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What happens when antibiotics stop working?

David Aaronovitch – whose life was saved by antibiotics after a routine operation went catastrophically wrong six years ago – talks to the scientists on a mission to solve the problem of drug-resistant infections. It's a race against time: the alternative is a future where a graze could be fatal

David Aaronovitch in 2011, pictured following his recovery
MARK HARRISON

The Times, July 29 2017, 12:01am

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This is a story of four generations: our grandparents, ourselves, our children and our children's children. It is a story of a cycle of death, hope, cure, fear and – quite possibly – death again. And, for me, it begins with a woman in her early thirties called Ida May Walmsley.

Ida Walmsley, a former actress, married to a soldier, had just given birth to her third daughter. It was summertime, and she was sitting out in the garden of a friend's house, the baby asleep indoors. And something, probably a gnat, bit her. The next day, a relative – a hockey mistress at a nearby girls' school – wrote in her diary that Ida's cheek was "very swollen". A day later and she was "very ill". The following morning she was taken to hospital because "the poison had gone right through her". She was operated on, but whatever the surgeons did (and it's hard to see what it might have been), it didn't work. Wednesday, August 20, 1930, was a day in which Don Bradman was piling up the runs in the fifth Test against England at the Oval. It was also the day that Ida Walmsley – my grandmother – died.

In 1930, a gnat bite and four days was all it took to kill a healthy young woman and leave three small girls motherless. But what actually killed Ida? Probably bacteria, carried on the mouth parts of the insect, entered her blood stream. Toxic in themselves, these bacteria began to multiply, using her blood as food. Ida's immune system then went into overdrive, releasing chemicals to kill the intruding bacteria, but in the process causing inflammation throughout her body – sepsis. The resulting "septic shock" began, in effect, to shut down her major organs.

Let's run forward two generations to another August day, 81 years later. A middle-aged man has been operated on in a London hospital to remove a small part of his colon – the large intestine – because a polyp that might be pre-cancerous has been spotted there. It's not a life-saving operation, but the surgeon nicks a section of the colon without noticing. And from here things can only go badly.

> A 5 per cent chance of dying from infection now might become a 95 per cent chance

Over the next four days, as the man is fed and his small incisions heal, bacteria from the gut leak into the abdominal cavity. Organisms that are OK in one place are now in another where they are poisonous. The immune system begins to react. The surrounding tissues start to inflame. The abdomen swells and pushes up, crushing the bottom of the lungs. The doctors are called back in. The man is stronger than Ida was, but even so it is a matter of time before organ failure kills him. Unless, that is, the surgeons can clean out the infected area and, above all, kill the bacteria that are proliferating and creating the immune response.

So the man is given intravenous antibiotics, which kill off these bacteria. After a week in a coma and another conscious but in intensive care, our chap survives. Survives to write this piece and relate how his grandmother's unmet grandson was saved from dying her death – by antibiotics. Don't ask me which antibiotic, because I was unconscious at the time.

Of course, I could have died anyway if the sepsis had not been diagnosed in time, and thousands of people in this country do. But millions more are saved from this – and myriad other conditions caused by bacterial infections – by the family of "wonder drugs" called antibiotics. And, put at its simplest, the discovery and development of antibiotics in the period between Ida's life and mine is the main reason why we don't die of infections that used to kill us in our tens of millions.

My third generation is my children's. A friend of one of my daughters recently contracted a tiresome respiratory infection. Harry is a very fit young man in his late teens, but the condition wouldn't go away. It began to weaken him. He became lethargic and always felt a bit unwell. He was getting more ill, not better. Naturally, the doctors gave him antibiotics. First one, and then another and then another. And one after another they failed to work. The organism causing his infection seemed to be immune – resistant – to whatever they gave him.

Now, as he weakened, everyone began seriously to worry. Was it in any way conceivable that this originally minor infection might (and you thought it but didn't say it) actually kill him? But eventually they found an antibiotic that did work. Perhaps it was one of those "last-resort" antibiotics that is less used because it has its own potentially toxic effects. I don't know, but after the scare, Harry survived.

The Reno woman didn't. It happened in the state of Nevada last September but didn't hit the press till January. A 70-year-old woman had broken her right thighbone while on a visit to India. The leg had become infected and the infection had spread to her hip. She had made repeated visits to hospital in India and then, when she returned to the US, to a hospital in Reno. Tests showed that the infection was caused by something called *Klebsiella pneumoniae*, a gut-based bacterium that is usually harmless.

