

ENSURING MEDICAL INNOVATION IN THE UNITED STATES

Topic Background for the U.S. Senate on Medical Innovation

"It is not the strongest of the species that survives, nor the most intelligent, but the one most adaptable to change." - Charles Darwin's Origin of Species

Potential of Medical Innovation

On May 5th, 2023: the **World Health Organization (WHO)** (photo by Thorkild Tylleskar) proclaimed that the COVID-19 Pandemic, which had ravaged the world for the past 3 years, was no longer a public health emergency of international concern (PHEIC)¹. Despite the reduced threat of COVID-19 and a return to normalcy for many, the WHO still warns that there are at least 9 diseases currently in existence that have global pandemic potential. Given this and other potential public health threats, it is important that the United States Senate start examining healthcare innovation and its potential to help mitigate these health threats.



World Health Organization, Photo by Thorkild Tylleskar

In the field of healthcare innovation, there has been much progress made. According to the World Economic Forum, there have been several innovations in healthcare which have improved the industry substantially. Breakthroughs in **Artificial Intelligence (AI)** have allowed for doctors to detect bacteria, infectious diseases, and cancer over 30 times faster with nearly 100% accuracy. 3D printing in hospitals has allowed for the creation of dental implants, replacement joints, as well as for made-to-measure prosthetics. Current research into **Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)** also known as **CRISPR gene editing**, CRISPR technology works by “harnessing the natural mechanisms” of invading viruses and then “cutting out” infected DNA strands. If CRISPR research comes to fruition, it has the potential to fight killer diseases, cancer, and sickle cell diseases².

However, despite these many medical innovations, there are still many health threats that the global community continues to face. A prominent healthcare threat is the existence of **superbugs**. Many **antibiotics** do not work against superbugs. In fact, antibiotics have the potential to make superbugs much stronger as bacteria learn how to counter antibiotic resistance. A disease which is immune to current treatment is a concerning thought, which is why the Biden Administration plans to put over 100 million dollars in researching ways to combat these drug-resistant superbugs, according to Reuters.

Outside of superbugs, another big threat to medical innovation is the increasing threat of another

¹ <https://www.reuters.com/business/healthcare-pharmaceuticals/covid-is-no-longer-global-health-emergency-who-2023-05-05/>

² [5 innovations that are revolutionizing global healthcare | World Economic Forum \(weforum.org\)](https://www.weforum.org/articles/5-innovations-that-are-revolutionizing-global-healthcare/)

pandemic or global disease. Since 2018, the World Health Organization has used the placeholder term “disease X” to refer to any potential infectious disease that causes the next global pandemic³. Climate change has proven to be an issue regarding disease threats. One example is **Permafrost**, which is starting to melt. Scientists believe that there are diseases which have been frozen for over thousands of years under these icecaps which humans have no **immunity** to. This threat has been dubbed “**factor x**”⁴. Threats such as factor x only further stress the need for medical innovation and government intervention on the matter.

Benefits of Medical Innovation

Medical innovation is helping increase medical research productivity



A clinical researcher in the Florida Healthcare System

As mentioned earlier, benefits of medical innovations such as utilizing artificial intelligence have helped accelerate research on bacterial diseases and other medical ailments. According to research from the World Intellectual Property Organization (WIPO), productivity in medical drug research and creation has increased significantly since the 2010s. Namely, the number of drugs that have entered **phase I and phase II trials** has gone up significantly since 2015. This means that there is more experimentation and enhancement of antibiotic drugs, and the implementation AI has helped speed up the research process. Therefore, medical innovation could help keep humans ahead of many infectious diseases for quite a while going into the near future.

Medical innovation can help those most at-risk

According to the professional services network Deloitte, breakthroughs in medical innovation are helping at-risk populations most. Through **next-generation genetic sequencing** developed by medical innovation, doctors and physicians are now able to better identify at-risk populations and treat conditions they may suffer from such as cancer. Genetic sequencing refers to the process in which doctors examine DNA and use it to determine potential risks that a patient might have towards certain diseases or illnesses such as Alzheimer’s⁵. Medical innovation has allowed for more technology involved in this process, which has sped up genetic sequencing significantly. This is especially important for those who may have a condition like

³ [WHO to identify pathogens that could cause future outbreaks and pandemics](#)

⁴ [Scientists Fear Cataclysmic 'Factor X' Will Emerge From Earth's Permafrost \(msn.com\)](#)

⁵ [Measuring DNA in dead nerve cells may help diagnose Alzheimer's \(alzheimersnewstoday.com\)](#)

cancer, which will only grow worse with time if left untreated.

