Only time will tell

Bryan Wong Wei Zhi, Raffles Institution

1 Raffles Institution Lane, 575954

1941. The dawn of the antibiotics era. Albert Alexander was the first ever patient to be treated with penicillin for his staphylococcal sepsis. However, he died when supplies of penicillin ran out...

Such was the tragedy of under treatment that we swore never to allow again. While Fleming pointed out in his Nobel prize acceptance speech that sensitive bacteria could be "acclimatized" to penicillin, we did not pay heed to his warning. We were ignorant of the repercussions. If we had the ability to produce sufficient antibiotics, *no one* would be denied the chance for a prescription. In fact, we would even over-prescribe.

This was what we had firmly stood by, until it all changed…

The year was 2025. Although merely 7 years from 2018, the differences between the times couldn't be more stark. We now lived in a world where all physical documents had to be digitised. Even schools were not spared. This was our response to Staphylococcus aureus, the common bacteria that causes skin infections from mere paper cuts, gaining complete resistance against all available antibiotics. Eating was something we took for granted in the past. Now, we had to incubate our foods under intense UV light to eliminate the bacteria Salmonella, which has also acquired antibiotic resistance. More shockingly, death rates skyrocketed to 20 million, a figure we anticipated only in the more distant 2050.

All 193 UN member states convened an emergency meeting, with the agenda on the immediate future of the world. World leaders and diplomats scrambled for a solution. The world was facing an unprecedented and immediate danger. We had to figure something out, and quick.
But it was also during this convention that grim news broke: Our 'last resort' and most potent antibiotics such as Vancomycin and Carbapenems, are now officially declared incompetent against bacterial infections.

All hope seems to be lost.

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Then, the Russians suggested something *peculiar*.

What about a time machine? What if we could go back in time, back to year 2000 that was the turning point of the Antimicrobial resistance (AMR) situation? And perhaps change our outcome?

They subsequently revealed the top-secret time-machine they were developing, which was in its testing phase, to an initially aghast international community that questioned their motives. Renowned physicists present questioned its feasibility, given the paradoxes associated with time and time travel.

Yet, the Russians were resolute and certain about its potential. They wanted to use this golden opportunity to openly solicit global expertise to refine their project. Specifically, they needed the knowledge of US scientists who worked on the Montauk Project alongside Nikola Tesla. The Russians believed that was the 'last piece' they needed to perfect their invention. They had nothing to lose at this stage, because it was increasingly harder to develop new potent antibiotics – only one or two new ones were developed in the last 30 years. Even our most promising alternatives, such as nanobots that could eliminate the pathogens in our body, still required an estimated 8 years of development.

We simply did not have any effective answers to the rising fatalities. This may be our *only choice*. We were out of time, and willing to risk it all.

It was either this or the end anyways.

And so, international efforts into the project started immediately. It was not always smooth-sailing, with the Americans and Russians sometimes at loggerheads. However, the death of a leading American coordinator, from a 'mere' bacterial infection (with respect to year 2018), seemed to have put pride and hostility between the two countries aside, and fostered closer cooperation.

While efforts went into developing the machine, an international committee of leading scientists was swiftly commissioned to analyse purposefully the causes of today's AMR apocalypse and how we could possibly avert it.

Finally, the Russians unveiled the long awaited machine to the world. It functions by capturing a wormhole and enlarging it sufficiently for humans can enter. The machine specially blocks out radiation, so that feedback does not occur in the wormhole, thus stabilising it. Given our current technology, the machine could only allow us to travel back to 2000.

And so year 2000 it was.

Travelers will be back as themselves in the destination year, but still conscious of their own thoughts from the future. The future (2025) was set to be erased, and the universe starts from 2000 all over again. A group of renowned figures, who command significant following in the international scientific community, and had the authority to influence public health policies, were chosen. I was fortunate as my credentials as a microbiologist in Singapore qualified me for this international mission.

