretty noisy.

With Burns script, Soderbergh was motivated to make a film about the response to a global pandemic informed by HIV/AIDS in the 1980s (see Chap. 2), as well as more recent events, such as 9/11, Hurricane Katrina, and what countries dealing with SARS experienced.

Film critic, David Denby in the *New Yorker* noted this (Denby 2011):

Contagion confronts reality head on; it’s a brief against magical thinking. Soderbergh and his screenwriter, Scott Z. Burns, may not have intended it, but their movie could become an event in an ongoing political debate over the nature of American life. In “Contagion,” paranoia reaches its logical end point: the everyday streams of connection—the personal and professional meetings that make economic and social life and pleasure possible—become the vehicle of our destruction…. The speed and the range of the movie are analogous to the way the disease spreads. The Internet, another system of universal connection, becomes a kind of plague, too. [Jude Law’s blogger character] Krumwiede’s aggressions echo those of 9/11 conspiracy theorists and, perhaps, of Julian Assange at his most self-righteous. As the filmmakers tell it, Krumwiede, spreading distrust, is part of the disease…

The film’s release in 2011 coincided with the tenth anniversary of 9/11, which was not lost on its audience; Denby also notes (Denby 2011):

*Contagion* is, of course, a 9/11-anniversary movie, though probably not one that the public was expecting. Soderbergh appears to be saying, “I’ll show you something far worse than a terrorist attack, and no fundamentalist fanatic planned it.” The film suggests that, at any moment, our advanced civilization could be close to a breakdown exacerbated by precisely what is most advanced in it.
Contagion now stands the test of time with fresh relevance during the coronavirus COVID-19 pandemic (Castrodale 2020; Yang 2020). Ironically, the film did particularly well in its release weekend in Italy in 2011, which became the first European hot zone for the spread of Coronavirus and COVID-19 and went on lock-down in March 2020 (Mounk 2020; Newsweek 2020; Lintern 2020). Praised by scientists for its accuracy, Contagion also received accolades from Paul Offit, an expert in vaccines (Offit 2011), for a good explanation of the Basic Reproduction Number or R₀—the anticipated number of cases directly generated by one case, and fomites.

Steven Soderbergh

A tail-end Baby Boomer born in 1963, Soderbergh’s debut film when he was 26 was the fascinating and hailed Sex, Lies and Videotape (1989), which explored the burgeoning changes technology interjected into sexual relationships, as many adults in the wake of HIV/AIDS looked to technology as an alternative to intimate relationships. Sex, Lies and Videotape also tapped into pre-social media behaviors decades before it was invented. The film was considered to have helped launch the Independent film industry in the 1990s. Known for his avant garde, French new wave and experimental style, reminiscent of a European filmmaker, Soderbergh is a master of the Independent film. His repertoire includes Traffic (2000), a tour de force about the Mexican-American drug wars; Erin Brokovich (2000), a film about the environmental tort law crusader; and the Ocean’s Eleven through Ocean’s Thirteen films (2001 through 2018). He also does his own cinematography under the pseudonym, Peter Andrews.

Ensemble Cast

Contagion boasts an impressive ensemble cast, not unlike And the Band Played On (see Chap. 2). Gwyneth Paltrow, as the index patient, has a more minor role and dies early in the film. Paltrow is also known as the CEO of Goop, a multi-million dollar company she started in her kitchen, which promotes healthy living and has a number of unique and highly priced products. At the same time, Paltrow has become a lightning rod for several in the medical and bioethics community for promoting pseudoscience through Goop’s products and messages (Pruden 2018). The cast also boasts Matt Damon, Jennifer Ehle, who was also known in the role of Elizabeth Bennett in the particularly compelling 1995 version of Pride and Prejudice by Masterpiece Theater on PBS, opposite Colin Firth. Laurence Fishburne (see Chap. 1), Jude Law, Kate Winslet, and Marion Cottilard fill out the cast.

Synopsis

Contagion’s fast-paced plot focuses on multiple simultaneous narratives, but each actor’s storyline was shot in one separate sequence, which included a large ensemble cast of characters. The first gripping scene begins with a black screen and then a cough. And then we meet coughing Beth Emhoff (played by Gwyneth Paltrow) at
the airport. She’s on the phone with the man she just made love to during her layover in Chicago, letting him know she’s at the gate, waiting for her connecting flight home to Minneapolis, where she returns to her family—husband, Mitch Emhoff, played by Matt Damon, her young son from a previous marriage, and Mitch’s teenage daughter from a previous marriage. Emhoff is the index case who becomes the super-spreader while she’s in Hong Kong on business and then brings the novel virus into the United States while traveling home from Hong Kong. On her layover in Chicago, she meets up with an old flame and infects him before catching her connecting flight from Chicago to Minneapolis, next infecting her son in Minneapolis, and, of course, anyone else along the way she’s been in contact with at airports, restaurants, and so forth. Beth Emhoff has flu symptoms, and then suddenly has a seizure and dies, leaving her widowed second husband and teenaged daughter behind, both of whom seem to be immune. As more cases begin to be seen in Hong Kong, and then around the world, Beth Emhoff’s death sets off a detective story where infectious disease experts at the CDC and the WHO try to isolate the virus; epidemiologists at the CDC and WHO try to contact-trace and figure out etiology, echoing the various ground zero clinical, research and social theaters also seen in And the Band Played On (see Chap. 2). As social distancing and mandatory quarantine becomes the only tool of containment while a vaccine is being sped through development and trials, the United States becomes mired in shortages of supplies and healthcare workers, panic buying, looting, stopping of basic services such as garbage collection, with martial law declared in various states. Finally, as the vaccine becomes slowly available, ethically sound rationing frameworks are used to dispense the vaccine via “birthday lottery” to global populations, as life starts to return to more normalcy.

One reviewer summarizes it this way (Moviesonline 2011):

Intelligently written, superbly directed and impeccably acted, Steven Soderbergh’s new bio-threat thriller, “Contagion,” examines what happens when our worst fears about a global pandemic become reality. An international traveler reaches into the snack bowl at an airport bar before passing her credit card to a waiter. A business meeting begins with a round of handshakes. A man coughs on a crowded bus. One contact. One instant. And a lethal virus is transmitted.

The Pro-science Obama Era: The Social Location of Contagion

When Contagion was being written and produced during the first term of the Obama Administration, scientists around the world were breathing a sigh of relief as science and technology appeared to be back on the agenda. In December 2008, before his inauguration (Tollefson 2012):

[Obama] announced other members of his future staff, who would make up a star-studded science team: marine ecologist Jane Lubchenco would head the National Oceanographic and Atmospheric Administration in Washington DC and physicist John Holdren would be Obama’s science adviser and head the Office of Science and Technology Policy, also in
Washington DC. They joined Lisa Jackson, a respected chemical engineer with political experience, who had been named to run the US Environmental Protection Agency (EPA) in Washington DC. After taking office, the president completed the team by appointing geneticist Francis Collins at the National Institutes of Health (NIH) in Bethesda, Maryland, and geophysicist Marcia McNutt at the US Geological Survey in Reston, Virginia. Never before had a president assembled such a strong crop of researchers to lead his science agencies.

