



SAPIENZA
UNIVERSITÀ DI ROMA



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E-ISSN 2531-7288
ISSN 0394/9001



MEDICINA NEI SECOLI

Journal of History of Medicine
and Medical Humanities

35/3 (2023) 111-130

Received: 23.07.2023

Accepted: 22.09.2023

DOI: 1013133/2531-72882823

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Filmdemics: the History of Modern Pandemics Through the Lens of Cinema

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ABSTRACT

The history of modern pandemics through the lens of cinema

The 21st century has been shaped by the COVID -19 pandemic, which impacted on social behaviour and artistic production. Cinema was not unaffected. The “pandemic movie” has become a genre of its own in the entertainment press. A review of the field conducted in the context of a film club coupled with literature review could trace the history of pandemics since the beginnings of cinema. Spanish Flu, Asian Flu, Hong Kong Flu, Ebola, HIV and sexually transmitted infections, bio-weapons the SARS and COVID-19 pandemics have all been described through the lens of cinema and science. Fiction predicted, described and influenced contemporary and future healthcare experiences. Behind the scenes, a new hero is emerging in the panorama of cinematography, the epidemiologist as a trademark of the future pandemic movies. For all these reasons, cinematic representations of disease are a valuable resource for those involved in the education of medical professionals.

Key words: Pandemics - Cinema - History of medicine - Medical humanities

Background and aims

As hypothesised since the Middle Ages, acute anxiety can curdle blood. The Department of Clinical Epidemiology at Leiden University has shown that horror movies are associated with an increase in the blood coagulant factor VIII¹. In addition, an increased reactivity of blood platelets was found in moments of terror such as in horror films².

As shown above, horror films have a direct influence on our organism; at the same time, our organism is able to influence cinematographic production with themes such as infections. Of all the medical specialties, infectious diseases is maybe the only one that provides the necessary excitement for cinematographic production³.

Infections have been part of literature since the earliest human writings. In the Middle Ages, the legends of witches, vampires and werewolves often had a contagious component. Horror as a literary genre in its own right began in the early 19th century with *Grimm's Fairy Tales* (1812), Mary W. Shelley's *Frankenstein* (1818) and John Polidori's *The Vampyre* (1819).

As cinematography gained prominence in the 20th century, a strong emphasis on themes such as plagues and apocalypse developed. An analysis of the use of infectious diseases in storytelling and in particular in horror films shows that they are often a metaphor for societal concerns^{4,5}.

The link between horror and history has been stressed by James Kendrick, a professor of film and digital media at Baylor University. He is deeply convinced that the history of horror films is inextricably linked to history itself: "The horror genre has always been a highly socially attuned genre because it draws on what we're afraid of [...] from era to era". So, horror films could be seen as screenshots of humanity's fears, decade by decade⁶.

Indeed, 20th century history has fuelled periods of great distress such as wars and crisis situations. These events have something in common with pandemics: they all served as catalysts for certain trends in horror films⁶.

The 21st century was certainly marked by the ongoing COVID-19 pandemic caused by the SARS-CoV-2 virus and its worrying variants⁷. This outbreak has had a major impact on the social attitudes and fears of people around the world⁸. Interestingly, in 2020, Walter Dehority researched the IMDb (Internet Movie Database) to identify films with a focus on infectious diseases. He found 373 films released in the US theatres; of which 142 (38.1%) featured an outbreak of a human infectious disease or a pandemic⁹.

Within one month of the first case of COVID-19, the masterpiece *Contagion* (Steven Soderbergh; 2011; 1h 46 min) was back in the top 10 most downloaded films on iTunes¹⁰. Furthermore, the number of scientific articles that have appeared in the PubMed library on the topic of "pandemic movie" in recent years is remarkable (Fig.1).

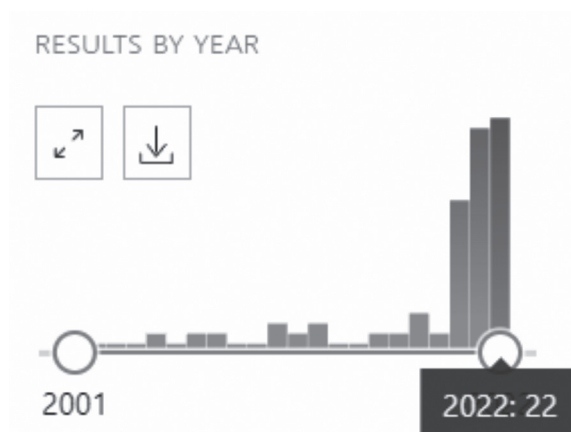


Fig. 1. It reports the yearly number of scientific papers responding to “pandemic movie” key words on PubMed. Years not reported correspond to 0 results. Of interest 22, 21 and 14 works have been encountered respectively for 2022, 2021 and 2020. Accessed on November 21 2022.