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This bacterium was in the wrong place, however, and now her immune system was looking to get rid of it. As she developed sepsis, her doctors began antibiotic treatment. As with Harry, one after another antibiotic failed to work. Everything you've ever heard of, and then some, was deployed, but this strand of *Klebsiella pneumoniae* was immune to everything they tried. In the end, the medical staff had used 26 different antibiotics, including colistin, one of the last-resort antibiotics.

The bacterium resisted the lot. The woman died. A medical officer at the US Centers for Disease Control and Prevention told *Scientific American* that the Reno bug had been confronted with "everything that's available in the United States", and had overcome them all. The bugs, he said, were becoming resistant to the drugs faster than anyone was developing new ones.

The woman from Reno and, to an extent, Harry are straws in what could be the illest of ill winds. They are the harbingers of what has been called "the slow catastrophe" of antimicrobial resistance (AMR) – the growing likelihood that microbes will resist all the drugs we have developed to kill them. There are plenty of other warning signs. For example, new strains of resistant E. coli (another gut bacterium) were found in the urine of a New Jersey man and a Pennsylvanian woman last year. These were resistant to colistin and the other last-resort antibiotic, carbapenem.

To understand why governments, health agencies and international bodies are now running scared of antibiotic resistance, I travelled to Liverpool to meet one of Britain's leading microbiologists. Dr Adam Roberts is a tall, rangy, friendly man in his early forties. He has just been poached by the Liverpool School of Tropical Medicine after working at University College, London, for 18 years. One lure is obvious – out of the window of his offices in the university area of Liverpool, he can point to the shape of a new building rising from the low-builds around it. "We've got an entire floor there," he tells me, as if he can't quite believe it himself. Microbiology (the study of tiny living organisms) has, until recently, been seen as a relatively unsexy, Cinderella discipline. That may now be changing.

> If action is not taken globally, by 2050 there will be an estimated 10 million deaths a year

Roberts is a man who can transfer his enthusiasm for his subject to others as easily as ... as easily as microbes can transfer their DNA. And that, it turns out, is scarily easy.

Roberts understood from studying A-level biology and chemistry in his native Stourbridge what the rest of us now need to understand. He loved the world of microbes from first intellectual contact because of "the beauty" of their adaptability. "You see in them the ability of DNA to reproduce itself, to fill every niche it possibly can," he says. "You couldn't possibly have a better example of evolution in action."

Bacteria are in the process of continuous adaptation and change in order to survive. Most of these adaptations happen over long periods of time and enable bacteria to occupy certain niches. Roberts started off looking at what was in our mouths and the way, for example, certain organisms had developed the capacity to attach themselves to tooth enamel.

But they can also – and this is the point – adapt quickly when they need to or when the opportunity arises. "They're incredibly promiscuous," says Roberts. "And the biological process that underpins this promiscuity is incredible. It's fantastic and it's really worrying at the same time." And he introduces me to the existence of "mobile genetic elements". These are bits of DNA, detached from their parent microbes, floating around waiting to be incorporated by some enterprising organism. These organisms, he says, then have a "beautiful ability to assemble it all".

Indeed, microbes can even swipe DNA from passing or dead organisms. Forget reproduction and inheritance: this is the equivalent of you being able to steal the revolver from a passing police officer and then incorporate it into your arm. Really. "Horizontal gene transfer like this," smiles Roberts, "makes a mockery of the concept of species."

Bacteria colonies
GETTY IMAGES

Now, there are restrictions on a microbe's capacity to use other organisms' DNA because it might compromise its existing functions, developed over aeons. Put simply, there's only so much that even a microbe can take on without having to give something else up.

But consider, says Roberts, what a bacterium must do when confronted with a killer like an antibiotic. It must search for and incorporate genes to make it resistant. It is, if you like, on the hunt. And, inadvertently, we are helping. "We're bathing the earth in this thin film of antibiotics," says Roberts, "and creating a really nice environment to select for resistance genes. And we are selecting for all of them at the same time." The more antibiotics there are out there, the more our "bad" bacteria are likely eventually to find genetic elements that are resistant. And then those bacteria will be the ones that succeed. Evolution can and has been speeded up; enter the superbug.