“The truth is that promoting science isn’t just about providing resources—it’s about protecting free and open inquiry,” Obama proclaimed as he made the initial appointments. “It’s about listening to what our scientists have to say, even when it’s inconvenient—especially when it’s inconvenient.”

Scientists and environmentalists swooned; they had spent 8 years complaining that the administration of President George W. Bush had overly politicized science. Climate researchers in government had charged that they were being muzzled and that their data were being manipulated. Pollution regulations were blocked or watered down. With Obama’s election, scientists would finally have a president who not only said the right things but actually appointed the right people. Even journalists drooled. “Science Born Again in the White House, and Not a Moment Too Soon,” read a headline in Wired magazine, endorsing Obama’s appointments with a swipe at Bush’s reputation as a born-again Christian.

*Nature* later recalled in 2016 (Monastersky 2016):

Many researchers who watched Barack Obama’s inauguration in 2009 were thrilled by his pledge to “restore science to its rightful place”…. In general, government researchers have enjoyed more freedom—and endured less political meddling—than they did under the previous president, George W. Bush. Bush’s administration was accused of muzzling or ignoring scientists on subjects ranging from stem cells to climate change.

Under Obama, science was back on-track, climate change was now framed as a national security issue; while environmental protections and other policies were being informed by real scientists. There was even a White House Science Fair being introduced (Whitehouse.gov 2015). In medical news, the biggest Obama era change was healthcare reform with the Affordable Care Act (see Chap. 4), while a decade after 9/11, healthcare for those exposed to World Trade Center dust (see Chap. 4) would finally have coverage.

The timing for a scientifically accurate film about the next pandemic was ripe, especially since the next flu pandemic appeared to be pending with concerns over the H1N1 virus (see under History of Medicine).

But in 2009, the Obama Administration had other problems. Two post-9/11 wars were raging in Iraq and Afghanistan and the financial crisis meltdown, freshly inherited from the Bush Administration, was in full bloom. Obama’s American Recovery and Reinvestment Act (ARRA) of 2009 was a huge fiscal stimulus bill that addressed the financial crisis (Amadeo 2019). But here is a picture of what the Obama Administration was dealing with (Amadeo 2019):

The unemployment rate rose to 10% in October 2009, the worst since the 1982 recession. Almost 6 million jobs were lost in the 12 months prior to that. Employers added temporary workers, too cautious about the economy to add full-time employees…Meanwhile, a
Federal Reserve report showed that lending was down 15% from the nation’s four biggest banks…[which] cut their commercial and industrial lending by $100 billion, according to the Treasury Department data…Lending from all banks surveyed showed the number of loans made fell 9% between October 2008 and October 2009…Bank of America pledged to President Obama it would increase lending to small and medium-sized businesses by $5 billion in 2010. But that’s after they slashed lending by 21% or by $58 billion in 2009.

Obama’s ARRA did not leave science in the dust. It also stimulated science by providing $10 billion to modernize science facilities and fund research jobs that investigated disease cures; $4 billion to increase broadband internet access to rural and inner-city areas, as well as $4 billion for physics and science research (Amadeo 2020). Neil Lane, the former director of the National Science Foundation (NSF) was interviewed by Chemistry World in 2017 (Trager 2017):

[Lane said] Obama’s science and technology record is “quite remarkable given the political circumstances in which he served”…Obama was responsible for this ‘unprecedented increase’ in funding for research through the one-time stimulus…Obama’s economic recovery package gave a ‘huge bump’ of almost 50% to the NSF’s budget…

Giving research a boost was a challenge given that Obama arrived as the financial crisis was in full swing, and roadblocks laid by his Republican opponents on Capitol Hill. ‘It was made very clear by the Republicans in Congress that they were not going to work with President Obama, and they were going to do everything they could to ensure that he was not successful,’ Lane recalls.

In 2009, the NIH made a public statement over the science funding (NIH Record 2009):

NIH is extremely grateful to President Obama and the Congress for recognizing both the economic and health impacts of biomedical and behavioral research…The science funded by this bill will stimulate the national economy and have an impact for many years to come.

In Contagion, there is a lot of emphasis regarding the science infrastructure needed in combatting a pandemic—containment facilities and equipment; under Bush, no such funding was available. Out of the $10.4 billion allocated by ARRA, $300 million was designated for “shared instrumentation and other capital equipment” and $500 million was for “NIH buildings and facilities” for “high-priority repair, construction and improvement projects” (NIH 2009). When teaching this film, it’s important to emphasize that while science doesn’t happen in a vacuum, infectious diseases can’t be studied in under-resourced, unsafe facilities, either, a condition that would reappear in the Trump era, which included an under-resourced response to the COVID-19 pandemic (see Afterword).

In the wake of the financial crisis and ARRA, it was also clear that social fabric was delicate, and a pandemic health crisis layered onto a society in which few had any real social safety nets, would be an existential threat. Meanwhile, a war-weary United States, in which its all-volunteer military was stretched to the breaking point, required Obama to rethink military strategic planning, given that both wars were going badly and had led to chaos (Woodward 2010). By December 2009, Obama ordered a troop surge into Afghanistan, and began to plan for exiting Iraq. Two
days after *Contagion* opened, so did the first 9/11 Memorial on the event’s tenth anniversary while the first 9/11 museum was still under construction until 2014. By December 2011, three months after *Contagion* opened, American troops left Iraq.

**Postmortem on Bush Era Policies and the “War on Terror”**

When the Obama era began, the postmortem on the Bush Administration had begun, too, as Americans felt freer to exercise their civil rights and criticize Bush era policies that had to do with decreasing individual freedoms and liberties in the name of the “War on Terror”. If Americans were willing to give up their rights in the wake of terrorism, what would they do in the midst of a pandemic?

*Contagion* is a post-SARS film in which many of the social conditions of a pandemic, as well as the balancing of individual liberties with pandemic conditions (see further) are depicted; however, to an Obama era audience, the slow erosion of their personal liberties was all-too familiar. The SARS pandemic is discussed under the History of Medicine section below, but the social location of SARS was in February 2003, just at the time that the Bush Administration was making an argument for the invasion of Iraq, based on the false premise that Iraq had weapons of mass destruction. *Contagion* also comments on the extent to which a public health or public safety threat—such as the post-9/11 environment—inspires Americans to give up their civil rights. When SARS hit, the Bush Administration had already expanded its war powers, and passed significant legislation that had encroached upon individual liberties, although the public’s acceptance of this was perhaps more significant, as Bush enjoyed an approval rating of 90% after 9/11, and above 60% until January 2004 (Gallup 2018). *The Patriot Act* (2001) sailed through Congress, while the “War on Terror” began to hold individuals suspected of ties to Al Qaeda or terrorist cells without legal due process, in violation of their civil liberties. Meanwhile, American citizens were being held without due process, as extraordinary rendition, in which those suspected of terrorist activities were detained and sent to another country for interrogation, became much too common in the Bush era. According to the ACLU in 2007 (ACLU.org 2020):

In the name of national security, the U.S. government is sponsoring torture programs that transcend the bounds of law and threaten our most treasured values. The ACLU has brought two lawsuits against the U.S. government and the airline that facilitates flight planning for C.I.A. renditions. The cases are El Masri v. Tenet, a lawsuit against former CIA director George Tenet on behalf of German citizen Khaled El-Masri, and *Mohamed v. Jeppesen*, a lawsuit against Boeing subsidiary Jeppesen Dataplan, Inc.