Prior to COVID-19 outbreak, these films were classified as members of the horror genre, science fiction, thriller, etc., or combinations thereof. For some years now, the term “pandemic movie” has become a genre of its own in the entertainment press. Pandemic films are thus an emerging genre, reinforced by audience interest in the current pandemics¹¹. From an ontological perspective, pandemics could be considered as an organic phenomenon rather than an inorganic phenomenon, which characterise other genres and subgenres of Horror.

The English philosopher Francis Bacon (1561-1626) first shifted the image of the monster as a portent in the form of the monstrous birth to a monster as a feature of a multifaceted and creative aspect of nature’s activity. Furthermore, he emphasised the role of the monster as part of nature and of scientific interest: the monster is created by the fertility of nature and not by the wrath of God¹².

For Charles Darwin (1809-1882), on the other hand, a pandemic could not be considered as a monster. In fact, he described monsters as having “some considerable deviation of structure generally injurious or not useful to the species and not generally propagated”¹³.

Nevertheless, it is our opinion that Francis Bacon’s definition of monster fits better when infectious agents and pandemics are considered as villains in horror films. While vampires, zombies and werewolves represent external threats that terrify civilised people, some creatures are scary because they hide and move inside our bodies. One of the most interesting examples of such an approach is *Invasion of the Body Snatchers* (Don Siegel; 1956; 1h 20min), in which aliens come to Earth in the form of spores and parasitise humans. An analogy that can be taken from textbooks on infectious diseases is the infestation of animals and humans with *Toxoplasma gondii*, as it is speculated that this pathogen could affect brain function and behaviour⁴.

The aim of this paper is to provide a narrative review of clinically relevant outbreaks and pandemics of the 20th and 21st centuries in conjunction with derivative culturally relevant horror and drama films.

It is neither possible nor the aim of this paper to provide a systematic history and review of pandemic movies, but to briefly review the field since the dawn of cinema. In addition to the wide range of films discussed in this paper, readers will recall their own medical horror films that may be applicable, as the field is truly vast. We also propose the figure of a new hero/heroine in the panorama of cinematography.

We strongly believe, as Darbyshire and his colleagues do, that the extensive library of cinematic representations of diseases and doctors is a valuable resource for those involved in the education of medical professionals¹⁴.

Materials and methods

The Authors screened English-language scientific papers available on PubMed, Medscape and Google Scholar. Secondly, a double check of cited movies was done on IMDb (an abbreviation of Internet Movie Database); which is an online database of information related to films, television series, home videos, video games, and streaming content¹⁵.

Movies have been cited in reference to APA Style and characterised by spillovers, setting, the role of health care workers (HCWs) and the similarities with the current COVID -19 pandemic. Most of the reported films were screened as part of a film club and thematically evaluated by the authors.

Spanish Flu (1918)

The 1918-20 influenza pandemic originated in rural Texas. Between January and February 1918, several cases of severe flu-like symptoms were reported. It was caused by the H1N1 strain of influenza virus, which is thought to have reached the European battlefields of World War I before spreading around the world. For the civilian population, the Spanish flu was the greatest trauma of the war, as there was a lack of medical care, treatment, and doctors, as most of them had been deployed as volunteers in war zones¹⁶. The epidemic wave registered in autumn 1918 was the most destructive one¹⁷. “1918 Flu” killed more people than any other disease in a period of similar duration registered in high-income countries. The death toll was 5 million (mln) people in sole 3 years^{18,19}. Thus, the pandemic was also defined as a true terror in scientific issues²⁰. The censorship imposed to cover the pandemic may be the reason why we have very little documentary evidence left a century later²¹.

Nevertheless, Spanish flu influenced cinematographic production promoting drama movies of success also during the silent movie era. As an example, it is remarkable the screenplay by Fritz Lang in 1919 titled *The Plague in Florence* (Otto Rippert;

1919; 1h 32 min) shot right in the middle of the pandemic. In the feature film, death is played by a beautiful countess who returns as a violin-playing witch to send the victims to hell²¹.

The first pandemic of the 20th century has left a long-lasting impact on screenplays conveying in documentaries and in 21st century sci-fi movies. A fictional pandemic caused by weaponized (or modified and accidentally spread) influenza-like or a generic respiratory pathogen is responsible for the quasi-extinction of humanity, such as the “Italian Flu” in *Fukkatsu No Hi* – also known as *Virus: The End* (Kinji Fukasaku; 1980; 2h 36min) or the “Captain Trips” influenza virus in *The Stand* miniseries and its remake in 2020. A similar respiratory pathogen is present in *12 Monkeys* (Terry Gilliam; 1995; 2h 9min) and in the *Rise Of The Planet Of The Apes* (Rupert Wyatt; 2011; 1h 45min); where it is called “Simian flu”²³.