The effects of antibiotics were noticed in antiquity. The ancient Egyptians had somehow realised that pressing a piece of mouldy bread against an infected wound could stop the infection process. In 1909, a German doctor, Paul Ehrlich, discovered that the bacterium *Treponema pallidum* – the cause of syphilis – could be killed by a chemical called (possibly unfortunately) arsphenamine. It was marketed from 1910 under the name Salvarsan.

But the term "antibiotic" was not used until the late Thirties, by which time Alexander Fleming had made his famous discovery of the properties of the fungus *Penicillium notatum*. He had seen that this fungus created a chemical that killed the staphylococcus bacterium, versions of which cause all kinds of conditions from skin eruptions to heart and lung infections. That was in 1928. By the time of the Second World War, penicillin – the "wonder drug" – had been developed for mass use, and was employed to treat infections among troops, many of whom, in the First World War, would have died. Of the same conditions.

> Through the Fifties and Sixties we enjoyed a golden age of antibiotic discovery. But around 30 years ago, we more or less stopped discovering new ones

Penicillin was the start. With antibiotics, the answer usually lies in the soil, where vast numbers of microbes need to develop defences against each other in the endless competition for food. Some of those defences, often evolved through the ages, when isolated became our antibiotics. So scientists took to the soil to find their drugs. Through the Fifties and Sixties we enjoyed a golden age of antibiotic discovery. Almost all the drugs you know, have asked for when you were poorly and have been prescribed, were developed in that period or within a decade or so. The tetracyclines, the cephalosporins, the sulfonamides, the carbapenems and many more, marketed as amoxicillin, ciprofloxacin, metronidazole and so on, until around 30 years ago, we more or less stopped discovering new ones.

Before antibiotics, people died – as Ida did – from infections, from diarrhoea, from pneumonia, from complications of even minor surgery, when opportunistic bacteria took the chance of entering a compromised skin wall or organ system. Soldiers had to fear the small flesh wound almost as much as the one that took off an arm. Any profession that involved a chance of cuts and scratches was at

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legacy bequeathed to our generation by our fathers and mothers. And that is the legacy we have unwittingly compromised.

This can have a darkly comic side. Take gonorrhoea. Earlier this year, it was reported that data collected by the World Health Organisation between 2009 and 2014 showed a marked rise in resistant strains of the sexually transmitted disease also known as “the clap”. Nearly all the 77 countries in the study reported resistance to ciprofloxacin, 81 per cent to azithromycin and two thirds to the last-resort antibiotic class, cephalosporins. Summary: it’s bad.

Dr Teodora Wi, medical officer, Human Reproduction, at WHO, noted that the gonorrhoea bacteria “are particularly smart. Every time we use a new class of antibiotics to treat the infection, the bacteria evolve to resist them.” Given that an estimated 78 million people are infected with gonorrhoea every year and that the disease is both uncomfortable and sometimes dangerous, this was unwelcome news for a lot of folk. But then the Washington DC-based director of the Center for Disease Dynamics, Economics and Policy, Ramanan Laxminarayan, added the mordant observation that “the best time to have had gonorrhoea was the Eighties”. In the many intergenerational arguments that can break out these days, about housing, university fees, pensions, etc, “You were lucky to get the clap when you did,” is the most improbable. And yet it is also true.

There is a simple rule to antibiotic resistance: the fewer antibiotics you use, the less likely that resistance will develop.

But ever since the dawn of the antibiotic era, we have been breaking that rule. We have demanded and prescribed antibiotics for conditions that they can’t affect. We have fed them to food animals by the tonne – in the United States in 2014, more than three times as many antibiotics were sold for use on farms than for use on people. And, by the way, the same is true of antifungals, the medicines we take for conditions as disparate as thrush and farmer’s lung.

> “Our generation is using up all these wonder drugs and leaving nothing behind. What does that make us?

Bit by bit, the evidence has mounted that the bugs are achieving and spreading resistance, and yet we have not yet significantly changed our habits nor been able to develop meaningful new antibiotics for the best part of three decades. Our generation can be accused, as things stand, of treating ourselves to the almost miraculous wonder drugs, to have used them all up and then to have left nothing behind. And what does that make us?

Scientists had been warning for years (as they always do) about where the science almost inexorably led. And they noted the slow and then the faster progression of resistance. Establishments were at first complacent (as they always are), publics were uncomprehending (ditto, alas), and lobbies such as the farm veterinary chemicals one were “sceptical”. Progress was made in some countries in restricting antibiotic use, but for every Dutch pig taken off antibiotics, there were tens of thousands of Chinese animals put on them.