*The Patriot Act* gave away a number of hard-won civil liberties (CRF 2019)

Some of the most controversial parts of the Patriot Act surround issues of privacy and government surveillance. The Fourth Amendment to the U.S. Constitution protects the “right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures….“ It requires law-enforcement officers to obtain warrants before making most
searches…. The judge may only issue a search warrant if officers show “probable cause” that the person is engaged in criminal activity….

The Patriot Act now authorizes the court to issue search orders directed at any U.S. citizen who the FBI believes may be involved in terrorist activities. Such activities may, in part, even involve First Amendment protected acts such as participating in non-violent public protests.

*The Patriot Act* also expanded the property that could be searched (CRF 2019):

In Sect. 215, “any tangible things” may include almost any kind of property—such as books, documents, and computers. The FBI may also monitor or seize personal records held by public libraries, bookstores, medical offices, Internet providers, churches, political groups, universities, and other businesses and institutions.

But what enabled *The Patriot Act* most of all, was that public opinion had dramatically shifted. By 2002, 47% of Americans felt that civil liberties should be sacrificed to prevent terrorism; 60% were in favor of Bush policies in restricting civil liberties, while 25% thought it hadn’t restricted them enough (Gallup 2018; CRF 2019).

By 2004, when the Abu Ghraib story had been outed, in which American soldiers were found to have tortured Iraqi citizens held in the Abu Ghraib prison (CBS 2004), accidentally replicating the Stanford Prison Study experiment (Haney et al. 1973), the country began to become disillusioned with the “War on Terror” and expanded practices of torture in the Bush Era (U.S. Senate 2014).

**Hurricane Katrina**

Also discussed in Chap. 4, Hurricane Katrina was considered one of the most disastrous events during the Bush era, not because of a natural disaster but because of the manmade disaster that followed. On August 31, 2005, Hurricane Katrina, a category 5 hurricane, made a bullseye for New Orleans and stranded its vulnerable population: citizens who were sick, elderly, poor, and largely African American. Levees breached as thousands were flooded out of their homes. The four-year old Department of Homeland Security (established in 2001), now responsible for the Federal Emergency Management Agency (FEMA) failed to respond in a timely and appropriate manner. For days, stranded victims of the hurricane went without proper resources, as Americans watched in horror how paralyzed the federal government had become in coordinating the allocation of abundant, not even scarce, resources to the victims. In fact, one of the federal employees responsible for the failed Katrina response was Kirstjen Nielsen, who would go on to even more notorious acts while becoming Director of Homeland Security in the Trump Administration. Aside from abandoning American citizens in the wake of disaster, what Steven Soderbergh noted (Hoffman 2011) was the complete breakdown in social order as citizens were left to their own devices to obtain resources to survive. Mass looting and citizens self-arming for defense became the norm very quickly—an environment that begins to take shape in *Contagion*. Ultimately, Hurricane Katrina would not have become as memorable were it not for the weeks-long social order breakdown that was completely preventable. Social order was only restored when the U.S. military went into the
region and established martial law. It took years for New Orleans to bounce back, but the United States depicted in Contagion was not a stretch. In fact, in a particularly disturbing scene in which Matt Damon is trying to escape Minnesota’s anarchy by trying to cross into Wisconsin, he is stopped as state borders are enforced. Similar local borders were enforced in the wake of Katrina, barring citizens from leaving New Orleans into other jurisdictions (Burnett 2005). However, Katrina also led to specific disaster ethics and pandemic ethics protocols that had contingency plans for vulnerable populations (see under Healthcare Ethics Issues).

**Viral Information: Social Media**

Contagion has a powerful subplot involving the role of social media in disrupting containment and social order, breeding disinformation, conspiracy theories, and misinformation by greedy and immoral actors looking to profit from the destabilized environment and panic. But Soderbergh was not depicting the social media of 2009–2010 when Contagion is in production. He is inadvertently depicting the social media of the future—which ultimately becomes its own social virus no one can contain, and which is only more dangerous now in the wake of foreign interference and message hijacking. In 2009, Mashable stated this (Parr 2009):

> To most observers, 2009 marked the year Twitter conquered the world. Yet it wasn’t the only social media company that grew like wildfire. There’s another that grew even more rapidly, adding over 200 million new users and raising $200 million dollars—double that of Twitter’s most recent round.

> 2009 was a breakout year for Facebook, even if some of its successes were overshadowed by its emerging rival. In fact, the two have been locked in a new battle for the soul of the web, and the right to be the platform where the world converses. To that end, Facebook’s 2009 has partly been about fighting back through the opening up of its data and profiles, a process we sometimes “Twitterfercation”

Indeed by 2016, just five years after Contagion is released, social media becomes the Frankenstein monster no one can control anymore—not even its creators (PBS 2018). But most of all, the “tool that Liberals built” (PBS 2018) became weaponized within the United States by Americans themselves serving anti-science groups, right wing conspirators and a variety of actors with the goal of spreading disinformation. Contagion does not tell us whether the U.S. government is functioning under a Democratic, Republican or Independent party, but instead, points to the global science communities as taking charge, while martial law appears to become the norm under a faceless and nameless administration. In a real pandemic, social media will likely become the critical messaging tool of local health authorities, as it has now displaced all other communication tools. By 2020 the COVID-19 virus was even called a “hoax” by the President of the United States (NBC News 2020).
The Zombie Context

When *Contagion* was in development, the “Zombie Apocalypse” genre for infectious diseases was well known. In fact, on May 18, 2011, the CDC had even published an article called “Preparedness 101: Zombie Apocalypse” providing tips on preparing to survive a zombie invasion. The CDC recognized that the zombie was a good allegory for preparedness messaging. The article by Khan (2011) starts:

There are all kinds of emergencies out there that we can prepare for. Take a zombie apocalypse for example. That’s right, I said z-o-m-b-i-e a-p-o-c-a-l-y-p-s-e. You may laugh now, but when it happens you’ll be happy you read this, and hey, maybe you’ll even learn a thing or two about how to prepare for a real emergency.

The explosion of the cultural allegory in media led the CDC to make use of it as an educational opportunity (CDC 2018). Scholars have noted that the zombie is merely a personification of how infectious disease spreads (Verran and Reyes 2018):

In the zombie, internal damage to the host becomes externalized, and contagion patterns among populations are demonstrated as the zombie hordes rampage. With no subclinical manifestation, the zombie makes the apocalypse visible, enabling us to physically map the spread of infection. In other words, the zombie becomes an “allegory of infectious disease” and a “metaphor of ubiquitous contagion…In their hordelike structure, zombies also operate metonymically, standing in for large swaths of the population (the infected), or viruses (the infection). The mathematics of zombie outbreaks has therefore also been explored as an education tool to represent contagion patterns and containment strategies…. Our innate knowledge of real disease epidemiology is thus illustrated in much zombie literature by the behavior of the humans who are under threat. In the absence of any treatment strategy, options are restricted to quarantine; immunization strategies (protection of the uninfected and control. As zombies become the manifestation of virulent infection, they do not just address our fear of pandemic disease and apocalypse; they also allow us to explore coping strategies.