We readily accepted the invitation; we were willing to sacrifice, and do the best we could. We had to secure the future of humanity.

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The guideline to avert the AMR crisis was also finalised, and is as follows:

Mission "About time"

Despite the efficacy of antibiotics in the past in dealing with bacteria, it would be wiser to view it with 'caution'.

Thus, to target the over-prescription of antibiotics globally, one of the main causes of AMR, a two-pronged approach will be undertaken, targeting its production and consumption, and expediting potential developments.

Antibiotics will also be classified as a controlled drug. Its production will be restricted. A timeframe will be allocated to decrease antibiotic manufacturing. Manufacturers caught flouting the rules will heavily fined. Instead, they are encouraged to research, develop and pioneer the more innovative methods to tackle the pathogens. The more promising nanobot[1]

[1] https://physicsworld.com/a/cell-like-nanobots-fight-bacterial-infection/

and its relevant technology will be leaked to the international science community back in 2000, to speed up its development for future use. Manufacturers have to be convinced of its profitability and the harm of antibiotics over-consumption in the long term. If given the correct attention, the nanobots are estimated to be commercially available by 2015, before the widespread deaths.

The conception of the Antimicrobial Resistance (AMR)[2] industry alliance will also be conceived earlier, to facilitate the development of a unified approach towards controlling antibiotics discharge, and preventing its exploitation especially in agriculture

Antibiotics will no longer be sold over the counter. It would require prescription by certified healthcare professionals. In addition, inexpensive and quick bacterial infection diagnostic techniques[3] will be introduced, whereby using only a drop of blood, the increased gene expression for 7 genes indicative of bacterial infections can be quickly detected in 1 hour- a remarkable improvement over cultures, which can take days. Thus, wrong prescription of antibiotics for viral infections can be minimised.

The role of immunotherapy[4] to combat bacterial infections will be expanded. The immunobiotic agents bind to the surface of bacteria, and triggers the opsonisation of bacteria by the immune. The agent can also itself induce the killing of bacteria by similar antibiotic mechanisms. This reduces the need to need to consume antibiotics. The relevant technology will be leaked to the science community to expedite its development. We estimate that it will be commercially available by 2010.

Fundamentally, while it is imperative to constantly develop novel antibiotics and other complementary technologies, the battle against AMR also boils down to the individual level. Public education campaign that targets the root cause of over-consumption- human ignorance of the attendant consequences, will be implemented. The campaign will seek to weed out the deadly misconceptions relating to antibiotic use and reason for resistance, such as instilling in people the value of completing their antibiotics course, and that antibiotics are not designed to for viral infections.

It is up to you, men and women, to change the course of our earth. We wish you all the best on behalf of humanity.

With regards,
The United Nations

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2 https://www.amrindustryalliance.org/shared-goals/common-antibiotic-manufacturing-framework/

3 https://dpcpsi.nih.gov/AMRChallenge

4 https://www1.lehigh.edu/news/immunotherapy-for-deadly-bacteria-shows-early-promise

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The day arrived. We were gathered in Saratov Oblast, Russia. There were countless media outlets streaming this monumental event, with cameras fixed on us and the portal. The world was watching.

Then the announcement was made. We were ready to go. I turned around one last time and stopped in my tracks. I hugged my family members, for possibly the last time in this age. I held back my emotions; *if we were trapped in the wormhole, then the world will start all over from 2017 again; and our tragedy will repeat itself.*

I made sure to double check my briefcase, and said a quick prayer as we approached the machine. We stood ready at the entrance, and waved to the world for the final time. We approached the blue spinning vortex, with hearts heavy but also full of hope for what is to come.

The world is ours to fight for; it is ours to create.

I heaved a sigh and stepped in. The wormhole closed behind me, and with it the world disappeared.

It was the same antibiotics introductory story, but now, we hoped for a vastly different outcome. Only time will tell if we succeeded.