But in 2013 the chief medical officer for England, Professor Dame Sally Davies, gave the whole debate a great shove. She produced a report called The Drugs Don’t Work, demonstrating the “catastrophic threat” to the world’s health of developing resistance. The report got the attention of opinion formers and was taken up by Prime Minister David Cameron. Cameron in turn set up a commission on antimicrobial resistance, led by the economist Jim O’Neill. This commission published eight interim papers and then its full report fourteen months ago. And there, in his foreword, Jim O’Neill summarised what we might expect to see in 2050 if action is not taken globally to reduce “bad” antibiotic use and to develop new antibiotics. The big statistic that flew off the page was the estimate that there would be ten million deaths a year worldwide as a result.

So now we come to that fourth generation – Harry’s kids. What will life be like for them in the post-antibiotic era, when a gnat bite in an English garden on Saturday can mean death by midweek? In Liverpool, Adam Roberts tries to give me an idea.

“It means the underpinning of the whole health system collapsing,” he says. “For example, the entire balance of risk in surgical procedures is changed. It’s a paradigm shift.” Every single time a surgeon cuts open your body or an endoscopist pushes a tube inside you that could conceivably make a tiny hole, although the risk of an infection stays the same, the risk that the same infection will kill you has grown dramatically. People will die of septicaemia after hip operations, knee replacements, pacemaker and stent insertions. “People undergoing therapy for cancer, looking at a 5 per cent chance of death from infection, might now be looking at a 95 per cent chance,” says Roberts. So, naturally, our children’s children will stop undergoing these life-enhancing procedures. I ask Roberts if, under those circumstances, he would opt for, say, a hernia repair operation. “Personally? No.” Welcome back to the land of the truss.

“When scratches can kill we will become risk averse,” he goes on. “Who is going to want to be a tree surgeon when a little mistake can cost you your arm? Or a rubbish collector where there is a significant chance of a graze or a cut?” That adventure holiday for the kids takes on a very different complexion when every cut the child gets in every microbe-rich environment carries with it the possibility of an infection that can’t be treated. The risk that the horse-fly bite on the ankle may mean no leg. Ida might have survived if she’d been bitten on one of her limbs, long enough at least to show her grandchildren her stump.

It is hard to overstate how dependent we have become on antibiotics and how much worse the world will be without them. But we took them for granted. Now we have to work out what we can do to avoid being cursed by future generations.

The O’Neill commission report showed the way, and its approach is the one that the scientific community largely endorses. First, you have to make the existing antibiotics last longer before resistance to them renders them mostly useless. To do that you have to prescribe them much less – and that means much better diagnosis of when they’re actually needed and a complete change to the “I’ve got a cough – give me antibiotics!” psychology that has ruled for half a century.

We need to stop feeding them to farm animals in any but the most pressing circumstances, and for us consumers that means boycotting meats produced using antibiotics. For governments, it means trade regulations preventing imports of such meat.

And we need to create incentives for companies and agencies to look harder for new antibiotics, because whatever the rate of resistance is, the fact of resistance is simply biologically inevitable.

> “Do we have the expertise to solve it? We do. But I am relatively pessimistic that we will fix it before we get into a bad place

We, the public, are the key, though. Adam Roberts has run a rather wonderful operation for a couple of years, called “Swab and Send”. For a small charge, he sends swabs out to people and institutions who ask for them. People have swabbed anything and everything – loo seats, teddy bears, meadow plants, you name it. He has had hundreds of swabs back, which he has then tested in the labs to find out if any of them contain organisms that have an undiscovered antibacterial quality.

So far he has found (from his own daughter’s primary school, as it happens) a promising enemy to Candida albicans – the thrush bacterium. But the main objective was to engage the public in the issue of antibiotic resistance. In this he has succeeded, with Swab and Send Facebook posts getting as many as six million hits. In the lab, he points me to growths in special Petri dishes that show “zones of inhibition”, indicating the production of antibiotic or antifungal chemicals.

What does he feel about our capacity to avoid antibiotic meltdown? He frowns. “I am a lot more optimistic than I was a couple of years ago. It’s been put on the political agenda. Davies convinced Cameron, who took it to the G7 and then to the G20 and then the United Nations general assembly. There’s some money now for research, and do we have the expertise as a species to solve it? We do.