Medical innovation is making healthcare more accessible

Another benefit of medical innovation which was identified by Deloitte was the development of more advanced **biosensors and trackers** to be used on human technology such as phone apps. Biosensors and trackers refer to tools which allow humans to track our health on devices such as phones. Primitive forms of these trackers already exist such as the “Health App” on iPhone, which can track heartbeats and the amount of footsteps a person walks per day. However, medical innovation could allow for biosensors on these apps which can track overall human health, including sickness or even tracking cancer, though this research is still years off. A big implication of this technology is that it can make doctors appointments and other costly medical visits accessible by patients merely checking an app. This could help limit the spread of infectious diseases among lower-income Americans who may not be able to afford an immediate visit to the doctor or receive treatment.



Medical innovation has the potential to make disease tracking possible from phone apps

Challenges that Medical Innovation Faces

Challenge of Superbugs

As mentioned before, superbugs pose a unique challenge to medical innovation because of their severe resistance to antibiotics and traditional forms of treating bacterial infections. While medical innovation has been able to produce and update antibiotics, it is unclear how effective these antibiotics are against superbugs. According to Jason Beaubien of NPR, superbug infections are still on the rise and killed more people in 2023 than HIV or malaria. In other words, despite the best efforts of innovation, superbugs remain a problem and have only grown more lethal. Overcoming the challenge of superbugs should be a top priority for any future medical innovation.

Challenges of financing medical innovation

A major issue regarding medical innovation is securing the funding for said innovation. While the Biden administration has invested 100 million dollars in medical innovation research, this is only a very small fraction of the Department of Health and Human Services budget. From 2020 to 2021, the Department of Health of Human Services budget decreased by 10 percent. Department funds being handled by Congress means the Senate has leverage in securing funding for the Department. The demand of medical innovation requires more funding, as 100 million dollars alone is not enough to overcome the mounting health challenges that humanity is facing. With factors such as superbugs and disease x being present, increasing funding for the department is something Senators should consider.

Public trust in medical innovation

Since the COVID-19 Pandemic, there has been a rise in distrust towards medical innovations such as vaccines. Medical technologies and innovations which were widely accepted have now fallen prey to **misinformation** and political polarization, making it harder for medical innovation to become more widespread. We have already seen the damage done by this misinformation, as previously extinct diseases such as measles and polio have made a resurgence in public health. If proper resistance to superbugs or “disease x” is developed, ensuring widespread inoculation (vaccination) might prove to be more difficult than it has been historically.

Potential Solutions

Subsidizing research into medical innovation:



Pfizer Headquarters in New York City

While funding from the U.S. government has remained an issue, there are still private companies leading the charge on researching medical innovation. These companies include Pfizer, Johnson & Johnson, AstraZeneca, and many more. Rather than directly fighting over funding the Department of Health and Human Services, subsidizing research through private companies could be a way to overcome gridlock and ensure innovative research is still occurring. Partnering and subsidizing private companies for medical research has paid off for the United States in the past, such as the successful rollout of COVID-19 vaccines as part of the Trump administration’s “Operation Warp Speed.” Therefore, this should be an option Senators consider going forward with a potential resolution.

Making medical care more accessible

A large issue that comes with rolling out new medical innovative technology is that, many Americans could struggle with affording some of the more expensive products which are created from medical innovation. According to a survey done by West Health, 1 in 5 Americans struggle to afford healthcare as it is. New innovations could struggle to reach Americans who cannot afford them and thus exacerbate existing issues. However, there have been steps taken in the past to make medical innovation affordable, such as when COVID-19 testing was made free during the Pandemic. Senators should consider ways of making healthcare more accessible or affordable in order for all citizens to receive the benefits of healthcare innovation.

Taking precautions for the next pandemic

While the world is still recovering from the aftermath of the COVID-19 Pandemic, the United States should continue to think about and prepare for the next pandemic. As discussed earlier, the World Health Organization still warns of a “disease x” which could cause a pandemic in the near future. Similarly, permafrost melting in Siberia and the arctic could expose humanity to diseases they aren’t adapted to resist. As a result, the United States must develop a comprehensive pandemic preparedness plan for the near future. The Obama administration had prepared a “pandemic playbook” during the 2010s for such an instance, though it went ignored during the COVID-19 pandemic. Preparing concrete policy for the next pandemic should be something the Senate seriously considers.