Asian Flu (1957) and Hong Kong Flu (1968)

The H2N2 Influenza virus emerged in the winter of 1957 in Yunnan Province in China and quickly spread worldwide thanks to ships, planes and trains. For this reason, it was also called Asian flu. The approximate death toll was 1-2 million, with people under 65 having no immunity to this strain²². Interestingly, it was to some extent displaced in the media by Sputnik’s lunch during the so-called space race. When it made landfall in the United Kingdom general practitioners were “amazed at the extraordinary infectivity of the disease”. The subsequent flu pandemic of 1968 (called Hong Kong) was caused by the H3N2 strain of the virus. It is believed that the Asian flu strain underwent an antigenic shift from the H2N2 virus. Although this strain was highly transmissible, it was milder than the previous²³. It was responsible for between 1 million to 4 million deaths globally^{22,24}.

The Last Man on Earth (Ubaldo Ragona and Sidney Salkow; 1964; 1h 26 min) was interestingly released between Asian flu of 1957 and the Hong Kong flu of 1968. The movie described a worldwide pandemic that converted most of humanity into vampiric beings. The slogan of the movie reported: “where lifeless hands reach out for the warmth of human flesh” to remember the absence of life in affected people. In the film, the main character develops a sort of immunity and uses his own blood as a kind of immunotherapy to cure a girl with an early form of the disease⁴. It is of interest that Ian Watson, the Director of the College of General Practitioners’ Epidemic Observation, said during Asian flu pandemic: “Whether ... I will eventually develop a detectable antibody in my serum is the very point [...] a dose of the vaccine may be useful if I have not yet developed any detectable antibodies in the blood”²⁵. The use of convalescent serum as a therapeutic agent was first discovered by the Italian Francesco Cenci. Nevertheless, it is interesting to note that research in this decade led to the production of the first monoclonal antibody in 1975^{26,27}.

Moreover, after the launch of Sputnik in 1957, numerous films began describing the dangers of extra-terrestrial parasites. One masterpiece is *Space Master X-7* (Edward Bernds; 1958; 1h 11 min), wherein a deadly alien fungus reaches the planet on a satellite. This movie presented for the first time a detailed depiction of globalisation contributing to a potential pandemic, as an exposed woman is shown boarding a train to Los Angeles and a plane bound for Honolulu⁹.

The implications of increasing urban population, exports of goods and air travel passengers undoubtedly influenced emerging and re-emerging infectious disease, as majestic reported by Baker et al.²⁸.

Zombies have been reinterpreted as avatars for concerns about rapidly spreading disease in the first world. They were defined as allegories for contagious diseases and a metaphor for the ubiquitous contagion²⁹. The term “zombie” came to the United States thanks to William Seabrook’s 1929 book *The Magic Island*. The author collected traditions and stories from Haiti and necromantic practices of the voodoo religion. However, the modern aspects of zombie creatures were introduced by H.P. Lovecraft, who was surrounded by the gruesome atmosphere of the 1918 flu pandemic³⁰.

The theme of zombies has been so widely influenced by airborne virus pathogens transmission that zombie epidemiology has been proposed as an education tool²⁹. For instance, Centre for Disease Prevention and Control launched in 2011 the section on “zombie preparedness” to promote preparedness for different emergencies and disasters³¹. The famous zombie depiction *Night of the Living Dead* (George A. Romero; 1968; 1h 36 min), screened during the Hong Kong flu, considered zombification to be contagious after a bite and the infective aspect was impressively preminent⁴. On the other hand, the role of the mass media is as crucial as that of infection. Indeed, during the first scenes in Ben’s farmhouse, the radio broadcasts: “Do not venture outside for any reason [...] Keep listening to radio and TV for special instructions as this crisis develops further”³². A theme which will be repurposed for the next decades of pandemic movies.

Since Romero’s masterpiece production, hundreds of zombie movies and popular cable series have revisited the topic. As an example, *The Walking Dead* (2010) series described a “zombie apocalypse”. Any coincidence between zombie outbreaks and global flu pandemics is more than coincidental. In fact, executive producer Greg Nicotero has revealed that the contagious virus spreading in the series is a kind of flu but inspired by the 1918 pandemic rather than the one of the decade 1957-1968⁴.

Ebola (1975)

Ebola Virus Disease is a severe, often fatal illness in humans. It has become a well-known and notified disease all over the world, since the recent outbreaks in Guinea, Sierra Leone and Liberia in 2013. The disease is caused by the Ebola virus and is responsible for about 50–90% death in clinically diagnosed cases³³. Nevertheless, the viral strains have varying infectivity and virulence.

In the 1976 outbreaks in Zaire and Sudan, infectivity was relatively low, but mortality was close to 90%. In contrast, the mortality rate in the 2014 outbreak was 50%. In the period 1976-2017, a total of 36 documented Ebola outbreaks have been recorded, 19 of which are considered Major/Massive because more than 10 people were affected³³. Edgar Allan Poe could not have known about Ebola virus when he wrote *The masque of the Red Death* in 1842; nonetheless doctors have proposed to name the red death viral strains Ebola-Poe because of the similarities between the fictional infection and the real outbreaks occurred in the 70s³⁴.

