[intro music fades in]

[Pill bottle rattling]

Antibiotics have changed our world. Before their discovery, bacterial infections were a leading cause of death. In 1900, bacterial pneumonia, tuberculosis, and diphtheria caused 34 percent of all deaths. 90 percent of children who contracted bacterial meningitis died. Today, those same infections are treatable with simple antibiotics. We regularly conduct life-saving procedures, surgeries, and chemotherapy treatments because of the protections that antibiotics give. Most people take them for granted, and we even talk about them in kids shows.

[insert audio from *The Magic Schoolbus: Inside Ralphie* Timestamp: 15:45-15:55]

However, antibiotics are a double edged sword. Bacteria are becoming resistant to the drugs that we designed to kill them. A notable example is MRSA, which has become resistant to nearly all of our antibiotics and poses a high risk of death. How does this happen, and what can be done to mitigate this growing issue?

To better understand how we can stop this threat, we need to know how antibiotics work. We also need to understand how bacteria become resistant to them. Let's hear from "In a Nutshell" as they discuss antibiotic mechanisms in their video "The Antibiotic Apocalypse Explained."

[insert audio from Kurzgesagt - In a Nutshell's video *The Antibiotic Apocalypse Explained*, timestamp 1:07-1:40]

If only it were that easy forever! Though we have developed incredibly complex and efficient ways to kill bacteria, they continue to outsmart us. Bacteria have several modes of resistance that they can transfer amongst themselves. Resistance arises through a process scientists call selective pressure.

When antibiotics are taken, most bacteria quickly die. That's what we want. However, some survive because of random genetic mutations that give them an edge over the drugs:

[insert audio from TED-Ed's video *What causes antibiotic resistance?* Timestamp: 1:40-2:20]

That's the reason why you should always finish your entire course of antibiotics, even if you start feeling better. The antibiotics keep the overall number of bacteria low, so your immune system can kill the resistant ones.

Our widespread use of antibiotics in both human and agricultural settings has encouraged rapid mutations that give rise to resistance. Resistant bacteria in animals can be transferred to humans through poor sanitation and handling. Some strains of bacteria are resistant to multiple antibiotic types, and no new types have been discovered since the 1980s. So we clearly have an issue! There are many obstacles in the path of new antibiotics, and the biggest one is funding.

[insert audio from TED-Ed's video *How can we solve the antibiotic resistance crisis?*Timestamp: 4:36-5:10]

Going forward, policymakers and prescribers across the world should practice antibiotic stewardship. They should only prescribe antibiotics to patients who need them, and patients must take their entire course to reduce the risk of resistance. Increased funding for antibiotic research is necessary. The use of antibiotics as growth promoters in agriculture should be banned. Infection prevention through better sanitation and public health must become a worldwide priority. Otherwise, we may find ourselves right back at square one.

[closing music fades out]