

PREMED VIRTUAL RESEARCH COMPETITION

PILOT COLI

A SOLUTION IN 2070

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INTRODUCTION

It's the year 2070 and the world has been struck with a virus that is more infectious than ever. This report will investigate the cause of Pilot Coli and devise a solution that is effective for everyone.

What is Pilot Coli?

Pilot Coli (PC-2070) is an infectious, deadly disease caused by cockroach bites spread by respiratory droplets through physical contact, coughing, sneezing and even breathing in the same air as an affected individual. Symptoms of this deadly disease include a loss of smell after 5-7 days of infection, confusion and neurological issues as well as impaired function of limbs, which is an extreme, rare case resulting in limb loss. The most concerning symptom is the life duration after infection, risking death within 12-24 hours.

Impacts

Pilot Coli impacts the lymphatic system which is the complex system of vessels, tissues and organs. The virus also affects the Immune System, Cardiovascular and Respiratory systems. Consequently, an affected individual could potentially experience tumours and blood clotting as well excess fluid in the arteries and veins.

Pilot Coli genome

1. Spike (s)

This protein control the attachment of the virus to the host cell

2. Membrane (m)

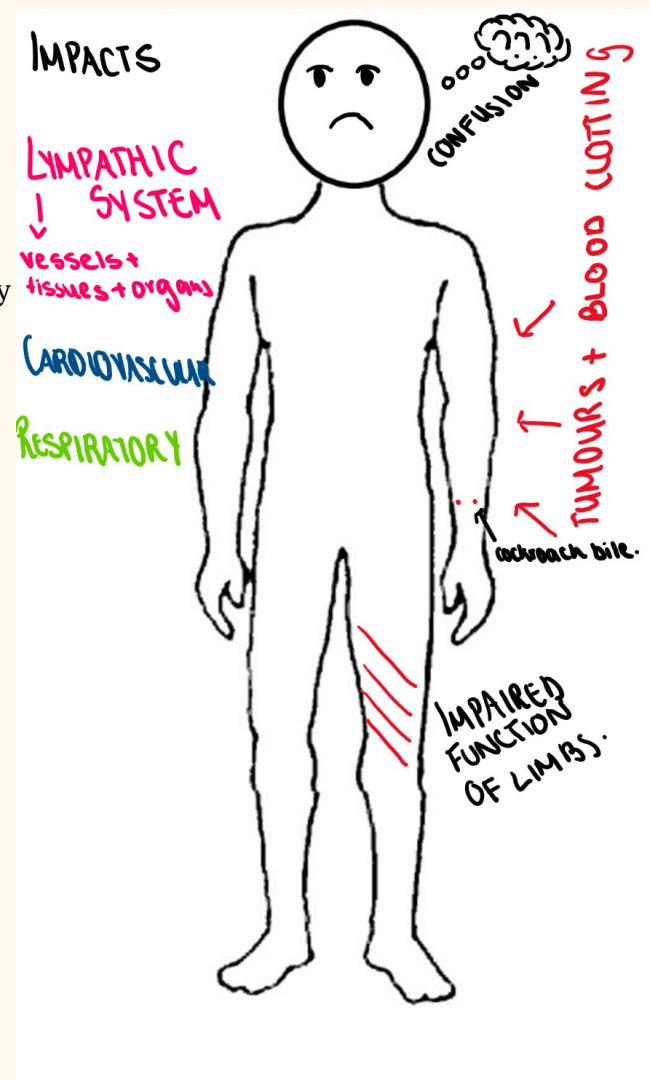
This is the largest protein that controls the shape of the virus envelope.

3. Envelope (e)

This protein is responsible for viral budding, which is the process where the virus exits the host cell.