Nearly two centuries later, Priscilla Wald examined 100 years of scholarly texts, journalism and popular culture, identifying a ubiquitous narrative about the “outbreak”. The main theme identified was a pathogen that infects animals and is transmitted to a human host. Quickly, this outbreak spreads to a city around the world and western scientists are called in to find an answer. Thanks to Mother Nature, the pathogen is anthropomorphized with intelligence, creativity and deadly intent³⁵. All these characteristics are clearly visible in a series of movies that have defined the imaginario of tropical Ebola outbreaks.

The Andromeda Strain (Robert Wise; 1971; 2h 11min) is famous for its multiple scenes where scientists and physicians wear bio protective equipment. With timeless precision the scenes could be set in hospitals treating the so called first Ebola outbreak⁴. In one interesting scene, gas bombs are launched against birds that feed on the bodies of victims, to avoid spread of the virus³.

The cycle of virus movies was very popular in the 70s; *Shivers* (David Cronenberg; 1975; 1h 27min) and *The Cassandra Crossing* (George P. Cosmatos; 1976; 2h 9min) are two remarkable examples where body horror and disaster movies intershape¹¹. During the 90s the cinematographic production recalling Ebola was boosted. In 1994, two rival films focusing on outbreaks were announced by Hollywood. The first, *Crisis in a Hot Zone* (1994), was never made; while the second, *Outbreak* (Wolfgang Petersen; 1995; 2h 7 min), remains the most important film about infectious diseases. The film describes an outbreak of an imported virus in the United States and it is clearly influenced by Ebola infections; thus, considered deadlier. An imported monkey from Africa is the vector of the disease and personal protective equipment is ever present in the scenes influenced by the 1989 and 1994 Ebola outbreaks³⁶. The fiction virus kills within 24 h after exposure and liquefy internal organs. Of interest, when an electronic microscopic picture of the virus is shown, what the audience really sees is a strain of Ebola virus. As declared by Pappas et al. *Outbreak* “remains the most sincere attempt to accurately portray the science of clinical microbiology in cinema”³³. On the other hand, television documentaries of educational importance were also recorded at the time. *Plague Fighters* (Ric Bienstock; 1996; 54min) is a documentary about the efforts to contain an epidemic of Ebola virus infection in Kikwit, Zaire³. Ric Bienstock and her crew spent a month sleeping in an abandoned house, filming the course of a lethal outbreak of Ebola virus to show the audience the fatality of the infection.

HIV and sexually transmitted infections

Sexually transmitted infections (STIs) have been known to humanity for centuries and have always been associated with suffering and stigma. In the 19th and 20th centuries, STIs, especially syphilis, were a burden that disrupted the lives of many people, bringing them pain, poverty, madness, alienation from society and death. Still, starting from the suffering and alienation that STIs could bring, they were also the inspiration for extensive artistic production, both in painting (e.g. Toulouse-Lautrec and Picasso) and literature (e.g. Baudelaire)³⁷.

In the Age of the Seventh Art, a terrifying new STI has brought suffering to many and inspiration to others at the same time. The AIDS epidemic officially began on 5 June 1981 when the U.S. Centres for Disease Control and Prevention reported unusual clusters of *Pneumocystis pneumonia* (PCP) in five homosexual men in Los Angeles³⁸. However, the definition of Acquired Immunodeficiency Syndrome (AIDS) was not defined until 1982 and the human immunodeficiency virus (HIV) was not identified as the causative agent until 1983. Since then, the HIV epidemic has swept the world: 84.2 million people have become infected with HIV and 40.1 million people have died from AIDS -related diseases³⁹.

Since the beginning of the epidemic, male homosexuals have been the most affected by HIV in the United States and Europe. This disease raises not only health issues but, more broadly, moral and political issues. As a result, HIV infection has led to further stigmatisation of homosexual people⁴⁰. Artistic production directly inspired by AIDS began in the United States and particularly by activist artists in the homosexual community⁴¹. Perhaps because the artists were often personally involved in the epidemic (which affected relatives, friends or themselves), artistic production, including cinematic, focuses mainly on the psychological and social aspects of the contagion.

There is a huge production of audiovisual material dealing with the subject: television and cinema films, short films, series, documentaries⁴². Wikipedia reports 272 films in which HIV or AIDS is an important plot element or in which one or more characters with AIDS or HIV appear⁴³. However, our work has focused on films in which HIV infection is the main theme of the work and which focus above all on the analysis of the ways of transmission and/or on the role of health workers.

The first film on this subject was *An Early Frost* (John Erman; 1985; 95 min) in which Aidan Quinn plays a lawyer who learns to be HIV-positive. It was criticised for being more about his family's reactions than about him. But still, the film was a call for compassion and empathy. And, more importantly, it wanted to inform and educate. Years later, the first mainstream film about AIDS with major stars was again about a gay man: *Philadelphia* (Jonathan Demme; 1993; 126 min). In this film, Tom Hanks plays a lawyer who gets fired when his colleagues discover that he is infected with HIV.