If *Contagion* is being shown in a more specific course about infectious disease, pairing it with *28 Days Later* (2002) and *World War Z* (2013) is recommended.

History of Medicine Context

It’s important to note that in the infectious disease genre of science fiction and films, some are based on the Plague (called Yersinia pestis) as in Stephen King’s *The Stand* (1978), some are based on AIDS (see Chap. 2), while the “rage virus” in *28 Days* is based on Ebola. From a history of medicine context, *Contagion’s* story is based on early twenty-first century global pandemics: Severe Acute Respiratory Syndrome (SARS), which emerged in 2003, and concerns over a novel flu virus, H1N1 in 2009. However, the virus’ etiology is based on the Nipah virus, which was identified as a virus in a type of fruit bat in Malaysia jumping to a pig, and occurred because of an overlap between fruit bat habitats and piggeries in Malaysia. At a farm where
the “wrong bat met the wrong pig”, fruit orchards were too close in proximity to a piggery, “allowing the spillage of urine, feces and partially eaten fruit onto the pigs” (Chua et al. 2002).

The film was released just three years before the 2014 Ebola pandemic, which indeed travelled to the United States and could have threatened large population centers if it were not for aggressive contact tracing and quarantine, which helped to contain it (see under History of Medicine). This section briefly reviews the 1918 flu pandemic, but focuses on SARS, H1N1 and the 2014 Ebola virus. As Contagion also deals with vaccine misinformation, this section also deals with the Andrew Wakefield incident, which influenced the script.

The 1918 Flu Pandemic

Contagion references the 1918 Great Influenza pandemic (aka Spanish Flu), which was a global pandemic that probably started in a small Kansas town in the United States in the early part of 1918. According to clinicians at the time (Barry 2005):

The flu ‘was ushered in by two groups of symptoms: in the first place the constitutional reactions of an acute febrile disease—headache, general aching, chills, fever, malaise, prostration, anorexia, nausea or vomiting; and in the second place, symptoms referable to an intense congestion of the mucous membranes of the nose, pharynx, larynx, trachea and upper respiratory tract in general and of the conjunctivae…[causing] absolute exhaustion and chill, fever, extreme pain in back and limbs…cough was often constant. Upper air passages were clogged.’ (Pg. 232)

There were also Ebola-like symptoms: 15% suffered from bleeding from the nose (epistaxis), and women bled from their vaginas due to uterine mucosa, not menstruation. “Blood poured from noses, ears, eye sockets” and when they died, “bloody liquid was seeping from the nostrils or mouths” (Barry 2005). For some flu victims, symptoms were very sudden and violent: sudden, extreme joint pain, chills and a high fever—almost an instantaneous reaction with no gradual buildup. In many flu victims, they could recall the exact moment they became sick, and many died within hours. According to Barry (2005): “JAMA reported ‘One robust person showed the first symptoms at 4 pm and died by 10 am’.”

The first victims of the flu were soldiers, who spread it through crowded conditions of various military bases and hospitals during World War I. For example, on October 4, 1918, over 100 men at Camp Grant died in a single day; in less than a month, 2800 troops reported ill in a single day (Barry 2005, p. 216).

The hospital staff could not keep pace. Endless rows of men coughing, lying in bloodstained linen, surrounded by flies—orders were issued that ‘formalin should be added to each sputum cup to keep the flies away’—the grotesque smells of vomit, urine and feces made the relatives in some ways more desperate than the patients.

Anyone with a living memory of 1918 in the United States—particularly if they lived in an urban center such as New York or Philadelphia, experienced conditions similar
to the plagues of the middle ages. Overcrowding and slums helped to spread the flu in cities, which were the same social conditions in Europe. As Barry (2005) notes, although the plague in the middle ages killed a much larger proportion of the population, in sheer body count, the 1918 pandemic killed more people in a year than the Black Death killed in a century. As another parallel, the 1918 flu killed more people in 24 weeks than AIDS killed in 24 years (see Chap. 2). In Louisville, Kentucky, 40% of those who died were aged 20–24. The Great Influenza pandemic of 1918 was different than other flu epidemics because it seemed to target adults in the prime of life, rather than the very old or young, which was more typical. Half the victims were men and women in their 20s and 30s, or roughly 10% of all young adults alive in that time frame. The death toll so overwhelmed cities, there were coffin shortages; piles of dead bodies; shortages of doctors and nurses. (In Philadelphia, when the flu exploded in the population, all 31 of its hospitals were filled with flu patients.) Relatives were either burying their own dead or wrapping them in cloth until “body wagons” (in trucks or by horse-drawn carriage) could pick them up. The deaths increased in 10 days from 2 deaths per day to hundreds of deaths per day. During this time, as in Contagion, people isolated themselves, and children would see one neighbor after the other die and wonder who would die next. Everyone was wearing masks. Everyone had someone in the family who was dying or sick, and many households had several sick and dying. Common public health signs from 1918–20 would read “Spit spreads death” while ordinances were passed that made not wearing a mask a felony. Public events were cancelled, and city streets became empty and “ghost town” like. The pandemic didn’t fade away until about 1920, but its impact lingered into the next century (Barry 2005).

Severe Acute Respiratory Syndrome (SARS)

SARS was a novel coronavirus that was first identified in China’s Guangdong province and quickly spread to Hong Kong, which borders Guangdong province. It began to spread throughout Asia from there, and then travelled by plane to Europe and Canada, brought by passengers infected with SARS, just like Beth Emhoff, played by Gwyneth Paltrow, who flies from Hong Kong to Chicago and then Minneapolis. SARS spread like the flu—contact with another person, droplets which can spread through the air, which makes air travel a particularly potent carrier. Crowded conditions, in fact, are known as “super spreader events”. A Toronto resident who had been to Hong Kong in Spring of 2003 brought SARS to Toronto, Ontario Canada—a city of roughly 6 million people, creating a preview of coming attractions for other large global cities. The Toronto Index case was described by Low (2004):

The index case and her husband had vacationed in Hong Kong and had stayed at a hotel in Kowloon from February 18 to 21, 2003. The index case began to experience symptoms after her return on February 23 and died at home on March 5. During her illness, family members, including her son (case A), provided care at home. Case A became ill on February 27 and presented to the index hospital on March 7 [2003]…. Toronto’s experience with SARS
illustrated how quickly the disease can spread in hospitals and highlighted the dangerous phenomenon of SARS superspreaders. The absence of rapid tests to distinguish this new disease from pneumonia, influenza, or other common diseases bodes ill for future outbreaks.

In Toronto, which is heralded for having one of the best healthcare systems in the world, the SARS epidemic spread through the hospital environment. According to the *Canadian Medical Association Journal* (Borgundvaag et al. 2004):

In Toronto, there were several “super-spreading” events, instances when a few individuals were responsible for infecting a large number of others. At least 1 of these events occurred in an emergency department, 6 where overcrowding, open observation “wards” for patients with respiratory complaints, aerosol treatments, poor compliance with hand-washing procedures among health care workers and largely unrestricted access by visitors may have contributed to disease transmission.

SARS hit several cities in Asia, South America, Europe and Canada, and could have been the ultimate nightmare scenario had it hit New York City or another major center in the United States aggravated by its unjust healthcare system, which surely would have denied care to patients without insurance (see Chap. 4).