4. Nucleocapsid (n)

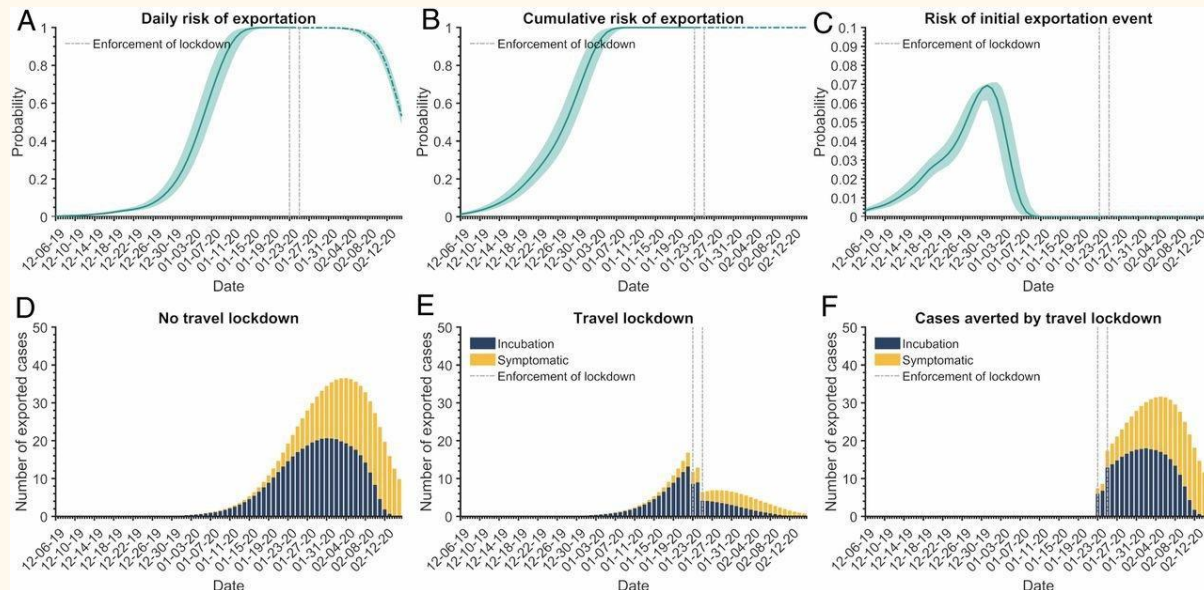
This protein binds to the RNA genome and is also involved in budding.



How does the virus enter the cell?

The virus is transmitted to the host cell by the interactions with the S protein and its receptor. The virus then enters the host cell, cytosol which is the liquid medium in a cell through cleavage of the S protein by a protease enzyme resulting in a fusion between viral and cellular membranes.

SOCIAL GUIDELINES



Social Guidelines

During the Covid 19 pandemic, there were various social guidelines enforced internationally, to mitigate spread. The most effective government and public health measures involved quarantine for travellers and Border control, as demonstrated in Figure 1 (D, E, F). Research also shows Lockdowns, mask wearing, and school closures dramatically reduced the number of cases recorded in local communities (Pauline Jones, 2021).

Social Issues

However, these social guidelines are considered problematic for some individuals depending on who they trust. A report on the role of trust and confidence during Covid 19 negatively associated political and religious leaders with social distancing mitigation behaviours (Jones, 2021). For Pilot Coli, it would be more beneficial for the public to have greater confidence in medical practitioners and scientists as they are positively associated with social guidelines.

Improvements from Covid

When Covid 19 first broke out, hospitals were overwhelmed with patients and the virus eventually reached the public health workers. Protective equipment reduced the number of cases in the hospital which led to an overall decrease in community cases. Early mask wearing and protective equipment for all public health workers should become compulsory to mitigate spread of Pilot Coli.

SOLUTIONS FOR PILOT COLI

Eliminating Cockroaches

Eliminating cockroaches is the first step to reducing infection of Pilot Coli and prioritising safety in homes. All homes should be thoroughly cleansed with frequent visits from pest control workers and surface food exposure should be limited. Insect Repelling Clothing should be distributed to all households and isolation should be enforced on every individual to mitigate spread. A powerful and effective cockroach repellent should be produced and distributed in case of emergency situations. Like Covid 19, Pilot Coli spreads from respiratory droplets through physical contact, coughing, sneezing and breathing from the same air as an infected individual. According to previous research on effective social guidelines, mask mandates and constant sanitization should be applied in all communities. Effective government and public health measures also involve Border Control measures, restricting travel until a vaccine is to be developed, as well as lockdown in all infected communities and school closures. All health care workers in hospitals managing infected individuals must wear protective clothing and gas masks as sudden exposure to medical workers would prolong recovery rate and medical treatment. To ensure all individuals are playing their role by staying at home, random weekly community checks should be enforced. Proof of the severity of Pilot Coli should be publicised through verified, medical information on all news platforms and social media. Rebellious individuals should be penalised through fines and monitored quarantines.