As we have seen, in the first films about HIV infection, the main characters were gay men. But even when the demographics of those diagnosed changed drastically, the

idea that infected persons are gay men prevailed: both in the public consciousness and in the film. One of the exceptions is *3 Needles* (Thom Fitzgerald; 2005; 127 min) that tells three stories set in China, Canada and South Africa. In this work other ways of HIV transmission are explored in addition to the sexual one and it is shown how the infection can also affect heterosexual men, women and children. On the other hand, *Trainspotting* (Danny Boyle; 1996; 93 min) explores the legacy between drug addiction and HIV showing Tommy, one of the main characters, while dying of toxoplasmosis, an opportunistic disease contracted because of his cats.

The topic of antiretroviral therapies (ART), which have drastically changed the natural course of infection since 1996, also plays a rather controversial role in the cinematic narrative. In the film version of the musical *Rent* (Chris Columbus; 2005; 135 min) the arrival of ART is shown, but it is not enough to save one of the protagonists. On the other hand, *Dallas Buyers Club* (Jean-Marc Vallée; 2013; 117 min) tells the story of Ron Woodroof, who traffics experimental drugs from Mexico to Texas and dispenses them to other AIDS patients. Woodroof's story proves the self-advocacy and self-education typical of members of the HIV community.

Furthermore, the story of HIV infection in society cannot be told without citing the rightly furious AIDS activist movement that peaked in the late 80s and the 90s. The French film *120 BPM* (Robin Campillo; 2017; 143 min) tells the story and the fights of AIDS Coalition to Unleash Power (ACT UP), an international, political group working to end the AIDS pandemic.

The role of health care workers both fighting the virus and being on the patient's side is presented in *The Normal Heart* (Ryan Murphy; 2014; 132 min). This film is based on a play by Larry Kramer (1985) that explores the impact of the growing epidemic on New York's gay community between 1981-1984. A key role in the film is played by Julia Roberts' character (Dr Emma Brookner), based on real-life heroine and early HIV and AIDS researcher Linda Laubenstein.

Also nowadays, the HIV epidemic is far from over. People continues to get infected and there is still stigma. But compared to forty years ago, we can look at this infection with more serenity thanks to effective therapies, but also thanks to the people who have fought to overcome the stigma. Even film production seems to have finally caught on. In *Three Months* (Jared Frieder; 2022; 104 min), Caleb Kahn, a South Florida teen realises he has been exposed to HIV. The film narrates his adventures while he waits three months for the definitive tests on his status.

SARS (2003)

Carlo Urbani (1956-2003) was the Italian expert on infectious diseases at the World Health Organisation (WHO) in Hanoi (Vietnam) who shed light on Severe Acute Respiratory Syndrome (SARS) in 2003. On 28 February 2003, he attended a Chinese-American businessman who complained of fever and was suspected of being infected with Avian Flu.

As soon as he recognized a possible new pathogen as the trigger, the hospital was closed to the public and infection control measures were initiated in the city's hospitals. A task force from the CDC and epidemiology specialists immediately went to Hanoi to help contain the infection. The disease identified by Carlo Urbani was declared a "global health threat". Sadly, Carlo Urbani contracted SARS while treating infected patients in Hanoi; by the end of the outbreak, 774 deaths were attributed to the SARS virus worldwide⁴⁴. The masterpiece *Contagion* echoes the SARS epidemic of 2003 and is widely praised for its scientific accuracy⁴⁵. Producers developed a fictional zoonotic paramyxovirus⁴⁶; which spilled when "the wrong pig met up with the wrong bat". Incubated in nature, the virus reached the human population when a butcher mishandled an infected pig and ends to cause a death count of 26 million³⁵.

Ultimately, the scientists develop a vaccine that ends the pandemic and underscores the goodness of humanity. However, in the films *Quarantine* (John Erick Dowdle; 2008; 1h 29min) and *Pulse* (Jim Sonzero; 2006; 1h 30min), made after the SARS pandemic, the cause of the outbreak lies with amateur scientists and professional scientists employed by corporations or the military are the main culprits³⁵. In *Pulse*, hungry dead souls merge with the Wi-Fi world and infect every human connected to it. Thus, *Contagion*'s reassuring narrative is atypical and the film was able to awaken the urgency of vaccination, convince the population to discard anxieties and encourage compliance with future vaccination campaigns^{35,47}.

Interestingly *Contagion* was also one of the must-see movies during general lock-down policies adopted in 2020 and it is thought to have reinforced COVID-19 vaccine optimism^{10,47}. Other pandemic movies produced after SARS pandemic to be mentioned are *Children of Men* (Alfonso Cuarón; 2006; 1h 49min), *[Rec]* (Jaume Balagueró, Paco Plaza; 2007; 1h 18min) and *Blindness* (Fernando Meirelles; 2008; 2h 1min)¹¹.