*Contagion* should be taught as a post-SARS film as it depicts scenarios and decision-making based on that particular outbreak. Canadian social science scholars noted (Ries 2004).

The outbreak took 44 lives in our country, threatened many others and created numerous challenges for public health officials and the acute health care system. In particular, SARS highlighted serious deficiencies in public health infrastructure and preparedness. As in other countries, officials in Canada were required to weigh the legalities and ethics of various interventions to control the spread of the disease, including quarantine.

**H1N1: 2009**

In 2009, when *Contagion* is in development, the United States was bracing for the H1N1 influenza (flu) pandemic. It was not clear at the time how serious it was, but it hit the United States in April 2009, infecting a 10-year-old boy (CDC 2010). The concern was that the virus “was a unique combination of influenza virus genes never previously identified in either animals or people. The virus genes were a combination of genes most closely related to North American swine-lineage H1N1 and Eurasian lineage swine-origin H1N1 influenza viruses” (CDC 2010). The virus originated from pigs but was spreading among humans only. Two days after the first child was infected, and 8-year-old was infected but there was no contact between the two children, suggesting it was likely in multiple places. H1N1 was a novel flu virus, which had all the ingredients of another 1918 situation—even an ongoing war, which in 1918 was World War I. On April 18, 2009, the United States reported the 2009 H1N1 influenza cases to the World Health Organization (WHO 2010). By April 25, 2009, after more cases were identified in other states, the WHO declared the outbreak a Public Health Emergency and by April 26, 2009, 25% of the U.S. government’s stockpiled supplies were released, which “included 11 million regimens of antiviral drugs, and personal protective equipment including over 39 million respiratory protection
devices (masks and respirators), gowns, gloves and face shields, to states (allocations were based on each state’s population).” After several reports of severe symptoms and deaths in Mexico and other countries, the threat level went to a phase 5:

As the outbreak spread, CDC began receiving reports of school closures and implementation of community-level social distancing measures meant to slow the spread of disease. School administrators and public health officials were following their pandemic plans and doing everything they could to slow the spread of illness. (Social distancing measures are meant to increase distance between people. Measures include staying home when ill unless to seek medical care, avoiding large gatherings, telecommuting, and implementing school closures).

By June 11, 2009, a worldwide H1N1 pandemic had been declared, and the threat level was raised to phase 6. However, most of the H1N1 cases were not fatal. By August 8, 2009, after 1 million infections, 477 Americans died from the 2009 H1N1 flu, including 36 who were under 18. Sixty-seven percent of the children who died had at least one high-risk medical condition. By September, H1N1 vaccines were developed, and by October, they were available in very limited supplies. By December 2009, major campaigns were initiated to encourage vaccination, however the anti-vax movement was beginning. The WHO described the 2009 H1N1 pandemic this way (WHO 2010):

After early outbreaks in North America in April 2009 the new influenza virus spread rapidly around the world. By the time WHO declared a pandemic in June 2009, a total of 74 countries and territories had reported laboratory confirmed infections. To date, most countries in the world have confirmed infections from the new virus…. The new virus has also led to patterns of death and illness not normally seen in influenza infections. Most of the deaths caused by the pandemic influenza have occurred among younger people, including those who were otherwise healthy. Pregnant women, younger children and people of any age with certain chronic lung or other medical conditions appear to be at higher risk of more complicated or severe illness. Many of the severe cases have been due to viral pneumonia, which is harder to treat than bacterial pneumonias usually associated with seasonal influenza. Many of these patients have required intensive care.

In 2009, in the setting of the financial crisis and economic collapse, the H1N1 pandemic could have been much more disastrous given that it was transmitted through “respiratory droplets…can survive for 6 hours on a dry surface…[and] when touched by hands it can be retransmitted. Transmissibility of the H1N1 2009 strain is higher than that of seasonal influenza strains” (Al Muharrmi 2010).

The Wakefield Case and Anti-vaccination

Contagion was released two years after a major scientific misconduct case surfaced, which surrounded a falsely reported connection between autism and vaccinations. In 1998, researcher Andrew Wakefield published a major paper in The Lancet, connecting autism spectrum disorder to the MMR vaccine (Wakefield 1998). Wakefield claimed that the families of eight out of 12 children attending a routine clinic
at the hospital had blamed the MMR vaccine for their child’s autism within days of receiving the vaccine. Wakefield also claimed that a new inflammatory bowel disease was also discovered in these children. This led to widespread mistrust of vaccination, and rates of vaccination dramatically dropped (DeStefano and Chen 1999). Several epidemiological studies began to refute Wakefield’s claims (Taylor et al. 1999).

According to (Walton 2009):

Researchers owe it to the public to do their best to ensure that their findings and interpretations of their data are presented accurately and simply through the mass media. Despite the fact that the original article had a sample size of only 12 children (and Wakefield’s claims are modest at best about the correlation between autism and immunization), once the media got hold of the story, many viewed the small study as a landmark article. According to the media, rates of immunization dropped from ~92 to 80% in the UK and many journalists claim that this is a direct result of the Wakefield article. First of all, that is a difficult claim to make. Second of all, it is quite likely due to the way that journalists actually interpreted and reported the Wakefield data rather than the data as presented in the Lancet article.

Wakefield et al. retracted their paper in a stunning admission that they committed fraud. Rao and Andrade (2011) note this:

According to the retraction, “no causal link was established between MMR vaccine and autism as the data were insufficient”. This was accompanied by an admission by the Lancet that Wakefield et al. had failed to disclose financial interests (e.g. Wakefield had been funded by lawyers who had been engaged by parents in lawsuits against vaccine-producing companies). However, the Lancet exonerated Wakefield and his colleagues from charges of ethical violations and scientific misconduct.

Ultimately, The Lancet completely retracted the paper by February 2010, while the studies on the children did not follow proper ethical guidelines; the British Medical Journal revealed that Wakefield et al. had actually committed fraud (Rao and Andrade 2011). The long-term consequences of the Wakefield incident led to unending distrust in vaccines by parents. It was the catalyst to the entire anti-vaccine movement that persists.

The 2014 Ebola Pandemic

Although Contagion was released in 2011, the film was prescient when the Ebola outbreak in 2014 threatened to become as out of control in the United States as it had become in parts of Africa, when an index patient presented at a Texas hospital and was sent home to expose potentially hundreds of unsuspecting people. Global health ethics issues also interfered with priority-setting (see further).

Ebola is a blood borne virus that spreads easily through contact with bodily fluids once symptoms present, and it is usually lethal. In March 2014, there were 49 cases of Ebola in Guinea, and 29 deaths. Doctors Without Borders had set up treatment centers. Two cases were identified in Liberia in March, but concern
mounted in Guinea, as Doctors Without Borders stated it was facing an “unprecedented epidemic”. Kent Brantly was a 33-year-old healthcare provider working in Liberia at a missionary hospital with Samaritan’s Purse and had downloaded a 1998 guide on “controlling Ebola”. His hospital opened an Ebola ward.