Natural Cockroach Repellants:

Natural Cockroach Repellent ingredients that can be used and made at home:

- Certain spices such as cayenne and garlic have an unpleasant smell to these creatures. Citrus smells can also have the same effect, such as lemons.
- Tea tree oil is often used for many other bugs as a repellent and is effective on cockroaches as well.
- Baking soda also has a pungent smell for these creatures and will kill them.
- A natural repellent that is made up of fossilised algae called Diatomaceous Earth is the most effective. This wonderful repellent is able to damage the exoskeleton of the cockroaches.
- Researchers from Iowa State University have also stated that catnip is just as effective as chemical repellents.
- Acetic acid or vinegar can have an overpowering effect that will fend off these creatures.

Symptom Screening

- Those expressing severe symptoms of PILOT COLI must be isolated to prevent further spread of the disease.
- Only after testing for PILOT COLI and getting a negative result, can they be cleared to leave isolation.
- If the individual tests POSITIVE, they must report all those they were in contact with in the past week and those individuals must get a rapid test immediately, followed by a PCR test.

Symptom 1: Sense of Smell

While managing infection rates, symptoms from infected individuals will start to appear, as monitored by medical professionals including a loss of smell and neurological problems. Sense of smell is vital to all individuals as they help identify spoiled, rotten foods and consumption of such food could lead to severe medical issues. Luckily, research shows that there are effective early intervention methods for anosmia, loss of smell. Professor Theo Hummel of Dresden University in Germany of 2009 published an evidence-based work on Smell Retaining Therapy (Friedland, 2021). The therapy utilises physiotherapy of the brain by calling on the brain cell's memory to recall different odours. In the original therapy, Professor Hummel used four scents including lime, cloves, eucalyptus and rose. These scents are beneficial as they stem from different categories, with lime as a fruity scent, cloves as spicy, eucalyptus as resinous and a floral scent for rose. However research shows modification through different, familiar scents does not decrease the therapy's effect. Nowadays individuals use essential oils such as lemon, sandalwood, cinnamon and peppermint. The training occurs twice, daily for 20 seconds for a minimum of 4 months or until recovery. The process involves opening each separate jar and taking gentle sniffs while concentrating on the scent. Initially, Smell Retaining Therapy Kits can be distributed before instruction on home made kits would be advised, resulting in a cost-effective solution to anosmia. To modify this olfactory training, research shows steroids can also be used as a more effective approach (Fan Yuan, 2021). Therefore, implementing steroids alone and modified olfactory training with steroids are considered effective approaches in curing anosmia from Pilot Coli.

Symptom 2: Neurological Issues and Confusion

Research shows that neurological issues and confusion have occurred as symptoms of past fatal diseases like Covid 19. Along with a lack of taste and smell some individuals suffered with pain, headaches and other neurological issues. A European study on mild Covid 19 patients reported a high prevalence of headaches, 70% (Daniele Orsucci, 2020). The research depicted a higher prevalence in young people rather than the older generation and more females were reported to suffer from the symptom compared to males. The headaches were reported to have occurred during the 7th day of infection. Despite the high prevalence of the severe symptom, there were no specific treatment plans reported, instead careful pain management was recommended.

Therefore, due to the lack of research and medical treatment available, infected individuals should be monitored for their safety.

Symptom 3: Prologoned fevers, cough symptoms

Since PILOT COLI affects the activity of the immune system, which is often stimulated by fevers, it is probable that high and prolonged fevers would be a big indicator of whether an individual is affected by PILOT COLI. In addition, the CDC states that cough, congestion, and a runny nose is also an indicator that an individual has COVID-19, a disease very similar to PILOT-COLI. A more extreme version of this would be difficulty in breathing, in which case the CDC recommends getting emergency care immediately.

THE COVID 19 VACCINE

Initially: Covid 19 is a type of coronavirus (SARS-CoV-2), so research was conducted prior to the development of its vaccine.

Clinical trials: The vaccine underwent the three phases of clinical trials but instead of individually completing each trial they were overlapped, to speed the process and control the pandemic. The sample size of testing individuals was diverse consisting of different ages, races, and ethnicities. Despite the speedy process, results were effective thus validating the Covid 19 vaccine. After 8 weeks there were no safety concerns and three vaccines were developed through the clinical trial results and assessment with the FDA. The vaccines were then distributed to the public. The FDA reviewed preclinical and clinical trial data information to approve the Pfizer-BioNTech (COMIRNATY) COVID-19 Vaccine for 16 year-olds and over and Moderna (Spikevax) COVID-19 Vaccine for individuals above the age of 18.