“So, more optimistic than I used to be. But I am still relatively pessimistic that we will fix it before we get into a bad place.”

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AmyS 11 days ago

How sad is it that we as individuals can do nothing, compared to those more 'powerful' individuals. I personally try to avoid antibiotics, but that makes zero difference. The big pharmaceutical companies will never stop pushing out these drugs because they will make less money. And the governments will not make it illegal because they will also lose money. How sad is that?

1 ★ Recommend Reply

Peter Collins 12 days ago

Excellent piece. I have been wondering for some time why the media haven't taken this issue up. It needs at least as much (or more) public and political attention world-wide as climate change: the worst case scenario is as bad; the remedies are more easily identifiable; there is far less economic downside to proposed solutions; and the science is pretty much undisputed and indisputable. Congratulations to Roberts as well as to you.

3 ★ Recommend Reply

J Mackenzie 13 days ago

I don't think there is much new in this article, though the points are well worth repeating because of the great danger to us and to future generations.

I am, however, interested in just one aspect of the historical statistics. The article makes much of the dangers posed by cuts, scrapes and bites in an antibiotic resistant world. If we were take one period at random, the late Victorian period, say, what would the probability be of a child dying from a bacterial infection resulting from a cut, a scrape or a bite?

Given that most children, apart from the some highly cosseted middle class children, spent a significant part of their childhoods playing either in the streets or the countryside, and suffering all manner of minor abrasions and bites over the years, it seems unlikely the risks were terribly high. Similarly, in the twentieth century, my friends and I, as children, would often be cut or scraped playing football, falling over or simply by indulging in pursuits common to children at the time. Yet I can recall none of us requiring antibiotics to prevent a possibly fatal infection.

I am not questioning the horror of such deaths but...

...I should very interested if anyone has any relevant statistics.

1 ★ Recommend Reply

Ian Whitlock 13 days ago

I had a resistant pneumonia infection 10 years ago and only the last but one drug available got on top of it. I was unaware of this problem and not feeling at death's door but my poor wife was! Very scary.

1 ★ Recommend Reply

Allison Laird 13 days ago

The multi-billion pound agribusinesses which place no value whatsoever on consumer-safe livestock rearing practices coupled with our (western) lifestyles which pretty much means 'what I want, how I want it, when I want it' will, coupled with absence of political will to do anything that would harm 'business', ensures the day will come when antibiotics will indeed lose their efficacy.
We'll die like flies. Serve us bloody right too.

5 ★ Recommend Reply

Derek Westwood 13 days ago

A fearful outlook! However 1 'old' antibiotic (vancomycin?) has been chemically adapted and now has 3 different actions making it difficult for a bug to survive! More use of multiple action antibiotics (either a singly or in combination) would help.
It would also be wise to stimulate the body's own systems, our fetish with cleanliness for example has resulted in less natural resistance being developed.
One problem is big business which probably wouldn't want its product used in combination with a competitors!
Antibiotic use in animals should be restricted to those which have a DIFFERENT action to those for human use.
Effluent from factories making drugs in India MUST BE FREE OF DRUGS to prevent resistance developing (as well as deformities in the fauna of the river).
A study of the infective organism's genetics could give an insight as to how resistance develops in an organism and therefore a possible line of attack.

1 ★ Recommend Reply

Martin Treacy 13 days ago

Very fine article - summarized the science/politics of this issue very effectively, and also a highly readable piece from a human interest perspective.

8 ★ Recommend Reply

Chris Oakley 13 days ago

Good article David. Thanks for reminding me that Sally Davis is not entirely useless despite her recent shameful and intellectually inept performance on behalf of the anti-alcohol lobby.

I am glad to see you back.

2 ★ Recommend Reply

Paul Hendy 13 days ago

Because of the repulsive ad hominem attack on you in a well known weekly periodical this week, I made a point of looking for your next article so that I could come on and praise it. As it happens, this excellent piece made it no hardship. Thank you.

19 ★ Recommend Reply

> **david aaronovitch** 13 days ago
> *@Paul Hendy* You're welcome, Paul. I hadn't seen that until you mentioned it. Rod does this regularly, ever since I reviewed his terrible book for The Times back in 2014.
>
> 14 ★ Recommend Reply

Lucid 13 days ago

"Penicillin was the start"
No it wasn't. Bacteriophages were being refined for thirty years before penicillins could be mass produced. Precision weapons in contrast to the indiscriminate power of antibiotics. Troops in the Red Army and the Wemacht both carried antibacterial phages in WW2. Now we need them again.
Come on, David, the use of phages in countering "superbugs" is not a secret. They have been trialled in the NHS and featured on the Today programme. News of this should have reached Islington by now.