Between April-June, the hospital couldn’t find any staff to work in the Ebola ward, and scrambled to find people. In a news conference in Geneva, the WHO stated the outbreak was “relatively small”. By late May, two cases and two deaths were in Sierra Leone, and seven cases were now in Monrovia. There was also uncertainty between whether the CDC or the WHO had jurisdiction over trying to contain and control the outbreak. By June 20, 2014, Doctors Without Borders warned that the virus is “totally out of control”; WHO ramped up its response. At this point, the Samaritan Purse Hospital in Liberia had become overwhelmed, and Melvin Korlkor, a healthcare provider who contracted Ebola along with 5 nurses and 4 others, was the only one to survive; the other nine died. On July 20, Liberian doctor Patrick Sawyer collapsed in Nigeria and died of Ebola, and by July 23, Brantly became infected and was flown to the United States and was the first to receive the experimental drug, ZMAPP. Brantly had begun to vomit blood and had diarrhea when he got to the United States. Another American, Nancy Writebol, also working at Samaritan Purse, contracted Ebola and was also flown to the United States. By July 24, 2014, the WHO upgraded the crisis to a 3. On July 29th, the lead virologist in Sierra Leone died from Ebola. At this point, Dr. Joanne Liu, president of Doctors Without Borders, requests a meeting with the WHO director in Geneva, imploring her to declare an emergency, which finally occurred on August 8, 2014. On August 31, Tom Frieden, then Director of the CDC stated that the outbreak was: “a plague on a medieval scale…a scene out of Dante.”

By September 2014, among the major global health organizations and governments, no one can exactly determine how to respond or who’s in charge. Doctors Without Borders implored countries to utilize their military personnel to help with control; by this time, Liberia had thousands of cases. Frieden noted: “We and the world failed [the Ebola] test”; Lui noted: “We’re losing the battle to contain it.” The U.S. government warned that there would be about 1.4 million infected by January 2015 without a robust response (Sun et al. 2014).

By September 30, 2014, Ebola arrived in the United States when Thomas Duncan, traveling from Liberia to Dallas, is visiting family, and staying in a home with two children. He began to display symptoms of fever and vomiting, and went to a Dallas hospital, which sent him home, as the practitioners there did not suspect Ebola, even though he did state he was from an Ebola-infected region. Duncan left the hospital and vomited on a public sidewalk; he potentially exposed two children as well, and the children then went to school, potentially exposing many more. Ultimately, Duncan returned two days later to the hospital by ambulance, where an unprepared staff admitted him, determined it was Ebola, and without proper precautions, instructed two nurses to take care of him; both of the nurses then got infected with Ebola, too. Duncan died within a few days. Once the U.S. index case was revealed, a race to do contact tracing, isolation and quarantine ensued, and it was contained. However, it was a close call, and could have had disastrous consequences (Rosenthal 2014). It
revealed, however, that the index case hospital, Texas Health Presbyterian in Dallas, was grossly unprepared (Spigner 2014; Berman and Brown 2014).

In a few other cases of Americans who had been potentially exposed to Ebola in their travels or charity medical work—including one physician who began to show symptoms while traveling on a New York City subway—various quarantine measures were implemented while public health, politicians and infectious disease experts argued over quarantine criteria. Fortunately, the Ebola epidemic was contained, but no one could predict that by 2018, the robust White House pandemic office would be disbanded in the Trump era, leaving the country completely unprepared for the 2020 COVID-19 pandemic that had brought the United States to its knees by the spring of 2020 (Cameron 2020).

**The Coronovirus COVID-19 Pandemic**

Ultimately, the nightmare scenario came true when the COVID-19 pandemic upended life across the globe, caused by a novel coronavirus that was highly infectious, with estimates of roughly 2.2 million deaths in the United States alone without extreme mitigation measures of physical and social distancing, shelter in place, and shutting down all non-essential business. In the absence of sufficient testing, shortages in hospital supplies, and no means to quarantine the infected from the non-infected, a stunning pandemic plot that is eerily close to *Contagion*, began to play out in China in 2019, and the rest of the world in 2020. Unpreparedness, delays and missteps in the United States led to a mass casualty death toll of over 100,000 by Memorial Day of that year (see Afterword).

**I’m Testing My Vaccine**

*Contagion* makes reference to scientists using themselves as research subjects, and discusses the ulcer-causing H. pylori discovery in 1985 (Ahmed 2005). When the character played by Jennifer Ehle tests her vaccine on herself, she makes reference to the 1985 research team that discovered that the bacteria H. pylori was the principal cause of ulcers. To prove that ulcers were not caused by stress, researcher Barry Marshall presented data suggesting that H. pylori caused between 80 and 90% of ulcers. Marshall ultimately used himself as a research subject and underwent a gastric biopsy as a baseline, and then deliberately infected himself with H. pylori to see if he developed an ulcer, which he did, and was able to prove was caused by H. pylori. He published his findings in the *Medical Journal of Australia* (Marshall 1985). Noted Ahmed (2005): “This extraordinary act of Marshall demonstrated extreme dedication and commitment to his research that generated one of the most radical and important impacts on the last 50 year’s perception of gastroduodenal pathology. Their research made H. pylori infection one of the best-studied paradigms of pathogen biology,
paving way for intense and hectic basic and clinical research activity leading to about 25,000 scientific publications till date” (Ahmed 2005).

In any Contagion scenario, including COVID-19, fast-tracking a vaccine by self-testing a “rough draft” may indeed become an ethical standard.

**Healthcare Ethics Issues: Pandemic Ethics**

Pandemic ethics frameworks require implementation of utilitarian justice principles in which a consequentialist framework is used, whereby the greatest good for the greatest number of people is the goal. This is an autonomy-limiting framework in which priority setting may restrict individual liberties, privacy and confidentiality, and ignore patient autonomy. This section covers the duties of healthcare providers in a pandemic; ethical frameworks for allocation of resources and priority setting; ethical issues in triage; ethical considerations regarding vaccination refusal and mandated vaccination; and individual liberty restrictions. It is this specific framework that Contagion presents accurately.

The field of Pandemic Ethics emerged as a legitimate subspecialty of bioethics in the wake of SARS in 2003 (Singer et al. 2003), and amidst anticipation of a bird flu pandemic (H1N1), which the SARS episode exposed as a potentially more problematic pandemic without more focused planning (see above). In 2005, a novel Canadian Report emerged from the SARS experience titled Stand On Guard For Thee: Ethical Considerations In Preparedness Planning For Pandemic Influenza (University of Toronto 2005).