Source: (CDC, 2022)

THE PILOT COLI VACCINE

Since the vaccine during Covid 19 reduced the number of cases significantly, a vaccine is essential for Pilot Coli and any other infectious, deadly virus to ensure the safety of every individual. Apart from the ongoing solution targeting symptoms like a loss of smell and neurological issues, a vaccine will also be developed. However, due to the lengthy process when developing a vaccine as identified from the research for the Covid 19 vaccine, the vaccine will take months to become fully developed and verified. The extensive research on its development and the relationship between Covid 19 and Pilot Coli should be revealed to the public to educate and verify their opinions. The same restrictions and regulations placed during covid 19 should be enforced as well, to protect the safety of vaccinated individuals.

METHODS FOR TESTING

The three phases of clinical trials should be executed separately for the Pilot Coli Vaccine, unlike the covid 19 vaccine. Similar to the covid 19 vaccine, the sample size will involve diverse individuals of different ages, races and ethnicities. A timeline of 8 weeks and no safety concerns the vaccine will be reviewed by the FDA using collected results before being released to the public.

Testing Methods

- **Saliva Testing**
 - Saliva contains PILOT COLI particles acquired by an individual, hence saliva tests can detect whether an individual has PILOT COLI or not.
- **Nasal Swab Testing**
 - Nasal Swab Testing will allow for examining respiratory particles, which is the medium through which PILOT COLI spreads, and if PILOT COLI particles are detected through the tests and individual can be diagnosed with the PILOT COLI disease.
- **Blood Tests**
 - Antibodies that fight COVID-19 and PILOT COLI can be detected in the blood through a blood test. If these antibodies are detected, it is likely that the individual has been infected with PILOT COLI.

For the smell retaining therapy kits, testing is not really required as this solution was devised in 2008 and used during Covid 19, revealing excellent results both times. The decision to modify the method and use steroids will be made from the severity of an infected individual and the effectiveness of the smell retaining kits. Results will vary as every infected individual would be different.

Pain management for neurological issues would result in minimal testing due to the lack of medical treatment available.

TIMELINE FOR SOLUTIONS:

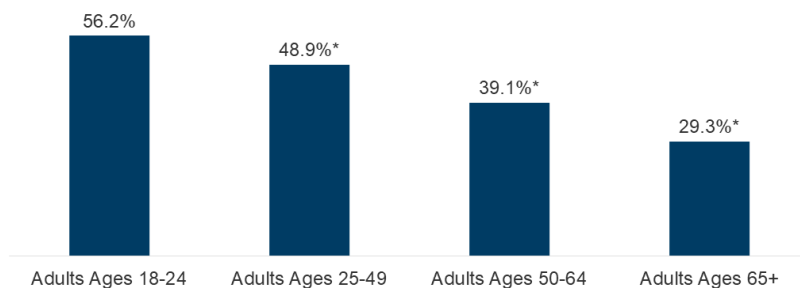
Timeline	Solutions
1-2 weeks	<ul style="list-style-type: none"> ● Identifying the root/cause of the virus ● Publicising sanitization as a priority
3rd week	<ul style="list-style-type: none"> ● Eliminating cockroaches through pest control, insect repellent clothing, and cleaning and house inspections ● Enforcing isolation ● Border + Travel restrictions ● School Closures + Mask Mandates

<p style="text-align: center;">2nd Month</p>	<ul style="list-style-type: none"> ● Distributing Smell Retaining Therapy kits ● Monitoring patients and creating pain management programs with patients struggling with neurological issues and confusion. ● Start researching to develop a vaccine. ● Mask mandates
<p style="text-align: center;">3rd Month</p>	<ul style="list-style-type: none"> ● Create tutorials on how to make homemade smell Retaining therapy kits ● Continue to enforce mask mandates
<p style="text-align: center;">5th Month</p>	<ul style="list-style-type: none"> ● Introduce steroids testing; this should be advertised to individuals that find Smell Retaining kits as ineffective. ● Ensure everyone is following the restrictions and community checks.
<p style="text-align: center;">6th Month</p>	<ul style="list-style-type: none"> ● If the cases continue to increase, enforce strict lockdowns in the communities with the most cases.
<p style="text-align: center;">1 year and a few months (difficult to estimate)</p>	<ul style="list-style-type: none"> ● Development of the Pilot Coli vaccine. ● Information sessions and thorough evidence of medical research to be distributed.
<p style="text-align: center;">6 months after vaccine</p>	<ul style="list-style-type: none"> ● Introduce Booster vaccinations ● Work restrictions for unvaccinated individuals ● Ease restrictions and mask wearing