Bioterrorism and bio-weapons

Fuelled by news in the recent past, preparedness against biological weapons and bioterrorism has recently become an issue for many public health officials and healthcare responders, to the point of establishing national health task forces and guidelines^{48,49}. It is not surprising that such an issue enters and flourishes in the cinematic consciousness. The Centre for Disease Control and Prevention's (CDC) list of bioterrorism agents or diseases is divided into three priority categories⁵⁰:

- Category A includes anthrax, botulism, plague (i.e. by *Yersinia pestis*), smallpox, tularemia, viral hemorrhagic fevers.
- Category B includes brucellosis, epsilon toxin of *Clostridium perfringens*, food safety threats (such as salmonellosis), glanders, melioidosis, psittacosis, Q fever, ricin toxin, staphylococcal enterotoxin B, typhus fever, viral encephalites, water safety threats such as cholera and cryptosporidiosis.

- Category C includes emerging pathogens such as Nipah virus and hantaviruses.

In some cases, the movie is inspired by the event of real-world epidemics of potential bio-weapons and healthcare workers are mostly presented as positive characters. *Variola Vera* (Goran Markovic; 1982; 1h 50min) is based on the 1972 Yugoslav smallpox outbreak, while *Virus* (Aashiq Abu; 2019; 2h 32min) was inspired by the recent 2018 Nipah virus outbreak in India. In other cases, real diseases or outbreaks are plot devices in order to narrate a thriller.

For instance, *Panic in the Streets* (Elia Kazan; 1950; 1h 36min), in which an homicide victim is an index case of a fictional *Yersinia pestis* outbreak, whereas *The Killer That Stalked New York* (Earl McEvoy; 1950; 1h 19min) is a noir movie inspired by the 1947 New York City smallpox outbreak. *Suspect* – also known as *The Risk* (Roy Boulting; 1960; 1h 21min) is a spy thriller based on a fictional bacterial bio-weapon. Again, a fictional smallpox outbreak mixed with family drama is the main theme of the British *80,000 Suspects* (Val Guest; 1963; 1h 53min) while in the Canadian *Anthrax* (Rick Stevenson; 2001; 1h 30min) is a fictional anthrax outbreak mixed with conspiracy thriller.

In other cases, some of these agents are mentioned or explored in the films, though scientific accuracy is not always guaranteed and sometimes only the name of the infection is mentioned to make a connection to a potential bioweapon in the real world. Both inspired by the 1954 novel *I Am Legend* by Richard Matheson, in *The Omega Man* (Boris Sagal; 1971; 1h 38min) a fictional biological weapon turns most of the humanity in nocturnal albino mutants, with the exception of the protagonist, while in *I am Legend* (Francis Lawrence; 2007; 1h 41min) the rabies-like pandemic that spares the protagonist is derived from a fiction measles morbillivirus strain. Bordering with the broad *zombie* horror/thriller genre but with some semblance of epidemiological connection, other movies explore fictional outbreaks by weaponized (or modified and accidentally spread) rabies-like pathogens, such as *The Crazies* (George A. Romero; 1973; 1h 43min) and its remake, *Doomsday* (Neil Marshall; 2008; 1h 53min), *Mayhem* (Joe Lynch; 2017; 1h 26min), *Cargo* (Ben Howling and Yolanda Ramke; 2017; 1h 45min). Less well known to the public are potential agents such as botulism, tularemia and Q fever, which are surprisingly ignored by filmmakers, and to the best of our knowledge no feature films have been released on pathogens with similar epidemiology or suggestive clinical manifestations.

SARS-CoV-2 and COVID-19 pandemic

The novel human coronavirus COVID -19 has been declared the fifth documented pandemic since the 1918 flu pandemic. It was first reported in Wuhan, China, and then spread globally in the winter of 2019-2020. The syndrome was named Severe Acute

Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses based on phylogenetic analysis. SARS-CoV-2 spill over probably happened from animal coronavirus which further adapted to human-to-human transmission⁵¹. As reported by WHO up to December 2022 2.150.288 deaths occurred with 268.815.186 confirmed cases solely in European countries⁵².

Hence, COVID-19 pandemic has been able to translate social fears to motion picture. *Corona: Fear is a virus*, is an upcoming Canadian thriller about people stuck in a lift during lockdown, an emergency situation in which people were not allowed to freely enter and exit buildings or move away from their homes. The film was written by Mostafa Keshvari and deals with xenophobia and racism in the context of the pandemic, an issue that is closely linked to the ongoing pandemic⁵³. Another film inspired by the current COVID-19 is the American horror comedy *Corona Zombies* (Charles Band; 2020; 1h 1 min).

Stuart Heritage of *The Guardian* called the film “the sort of thing you’d watch drunk in your house at midnight. But then again, that’s how you’re going to watch all films for the foreseeable future, so it has to be worth a go”⁵⁴. Of interest is the fact that lockdown policies have been deeply recalled after the spring of 2020. *Host* (Rob Savage; 2020; 57min) is a horror movie that was recorded entirely under coronavirus restrictions. The play is set in the context of a Zoom call between a group of friends who decide to hold a remote seance. It plays with the anxieties that can be triggered by prolonged isolation. *Songbird* (Adam Mason; 2020; 1h 24min) describes the four-year lockdown of Los Angeles in 2024, when COVID-23 has mutated and has a 56% mortality rate. Only the few immune people can leave their homes. Another example of isolationism is the majestic *The Pink Cloud* (Iuli Gerbase; 2021; 1h 45min), in which a mysterious and deadly pink cloud appears in the sky and spreads dramatically across the world, forcing everyone to stay at home. Giovana is locked in a flat with Yago, a man she met at a party the night before. While waiting for the cloud to pass, the two must invent themselves as a couple and overcome the emergency.