2 ★ Recommend Reply

> **Ronald Brown** 13 days ago
> *@Lucid* Totally agree. They are on wikipedia, for example.
>
> Of course phages evolve much more quickly than bacteria. Why are not millions spent on research on them? The problem may be that there is not much money in them for the pharmaceutical industry!
>
> 3 ★ Recommend Reply
>
> **Sharon Bell** 12 days ago
> *@Ronald Brown @Lucid* It's really frustrating. The traditional sort of risk-based prospecting model of pharmaceutical production doesn't work well for antibiotics at all. For a start, the patent system gives an incentive for drugs to be marketed as hard as possible in the first 10 years of their life, when you want to do the exact opposite with antibiotics. We might get further having governments/UN paying pharma countries basically to do contract research, and then retaining the IP and keeping the drugs off the market until needed.
>
> Alternatively as an ex pharma process chemist I feel pretty sure that if someone opened up a not for profit in one of those abandoned pharma labs in the south east, there's a whole army of early retirees who'd happily come in and put in the odd shift for beer money.
>
> 2 ★ Recommend Reply

basilia 13 days ago

"We need to stop feeding them to farm animals in any but the most pressing circumstances, and for us consumers that means boycotting meats produced using antibiotics. For governments, it means trade regulations preventing imports of such meat." Michael Gove et al definitely need to keep an eye on this worrying aspect of Brexit.

9 ★ Recommend Reply

> **Richard Moffat** 12 days ago
> Exactly, if post-brexit trade deals undercut our farmers, it will be much harder for them to implement sustainable health plans that reduce the use of antibiotics in livestock.
>
> 3 ★ Recommend Reply

onthetreadmill 13 days ago

Candida albicans is not a bacterium, it is a fungus.

Surgery should only be performed when it is truly necessary. That is a mindset that surgeons now need to adjust to.

No comment made about the role of lifestyle and nutrition on the immune system. It was poor nutrition that historically led to so many dying from infection in circumstances such as the trenches of WW1.

2 ★ Recommend Reply

Appeasementisfatal 13 days ago

Of all the initiatives of NHS being undertaken I believe BMJ is conniving to sell off NHS. We need to make the public aware of government's intentions. There are many so called initiatives being promoted by the private sector in the name of NHS.

★ Recommend Reply

> **Alan Hawkes** 12 days ago
> Is this remotely part of the problem that the article is about?

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Recommend Reply

Appeasementisfatal 12 days ago

No. But I could not find any other relevant place to have my say.
I feel better that atleast you have noticed. Thank you.

Recommend Reply

Kathleen Mawer 13 days ago

There is much verifiable evidence that Vit C can cure most infections when administered in large quantity intravenously. It is not some new lab. produced answer and thus ignored. We are now able to make a lipospheric Vit C i.e. each molecule is encased in droplets of an oil and thus passes through the stomach without the upset it would have caused in large oral doses, making the intravenous route less essential. It can be absorbed from the gut very quickly. I was impressed by some of the evidence - a snake bite for which conventional medicine requires the name of the snake in order to treat it with an 'anti venom' can be treated with Vit C for any such bite. A small child was sent home from hospital 'to die at home'; the parents had heard of the Vit C treatment and were able to find a doctor willing to administer it. A week later the child was playing in the garden. A book "Curing the Incurable" goes into this and more in detail with references to research etc. I am not a qualified medical person, but I was lucky enough to come across this book. It explains that Vit C has a different effect when in large amounts. Other substances such as silver in a colloidal form, are also effective for some infections etc etc.

Mawerka

5 Recommend Reply

Norman K Lloyd 13 days ago

@Kathleen Mawer How do you get hospitals to administer intravenous Vit c? Do they have the ability to do this? Or do the powerful drug companies hold sway and they are scared of upsetting the powerful drug companies?

Coliform infections like UTI's are now almost untreatable.

Recommend Reply

Roz Blakeslee 13 days ago

Yes! This is the heart of the problem. Why isn't everything that will enhance our immune systems and bring us to not just "ok" but to substantial good health, ...available to us all through public health instead of being a threat to pharmaceutically driven medicinal practice. A statement, of course. Not a question.