This report outlined an ethical framework to guide planning efforts in the health sector, and led to a major research effort at the University of Toronto to establish an internationally focused Program of Research on Ethics in a Pandemic. This program published a White Paper Series in 2009, titled Ethics and Pandemic Influenza. In 2008, the WHO published its own White Paper series titled Addressing Ethical Issues In Pandemic Influenza Planning. These documents informed the substantive literature worldwide with respect to pandemic ethics. The core pandemic ethical issues include: duty to care of health professionals; priority setting (a.k.a. resource allocation) of limited health resources; restrictive measures (e.g. quarantine); and global governance. The need for an ethical framework to guide local pandemic planning has been reinforced in multiple disciplines engaged in pandemic planning. Ultimately, the public health goals identified by Pandemic Ethics researchers comprised: (a) building and maintaining public trust; (b) protection of vulnerable populations; (c) establishing the obligations of health care workers in a pandemic; (d) establishing the reciprocal obligations of the health care system to health care workers; (e) establishing a framework to allocate strained resources such as ventilators, antiviral medication, or community health services and; (f) establishing a framework for communicating information to the public. These resources were intended for policy makers to deal with local pandemic planning based on a “reverse engineering” of what went wrong, and what went right, with SARS.
Ethical Duties of Healthcare Providers in a Pandemic

Health care providers—both clinical and nonclinical—face disproportionate health risks in a pandemic situation. As shown in *Contagion*, they may face competing personal and professional obligations to their patients, colleagues, employers, family members, and to their own health. Research indicates that 25–85% of healthcare providers report being unwilling to show up for work in a pandemic. Pandemic Ethics researchers have raised the following questions (CanPrep 2009): Do healthcare providers have an obligation to treat patients despite risk of infection? What limits, if any, are there to health care workers’ duty to care? What institutional supports are owed to health care providers in a pandemic? Health care providers’ ethical duty to care (distinct from the legal duty to treat) is both a professional duty and societal duty, but professional codes are typically insufficient in addressing duty to care in a pandemic. Communicating duty to care to healthcare providers is best done within the context of societal obligations (a social contract framework) rather than professional obligations, but that reciprocity should be a consideration in priority setting. For example, in *Contagion*, healthcare providers were first to receive limited supplies of vaccine. Research indicates that the public’s perception of healthcare providers is that they have special obligations to care because of the profession they entered, but that their institutions or government must ensure they have reciprocity, meaning they are safe, and fairly compensated for their risk, and given priority for resources. Guidelines were cited by Toronto experts as follows (CanPrep 2009):

1. Pandemic planners should ensure the right of healthcare workers (HCWs) to safe working conditions is maximized to ensure the discharge of duties and that HCWs receive sufficient support throughout a period of extraordinary demands, which will include training on hygienic measures to reduce infection risk.
2. Consideration should be given to needs of health care providers to ensure care to their families.
3. Professional associations should provide, by way of their codes of ethics, clear guidance to members in advance of an influenza pandemic. This may include information regarding existing mechanisms to inform members as to expectations and obligations regarding the duty to provide care during a communicable disease outbreak.
4. Pandemic planners should ensure that processes be in place to accommodate legitimate exceptions to the provision of clinical care (e.g. pregnancy, immunodeficiency).
5. Pandemic planners should assess local circumstances and ensure the participation of the community sector in planning of formal and informal care networks and engage clinical and non-clinical, professional and non-professional HCWs.
“Priority Setting” is the dominant term used by pandemic ethics researchers in the discussion of resource allocation in a pandemic setting, in which ordinary healthcare resources and services are expected to exceed demand.

Access to ventilators, vaccines, antivirals, and other necessary resources in hospitals and in the community will need to be prioritized, and typical clinical criteria is insufficient in priority setting. Value-based decisions in a pandemic setting will need to be made, but how? Should we give priority to the sickest or should those most likely to survive be the benchmark? The following questions have been raised by pandemic ethics researchers (CanPrep 2009): Should resources be allocated to save the most lives or to give everyone a fair chance at survival? Should special consideration be given to vulnerable populations in determining access to resources? Who should make these allocation decisions?

The ethical goals of resource allocation or priority setting are legitimacy, fairness, and equity. Research indicates the following parameters are acceptable to the public in resource allocation decisions: need, survivability, and social value. Need takes into consideration not just the sickest person; persons who are responsible for caring for others may take priority. Social utility of individuals (healthcare workers, critical infrastructure workers, etc.) who are sick is a key concept in prioritizing. Establishing transparent priority setting criteria in advance of a crisis is another key concept, to enforce fairness and public trust in priority setting. There is public consensus that priority should be given to healthcare workers, whose social utility value is high; and whose risk assumption is high. Research indicates there is public consensus that children should be given second priority after healthcare workers.

The WHO (2008) emphasized that priority setting is typically based on the principle of efficiency (saving most lives), which prioritizes protecting individuals responsible for caring for the sick, and is not necessarily based on prioritizing resources for the “sickest”. The principle of equity is typically a failed principle in priority setting because equitable distribution of resources may not achieve the goals of public safety in pandemic situations. The WHO White Paper on priority setting provides a detailed and thorough discussion of the strengths and weaknesses of various moral frameworks for establishing priority setting guidelines, however the 2009 University of Toronto report distills much of this information into practical guidelines (CanPrep 2009):

1. Governments and health sector officials should engage the public actively in transparent, inclusive, and accountable deliberations about priority-setting issues related to the use of limited resources for treatment and prevention.
2. Governments and health care sector officials should engage stakeholders (including health care workers and administrators, and the public) in determining what criteria should be used to make resource allocation decisions (e.g. access to ventilators, vaccines, antivirals).
3. Governments and health care sector officials should provide an explicit rationale for resource allocation decisions, including priority groups for access to limited health care resources and services. The rationale should be publicly accessible, justified in relation to the defined criteria, and include a reasonable explanation for any deviation from the pre-determined criteria.

4. Governments and health care sector officials should ensure that there are formal mechanisms in place for stakeholders to bring forward new information, to appeal or raise concerns about particular allocation decisions, and to resolve disputes.

**Ethical Issues in Triage**

The WHO (2008) emphasized the following with respect to triage:

Similar to judgments about medical futility, triage decisions should be based upon professional standards that are publicly justifiable. In this way, controversial and deeply troubling decisions are not left to the discretion or subjective assessment of individual caregivers. Priorities should be based upon general triage criteria that are reasonably acceptable to everyone. On the one hand this involves appeal to the basic normative principles discussed previously; maximization of health benefits (notably saving lives) and equity. On the other hand, criteria should be defined and specified on the basis of medical evidence about health needs and factors that determine the chance of recovery.

In critical care, the primary focus is on saving lives by responding to acute health crises. Triage decisions aimed at saving the most lives with limited resources will give less priority to patients who are expected to recover less easily. Although the implications of such decisions will be harsh and controversial, the basic principle to save the greatest number of lives possible can be reasonably justified to anyone.

**Ethical Considerations Regarding Vaccination Refusal and Mandated Vaccination**

The main issue identified with a vaccine for a novel virus is time; it is typically not expected that an appropriate vaccine will be available to the public at least for the first six months after the start of any pandemic, and for large numbers of people this will be far too late. Yet even when a vaccine has finally been developed and approved, deployment will be incremental and there will be insufficient production capacity to accommodate the enormous demand worldwide (see further). Priority Setting guidelines can help to get vaccine to the critical populations. However, there is a considerable ethical issue on the rise regarding vaccine refusal. Vaccination refusal (see earlier) is linked to two issues in public health: (1) a flawed vaccine that was distributed in 1976, in anticipation of a flu pandemic, which produced a number of side effects; (2) parental distrust of vaccines, and their unproven association with autism due to the scientific misconduct of the Andrew Wakefield research (see under
History of Medicine). There is an increasing distrust by the public regarding the safety of vaccines. Refusal of vaccines is also now seen among healthcare providers themselves. Vaccination refusal has been dealt with by Diekema (2005) in the context of the Harm Principle, originally outlined by J. S. Mill in his On Liberty treatise (1859). The Harm Principle states:

That the only purpose for which power can be rightfully exercised over any member of a civilised community, against his will, is to prevent harm to others… The only part of the conduct of any one, for which [an individual] is amenable to society, is that which concerns others. In the part which merely concerns himself, his independence is, of right, absolute. Over himself, over his own body and mind, the individual is sovereign.