Pandemic films produced in the last three years have obviously been influenced by SARS-CoV-2 and the non-pharmaceutical interventions (NPIs) used to contain the pandemic. Nonetheless, film production in past decades has been remarkably good at predicting and forecasting events of the COVID-19 pandemic. One of the most important examples are films that showed the restriction of personal freedom for major health purposes. *Cassandra Crossing*, *Outbreak* and *Blindness* are fine examples of NPIs like lockdown and military presence in everyday life. In *Blindness*, panic and illegal raids on supermarkets are described; while in *[REC]*, Asiaphobia is at the centre of the action. Moreover, in *Outbreak*, the everyday importance given to the maps of contagion and the mediatisation of death is illustrated by images of coffins and military vehicles loaded with corpses. Indeed, the primacy of mass media in describing a pandemic was hypothesised more than fifty years ago in the

majestic *Night of the Living Dead*, when radio, rather than the internet, kept isolated populations in touch.

Philadelphia gives us a striking picture of the panic of contagion and the constant attention to the ways the virus was transmitted (e.g. could the cigar, the hat and the shaken hand be contagious?). In *Andromeda Strain*, the mutation and evolution of the virus is shown, while in *Contagion* the “Green Pass” was invented for healed people. In our opinion *Conatagion* has been a majestic reproduction and forecast of the COVID-19 pandemic on the subjects of fake news (e.g. homoeopathic remedies and not effective treatments). Moreover, conspiracy theories (e.g. those propagated by the character of Alan Krumwied, played by Jude Law) soak the movie and have similarly emerged during COVID-19 pandemic⁸. A brilliant foreshadowing and illustration of what would happen in the relationship between science, information and the “civil” population about ten years later.

Have the old protagonists in the history of medicine become the new “heroes” of the 3rd millennium?

During the pandemic COVID -19 politicians and the media often referred to doctors, nurses and other healthcare workers as ‘heroes’ who were on the front line when the terrible symptoms of this unknown disease first appeared. This depiction clashes with the image of the doctor and the scientist that cinema, with few exceptions, has often accustomed us to.

Of the terrible moments of the acute phase of the COVID -19 pandemic and the grueling shifts that health workers had to work in order to cope with the catastrophe, some iconic testimonies have survived, such as the photo of the nurse sleeping on her desk after an exhausting shift, taken by a Colleague in Cremona on 8 March 2020.

We also have important film footage that shows what really happened in those first months of the pandemic: films that bring to mind a newsreel fragment - *San Francisco in the Time of Spanish Flu* - documenting the so-called Spanish Flu pandemic of more than a century ago, and other fragments from the *DW Documentary in the Spanish Flu*⁵⁵, or the extraordinary educational film *Dr. Wise on Influenza* by Joseph Best from 1919, which shows how to protect yourself from the pandemic by washing your hands, wearing the mask that he himself teaches to make, keeping a distance from other people and avoiding crowded places.

Dr Wise is here to advise! As Britain fell under the grip of the Great Influenza of 1918-19, the Local Government Board (later the Ministry of Health) commissioned this dramatised public information film. Its hard-hitting message was designed to shock people out of their complacency towards this common illness and take preventative measures, as recommended by Dr Wise²¹.

Indeed, 19th and 20th century epidemiologists very often played a fundamental “educational” role. First, there were those who advocated inoculation against smallpox and then, after Edward Jenner, vaccination.

Obviously, the vaccination programme was not exempt from criticism; heated arguments raged between supporters and opponents, often detractors, giving rise to an intense scientific and cultural debate⁵⁶. An “*ante litteram* communication campaign” was needed on the part of the doctors and government officials, which was aimed at convincing the so-called “hesitant” and confuting the arguments of those who opposed vaccination⁵⁷.

Later, Ignaz Semmelweis taught that doctors should wash their hands before examining a patient, a precaution that significantly reduced cases of puerperal fever at the time, and which is just as essential today⁵⁸.

The physicians and researchers who have played a very important and sometimes arduous role in discovering the causes of epidemics and combating them are too numerous to list here.

However, we cannot but mention John Snow, the father of epidemiology. He discovered the causes of the spread of cholera in London at the end of the nineteenth century and introduced one of the first contact tracing procedures in history, collecting information from and about those affected by the disease in order to determine the origin of the infection and contain its spread.