Subcommittee Charge

The United States Senate is tasked with the oversight, regulation, funding and lawmaking of nearly all aspects of life in the United States. From food safety to military contracts and space exploration, the United States Senate is tasked with ensuring that U.S. policy is aligned to their policy preferences and those of their constituents. In order to distribute this massive responsibility, the Senate is split into distinct Committees with broad responsibilities, and then subcommittees with more specific jurisdiction. Each of the 100 members of the United States Senate is assigned to one or more committees where the majority of legislative debate, discussion and review occurs. For a bill to become a law, it must be approved in its respective committee before being elevated to the Senate floor.

The overview of medical innovation or research is under the jurisdiction of the **Committee on Appropriations**, and more specifically, the **Subcommittee on Labor, Health and Human Services, and Education, and Related Agencies**. The subcommittee has a number of policy avenues to explore in relation to healthcare, the impact of diseases and other factors on the American people, and policy to improve healthcare and other health services for the people.

Expert Witnesses will provide opening testimony for the committee, and then will be available for questioning from the Senators. Through the testimony and questioning of expert witnesses, along with speeches and debate between Senators, the committee is charged with crafting a policy proposal aimed at solving persistent issues plaguing AI and Cyber Security regulations.

Questions to Consider

1. What are some of the particular challenges of medical innovation that face the American public? In your opinion, which of these challenges are the most important to address?
2. What have been some of the benefits of advances in next-generation genetic sequencing?
3. What are some of the additional challenges faced in medical innovations that are not listed? What impacts might they have?
4. How do factors such as climate change affect global health and well-being? What are some examples?
5. What is a term that stood out to you? Why do you think the term is important?

Glossary of Terms

Term	Description
World Health Organization	A specialized agency of the United Nations which studies public health
Artificial Intelligence	the theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and language translation.
Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)	a family of DNA sequences found in the genomes of organisms such as bacteria and archaea
CRISPR gene editing	The scientific process of “cutting out” infectious strains from DNA
Antibiotics	Drugs that kill or inhibit the growth of bacteria
Permafrost	A thick subsurface layer of soil that remains frozen throughout the year, occurring chiefly in polar regions:
Immunity	the state or quality of being resistant to a particular infectious disease or pathogen
Factor X	Microbes and infectious diseases that have been covered by permafrost for thousands of years. Some scientists fear melting permafrost will allow for factor X to emerge.
Phase I and phase II trials	The phases of trials in which doctors test medicine and other medical technology. If it passes all phases, the medical technology becomes open to the public.
Next-generation genetic sequencing	A scientific technique used to examine DNA sequence in order to identify potential risks that a person with certain DNA might have such as an increased likelihood of cancer.
Biosensors and trackers	An analytical device, used for the detection of a chemical substance or other health issues, that combines a biological component with a chemical detector.

Misinformation

Incorrect or misleading information that does not match the best available evidence at the time

Helpful Resources

- **[U.S. Healthcare System Ranks Sixth Worldwide — Innovative but Fiscally Unsustainable \(pgpf.org\)](#)** - This article details the strengths and drawbacks of the United States healthcare system going into 2023. The US healthcare system has kept up with innovations and research in recent years. However, the main drawback it faces is the fiscal unsustainability of its system with the US spending way more on its healthcare system compared to other developed countries yet yielding less in several aspects.
- **[Preparing to Avert Another Pandemic \(voa.gov\)](#)** - This Voice of America editorial discusses the United States' preparations for the next pandemic. Specifically, World Health Organization Director Dr. Tedros Adhanom Ghebreyesus discusses the preparations being taken by the United States and other countries across the world to handle a potential future pandemic.
- **[Biden plans \\$100 million drive to combat drug-resistant 'superbugs' | Reuters](#)** - This Reuters article is discussing plans by the Biden administration to combat drug-resistant "superbugs." The US is investing up to 100 million in research and development to fight against these "superbugs" and build more resistant US healthcare infrastructure.
- **[5 innovations that are revolutionizing global Healthcare](#)** - This article is a list of the 5 innovations of the 21st century affecting global healthcare. A great resource for topical medical technologies that are revolutionizing the medical field.
- **[Measuring DNA in dead nerve cells may help diagnose Alzheimer's \(alzheimersnewstoday.com\)](#)** - This article demonstrates the power of genetic sequencing and other medical innovation.

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