This principle makes it clear that when parents exercise their right to refuse to vaccinate a child, that right infringes on another’s right, and may harm another child. Vaccines in a pandemic situation are not only for the benefit of the individual receiving the vaccine but also for the benefit of the public. The process of creating “herd immunity” allows for individuals who do not get vaccinated, cannot get vaccinated, or do not develop sufficient immunity from vaccination to derive some measure of protection from others in the population being successfully immunized. Determining the purpose of the vaccination program is a key concept: is it to protect the public or individual? If it’s to protect the individual, then the individual’s autonomy to refuse vaccination should be honored. However, if the program is designed to protect the public, then the principle of “solidarity” and protecting the public from harm justifies coercive policies in mandating vaccination, and infringing upon individual liberty. Pandemic ethics researchers assert that in order for public health officials to justify the use of more coercive measures, they need to have scientific evidence that supports the population health benefits of the vaccination program. Coercive policies can include consequences for HCWs who refuse to get the vaccine. Some work places have introduced laws that require health care workers to go home without pay when an influenza outbreak occurs if they refuse vaccination.

Mandated school vaccination programs are also common. Coercive policies could be justified, such as not permitting school attendance during an outbreak if the child is not vaccinated. While there may be a reluctance to use and justify coercion, public health officials also have a responsibility to justify the lack of use of coercive policies for vaccination, particularly if there is evidence for the population health benefits of such policies. The failure to do so would violate the principle of solidarity and protecting the public from harm, resulting in avoidable illness and death. In making this decision, officials will have to balance the potential risks and benefits of the vaccination program taking into account the strength of evidence for both of these. Officials will also have to be guided by the “precautionary principle”, which advocates a lower evidentiary standard for taking action to protect against a large scale risk than what is traditionally used in evaluating the benefit of health technologies at the individual level.
In any mandated vaccine program, there are reciprocal responsibilities of the state to vaccine recipients: ensuring the safety and effectiveness of the vaccine, and providing just compensation to those who suffer an adverse event following vaccination.

**Individual Liberty Restrictions**

Research indicates that roughly 85% of the population supports states and governments to suspend some individual rights (e.g. traveling, right to assemble) during an influenza pandemic. However, such rights can only be suspended in the public’s view, with reciprocity: reciprocal obligation of governments to provide for the basic needs of restricted individuals, as well as support services after the restrictive measures end. For example, restricted individuals should not be penalized by an employer for following a quarantine order (e.g. losing a job). Pandemic Ethics researchers have summarized guidelines regarding individual liberty restrictions as follows (CanPrep 2009):

1. Public health officials should ensure that pandemic response plans include a comprehensive and transparent protocol for the implementation of restrictive measures. The protocol should be founded upon the principles of proportionality and least restrictive means, should balance individual liberties with protection of public from harm, and should build in safeguards such as the right to appeal.
2. Governments and the health care sector should ensure that the public is aware of the rationale for restrictive measures, the benefits of compliance, and the consequences of non-compliance.
3. All pandemic influenza plans should include measures to protect against stigmatization and to safeguard the privacy of individuals and/or communities affected by quarantine or other restrictive measures.
4. Measures and processes ought to be implemented in order to guarantee provisions and support services to individuals and/or communities affected by restrictive measures during a pandemic emergency. Plans should state in advance what backup support will be available to help those affected by restrictive measures (e.g. food, bills, loss of income). Government should have public discussions of appropriate levels of compensation, including who is responsible for compensation.
5. In order to get the public “on board” with decisions regarding restrictive measures, policymakers need to include the public in deliberations about public policy with respect to a pandemic.
Global Health Ethics Considerations

Contagion raises serious global health ethics questions surrounding fair distribution of resources in a pandemic. Should wealthy countries, which may ultimately be responsible for creating any vaccines or treatments, usurp the resources and have greater access than poorer countries? In the film, healthcare workers from wealthy countries are taken hostage to ensure equitable distribution of resources. In the Ebola epidemic, Americans who got infected were flown to the United States and provided with experimental treatments over patients in West Africa who were dying. In August 2014, for example, a WHO Ethics Task force on Ebola was severely criticized for failing to address distribution of resources and cultural ethics issues that led to the spread of the disease (e.g. burial practices). At the same time, dependence on aid from wealthy countries led to a failure of local strategies to contain Ebola. Meanwhile, viruses ravaging poor countries are taken less seriously until they reach wealthy countries. Oyewale Tomori, a Nigerian virologist noted in 2014: “Ebola is swimming in an ocean of national apathy, denial and unpreparedness…After the first cases occurred, it took three months for WHO to know…. [Africa] should take the lead of Ebola control efforts—not Geneva, not Washington, not New York” (Kupferschmidt 2014). He noted that one major problem was that when the international medical charity groups leave at the end of any given epidemic, the countries dependent on aid will remain in the dark about how to effectively respond to the next one. Ebola left in its wake “squandered millions in international aid from unstable leadership and governments” (Farmer 2014; Kupferschmidt 2014).

Global health ethics issues expose a disconnect between global health officials and infectious disease control (Sun et al. 2014). In the Ebola case, West Africa was not equipped, while other sociopolitical issues such as civil war, chronic poverty, poor healthcare, and less than 50 doctors in Liberia, turned it into a manmade disaster as well. Other global health ethics issues in a pandemic occur when foreign aid disappears because the workers get sick or flee, while contact tracing cannot be done effectively. Meanwhile the conditions, criteria and ethical basis for quarantine and travel bans can still divide experts.

Conclusions

Discussions surrounding pandemic ethics issues, and global health disparities are situated within the broader theme of Justice and Healthcare Access in the context of allocation of scarce resources as healthcare delivery may become overwhelmed and vaccine production and distribution may be limited. Some of these discussions may overlap with discussion of the global HIV/AIDS crisis as well as the mismanagement of HIV/AIDS in the early years of the epidemic (see Chap. 2). Additionally, emerging analyses of the COVID-19 pandemic will put these issues into greater context (see Afterword). When teaching Contagion to healthcare trainees, it’s important to note
that they will now have a living memory of being on the front lines during the 2020 pandemic. However, in light of the growing epidemic of science denialism and vaccine refusal, it may be that the pandemics will recycle, or a familiar virus from the past will revisit. Ultimately, *Contagion* enhances any curriculum dealing with pandemic ethics, scarce resources, or infectious disease.

**Theatrical Poster**

*Contagion (2011)*

- Directed by: Steven Soderbergh
- Produced by: Michael Shamberg, Stacey Sher, Gregory Jacobs
- Written by: Scott Z. Burns
- Starring: Marion Cotillard, Matt Damon, Laurence Fishburne, Jude Law, Gwyneth Paltrow, Kate Winslet
- Music by: Cliff Martinez
- Production Company: Participant Media, Imagenation Abu Dhabi
- Distributed by: Warner Bros. Pictures
- Release Date: September 9, 2011.

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