Such efforts continued into the 20th century during the public health campaigns against malaria⁵⁹, and polio. This latter saw two opposing approaches to vaccination: on the one hand, Jonas Salk used an inactivated polio vaccine (IPV); on the other, Albert Sabin formulated his oral polio vaccine (OPV), which was derived from live attenuated viruses⁶⁰. Of course, it was the job of the two scientists to fight the virus. No less important, however, was their role in raising public awareness of what was happening, in order to limit as much as possible, the spread of news that had no scientific basis but could cause considerable damage. This is all the more true today when “the ease with which news of all kinds, often uncontrolled by specialists of those disciplines, can spread with great speed thanks to the technologies available today”⁶¹.

This goal was also present in some of the documentaries that recorded what happened in the hospitals during the first phase of the COVID -19 pandemic and testified to the great commitment of the doctors and nurses. *A viso aperto*, for instance, is a “documentary” describing a sort of journey through the Italian regions most severely affected by COVID-19⁶². It is the story of those who did everything possible to cope with the pandemic: not only doctors and nurses, but also entrepreneurs who converted their facilities to the production of badly needed masks and gowns.

Further testimony to the drama of those days is provided by the documentary *Io resto (My Place Is Here)*, which was filmed by the young Veronese director Michele Aiello in the hospitals of Brescia during the first pandemic peak. “Instead of underlining the concept of heroes or angels, I preferred to recount the everyday life of normal people – people such as doctors and nurses who remained in the trenches not because of heroism, but because that’s their job”⁶³. The director’s aim was to narrate the theme of the empathy of doctors and nurses with their patients and to get away from the heroic image depicted by the media (Fig. 2).

The opposite approach was taken in the short film *Positive*, “a eulogy to the ‘masked heroes’: doctors and nurses who risked – and often lost – their lives fighting the invisible enemy in the front line in order to save thousands of patients”⁶⁴.



Fig. 2. One image extracted from: *Io resto (My Place Is Here)* by Michele Aiello, Luca Gennari and ZALAB FILM, 2021, Italy. Courtesy provided by ZALAB FILM.

A synthesis between a vision of doctors and nurses as heroes and one that sees them as professionals who refuse to surrender is offered by Matthew Heineman’s National Geographic documentary, *The First Wave*. “Adopting his characteristic ‘cinema vérité’ approach, Heineman joins a group of doctors, nurses and patients as they desperately try to cope with the emergency of a pandemic that has changed the fabric of our everyday life and exposed the long-standing inequalities present in our society”. In March 2020, at a time without vaccines, without prospects and without answers in the battle against an unknown disease, the cameras documented the rapidly growing number of cases of COVID-19 in the intensive care unit of the Long Island Jewish Medical Center in New York.

The film recounts the everyday life of a small group of doctors and patients in the most terrible period of their lives. “In *The First Wave*, the camera is always very discreet; it manages to observe a vulnerability rarely seen in a profession made up of true heroes, who are nevertheless also people in flesh and blood”⁶⁵.

Concern about the *big one*, defined as a microbiological catastrophe threatening the survival of humankind, has given rise to a new film character: the epidemiologist as cultural hero. During the COVID -19 pandemic the term *hero* became widely used, with some authors rightly debating the appropriateness of the word. Historically, the term *hero* was used for persons with a noble soul, who have special abilities, are a role model and are so famous that they are remembered; not for the representation of a professional identity⁶⁶. Other Authors, on the other hand, recommend forgetting about the fantastic characters, since the modern heroes are the ones who fight the virus on the front lines and

Conclusion

As shown above, the narrative of pandemic movies in 20th and 21st century is about airborne or bloodborne microorganisms; reflecting the scenario of real worldwide pandemics. As nicely written by Foreman. “Cholera [...] faces a delicate problem: How likely are stars such as Dustin Hoffman and Robert Redford to agree to perform in such a movie?”⁶⁹.

As Heather Paxson stated in 2008, our uncertainty about how to coexist with microorganisms reflects our uncertainty and conflicting ideas about how we humans should coexist with each other or with the other species with which we share the planet⁷⁰. This statement perfectly resumes the doubts that public and scientific opinion leaders have when facing new emerging diseases. As a matter of fact, the recent outbreaks of Monkeypox in non-endemic countries and avian flu H5N1 has brought new insecurities after the curving waves of COVID-19.

As Wade et al. report, films show pandemics arising from humans and nonhuman-animal contact in the periphery of the global economy, fuelled by the blindness of rich democracies. Moreover, only few films show heroic Western scientists succeeding in saving the world after the failures of contemporary society³⁵.

Nevertheless, the global response to the COVID-19 pandemic and the sacrifice of health personnel registered in the last three years could change the role of mankind and physicians in pandemic movies. From the figure of guilty humans causing outbreaks and characters distrusting authority to the figure of new heroes promptly responding, tracking and defeating pandemics⁷¹.

Any future pandemics could strengthen this feature. It is our opinion that the figure of a nerdy or sexy epidemiologist could become a trademark of film production thanks to the successes on SARS-CoV-2 infection and the rapid response against COVID-19 pandemic.

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