

Nobody wants to foot the bill for new antibiotics

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The Norwegian government is working on a strategy to handle problems with antibiotic resistant bacteria after an outbreak of Methicillin-resistant Staphylococcus aureus (MRSA) at a pig farm in central Norway. But researchers from the Norwegian University of Science and Technology say the government's focus is too narrow.

Too many people die from infections related to injuries as little as a splinter in their finger. Scientists think the government strategy to address the problems posed by [antibiotic-resistant bacteria](#) is too narrow. Unfortunately, they say, speeding up the development of new antibiotics will only happen when cancer can no longer be treated with existing medicines.

Magnus Steigedal thinks this is a major problem. Steigedal, Director of the Norwegian University of Science and Technology's (NTNU) Strategic Research Area on Health, is also head of the Norwegian section of a large EU project on the development of new antibiotics.

He is busy. More people die from [antibiotic-resistant bacteria](#) than from traffic accidents in Europe. About two million people die of tuberculosis every year.

If antibiotics can no longer kill [bacteria](#), a simple urinary tract infection can be fatal.

A ticking time bomb

Antibiotic-resistant bacteria are like a ticking time bomb. The world needs new antibiotics. Scientists, veterinarians and doctors have been talking about this crisis for some time. So why is it taking so long for pharmaceutical companies and governments to respond? Why is so little happening?

The honest truth is money. No one wants to foot the bill. The pharmaceutical companies have to make money, which they generally don't do on antibiotics.

"The biggest challenge is to make developing new antibiotics commercially viable. It may take 20 costly years to develop new medicine. Pharmaceutical companies aren't generating much income when patients stop taking their medicine after a few days or weeks," says Steigedal.

Lifelong medication use is favoured

Pharmaceutical companies prioritize developing medicine for chronic diseases such as hypertension or diabetes. The reason is simple: the longer a patient is on medication, the more money the company earns on drug sales. Lifelong medication use is the best.

Pharmaceutical companies can foot the bill to find new antibiotics if their profits are sufficiently large that they can do it for economic reasons. That is not the case now after the financial crisis. They will also take on the cost if they have to, for example if a patient cannot receive costly cancer treatment due to infections, Steigedal says.

Diminished immunity from chemotherapy

Chemotherapy weakens immunity, which in turn increases the risk of serious infections in cancer patients. If patients cannot be treated with antibiotics, modern cancer treatment may in many cases not be possible to implement.

"Only when cancer can no longer be treated, will the development of new antibiotics speed up. It sounds cynical, but that's the way it is," says Steigedal, who works at CEMIR, the Centre for Molecular Inflammation Research, which is a Norwegian Centre of Excellence at NTNU. Here, the interactions between bacteria and viruses and the immune system are under scrutiny.

Together with researchers from the Netherlands, France, Switzerland and Canada, Steigedal is working on new antibiotic mixtures, and also a new method to find antibiotics.

Must be cheap for pharmaceuticals to take over

"Today, scientists are testing new antibiotics that have been collected in a large library, which is like looking for a needle in a haystack. There are hundreds of thousands of chemical compounds in the library, and they are tested against various bacteria. This is expensive and demanding. The new method needs to be relatively cheap for [pharmaceutical companies](#) to take over. If universities can bring them the knowledge, antibiotic development could become commercially viable," says Steigedal.

Professor Trude Helen Flo is CEMIR's Co-director. She says the biggest problem with antibiotics is not in Norway. When Norwegians travel they bring microbes home, including resistant ones, even though the traveller may not be sick themselves. It takes a few months before these microbes are gone, and in that time it is possible to infect someone else. Some people are particularly vulnerable, especially in hospitals. This risk

applies particularly for travel to India, for example, but also to Greece, Turkey and Spain – countries that have greater resistance problems than we have.

She says that the goal for new antibiotics is first and foremost to weaken bacteria rather than kill them completely.

"Antibiotics do not need to kill the bacteria entirely. If we can strengthen a person's immune system, weakening the bacteria may be enough for the immune system to clean up the rest. In the new project we're going to try new combinations of antibiotics. It may be that an antibiotic that has lost its effect will work if we combine it with others. We are going to investigate what is vital for the bacteria to survive, and then go on the attack against it. Today we still lack an understanding of this fundamental interaction between bacteria and humans," says Flo.

Finds the government's strategy limited

Minister of Health and Care Services Bent Høie (H- Conservative Party) along with Minister of Agriculture and Food Minister Sylvi Listhaug (FrP- Progress Party) are preparing a strategy this spring to overcome antibiotic resistance. "We need to work to make Norway as strong as possible in this area," Listhaug told the Norwegian business newspaper Dagens Næringsliv in January.

Steigedal believes that Høie and Listhaug's statements suggest that their strategy will be too narrowly focused. "It appears that the government plans to monitor more, slaughter pigs infected with multidrug-resistant bacteria and cut back on [antibiotics](#) use in Norway by encouraging doctors to cut back on prescribing the drugs. This approach will work in Norway, and it's very good. But the biggest problem is not in Norway. This is a global challenge and a global responsibility. We are already on top of the issue in Norway, but it doesn't help the world if we get even

better. Most people travel around the world a lot, and carry bacteria across the border with them," said Steigedal. He is encouraging Høie and Listhaug to initiate a collaborative Scandinavian effort.

Should push through legislation

"Together we can take a global responsibility and push through legislation and sanctions that will also help in Norway. A good example is the UK, which introduced stricter rules and has reduced multiresistant staphylococcus bacterium cases in their hospitals to a third of what they had five years ago," Steigedal says.

West Africa has been hit hard by Ebola, and their already vulnerable health systems have collapsed. Now other diseases may also become more problematic, because people don't dare to visit the hospital for fear of being infected by Ebola. Liberia, one of the hardest-hit by Ebola, has recently had major measles outbreaks, reports NRK, the Norwegian Broadcasting Corporation.

"After Ebola there will probably be a resurgence of several diseases, such as tuberculosis," says Steigedal.

Because of the financial crisis, there has been no new European research money to find [new antibiotics](#) and understand the interaction between bacteria and humans.

The European research program Horizon 2020 previously funded this research.

Flo finds the current situation scary. Steigedal hopes Norwegian politicians take global reality into account as they develop a new strategy.

Provided by Norwegian University of Science and Technology

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