1 Recommend Reply

Kathleen Mawer 13 days ago

@Norman K Lloyd @Kathleen Mawer It is unlikely that any UK hospitals are yet using this treatment, one can only hope that when the antibiotics really start to run out, someone with influence will put this forward. I think it may well be possible for someone to get treatment in the US but that would be no good in urgent cases. Many of the reports come from worldwide scientific examples of lab tests and and successful use, inc Russia! Whether it would be possible to get a doctor to supervise using high dose Vit C may be unlikely, they stick to current methods.
I can only advise you to try and get your hands on a copy of the book (ISBN 4010-6963-0) which mainly talks about injecting the Vit C, but has a chapter on the liposomic use which was still quite new. I got mine from www.altrient.com.

Recommend Reply

Roz Blakeslee 13 days ago

In the US I get liposomal C from Livestong.

Recommend Reply

onthetreadmill 13 days ago

@Kathleen Mawer Has your section expired?

2 Recommend Reply

Bloke 13 days ago

This is a really excellent piece of writing. Thank you.

AMR is beginning to look like a Malthusian check, or at least the horse on which Pestilence rides.

11 Recommend Reply

cecile 13 days ago

It would be a start if antibiotics were restricted - removed from the market. In many parts of the world they can be bought over the counter without prescription. Likewise, their routine use in animal husbandry must stop. Might buy a bit more time to develop new antibiotics.

16 Recommend Reply

Chris Frankland 13 days ago

We all die David. Simples.

1 Recommend Reply

cecile 13 days ago

@Chris Frankland Don't be ridiculous.

14 Recommend Reply

Chris Frankland 13 days ago

@cecile @Chris Frankland it was a joke. Ohhh dear. You sound like a laugh a minute.

2 Recommend Reply

Mr R A Adams 13 days ago

@Chris Frankland @cecile Really?

2 Recommend Reply

Appeasementisfatal 13 days ago

Medical profession is in as much in a mess as the Government is at present.
I saw my GP yesterday. Our surgery is of 4 doctors. For normal appointment you have to wait for 3 weeks. For urgent appointment you phone at 8am to book for one of the 10 appointments earmarked for that day. That are taken up within 10 minutes.
For all other emergencies you keep phoning and if you are lucky you may be offered telephone consultation.
Failing all, you head for A@E.
I did not see any GP running off their feet!
It seems to me another Brexit of NHS!

6 Recommend Reply

Patrick Hogan 13 days ago

@Appeasementisfatal
I am very sorry to hear that difficulties like this persist for NHS patients.

As I have some times commented, I have lived for some years in Germany where the situation is "healthcare via private health insurance regulated by the government".

In the UK, being retired, I paid little or nothing and received the standard NHS care. In my case, it proved adequate, though many grumble that it falls below what is needed.

Here in Germany, I pay the equivalent of 170 pounds each month but receive absolutely top class medical and health care, no matter what it entails or what it costs my health insurance company.

Were the systems here (and in the more prosperous EU countries) replicated in the UK, I presume that there would be fewer grumbles.

If the funding system is good and its controls strict, health care works.

I have the deepest forebodings about what will be the case in the UK, post-Brexit, as I cannot believe sufficient government money to fund what is presently on offer will be available for very long.

1 Recommend Reply

Roz Blakeslee 13 days ago

Austria as well. Excellent health care. Here in the USA I believe we are too corrupt to institute a pro human health single payer system.

1 Recommend Reply

Ian Chaplin 13 days ago

@Patrick Hogan @Appeasementisfatal I fear that no Government is strong enough to face up to the two large self interest lobbies, the electorate who will reject any expenditure on their part which is currently covered by other tax payers. the other is the NHS itself, which is very averse to any change in the way they have control over health in the UK.

3 Recommend Reply

Barbara Collier 13 days ago

Well, I think it's a great article. Thank you David, for highlighting one of the greatest areas of concern facing humanity.

42 Recommend Reply

Stephen Dunne 13 days ago

Maggie would say - Leave it to the market!

1 Recommend Reply

Gramarian Jul 29, 2017

Progress will be zero to do with politics and journos and their opinions - rather fundamental research into the the atomic mechanics of biology.

Looks like we were tossed an unlikely bone with CRISPR when it all seemed a bit difficult and onerous.

2 Recommend Reply

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