DEALING WITH MENTAL ILLNESSES DURING A PANDEMIC

Figure 3

Share of Adults Reporting Symptoms of Anxiety and/or Depressive Disorder During the COVID-19 Pandemic, by Age

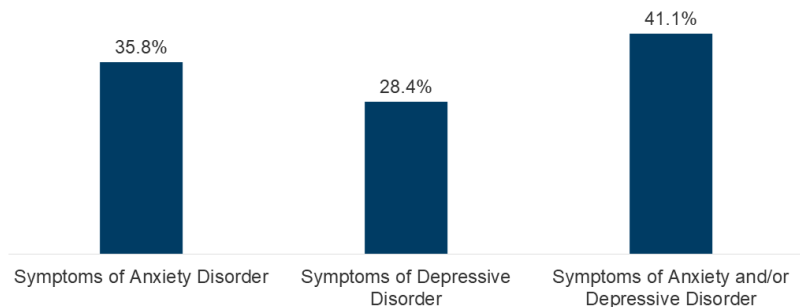


NOTES: *Indicates a statistically significant difference between adults ages 18-24. Data shown includes adults, ages 18+, with symptoms of anxiety and/or depressive disorder that generally occur more than half the days or nearly every day. Data shown is for December 9–21, 2020.
SOURCE: U.S. Census Bureau, Household Pulse Survey, 2020.

KFF

Figure 2

Share of Adults Reporting Symptoms of Anxiety or Depressive Disorder During the COVID-19 Pandemic



NOTES: These adults, ages 18+, have symptoms of anxiety or depressive disorder that generally occur more than half the days or nearly every day. Data shown is for January 6–18, 2021.
SOURCE: U.S. Census Bureau, Household Pulse Survey, 2020–2021.

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During the COVID-19 pandemic, there was a 25% increase in anxiety and depression worldwide. People were isolated in their homes away from socialisation, fearing what COVID would bring, and coping in a lonely environment. How can society protect themselves from this predicament? Society can start by taking care of their bodies, eating healthy foods, avoiding substances, sleeping, limiting screen usage, and exercising. With a regular routine and creating new hobbies our mind can reduce triggers that lead to stress. When pessimistic emotions arise, support from friends and family can create guidance. If someone feels hopeless and needs professional help, society has developed new virtual forms of therapy. Using these resources

will surely help victims of this dangerous pandemic to reverse any negative mentality.

It is important to remember outreach is a key component to addressing mental health issues. While resources may be available, they will not be utilized to their full potential unless government agencies and organizations raise awareness about mental health resources that are accessible. So a priority would also be to create outreach programs that can connect individuals to their mental health resource.

PROS AND CONS

When eliminating cockroaches most resources have already been created and just need to be distributed resulting in less creative effort.

Despite the cheap expenses of the repellants and protective gear, bulk distributions to all households may result in some financial crisis.

There also may be some individuals with allergies and sensitivities to certain chemicals used in repellant substances resulting in a barrier requiring different equipment.

The weekly and random house checks may not be of the best quality and groups of people may find different alternatives to rebel against social guidelines, which is inevitable in any solution.

The solution for sense of smell through smell retaining therapy kits is the most cost-effective solution as the finances involved in the kit are minimal and the distribution is temporary as there are homemade alternatives.

The smell retaining kit may not be effective for every individual and steroids may be damaging to health resulting in hesitant attitudes from affected individuals due to their already poor conditions.

Pain management programs may not be effective and cases may rise when monitoring infected patients.

Homemade Repellents provide individuals with a cost effective alternative that is beneficial for individuals with allergies as they are personalised using effective ingredients.

Targeting mental health would benefit individuals worldwide, especially since depression and anxiety cases rise rapidly during pandemics like Covid 19 and Pilot Coli, isolating people from their families and friends.

Solutions are financially accessible for every individual.

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