



Why reducing antibiotic use now is an imperative

November 27 2019

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Is there a scientific imperative to reduce antibiotic use in humans and or animals ?





The Everyday Misery of Antibiotic Resistance



Antibiotic Resistance- Story 1

Joan 56 years old

Monday has cystitis (again)

No better in a couple of days – sees GP Wednesday

Gives her an antibiotic (cephalexin)

Friday night – high temperature, vomiting, shivering, backpain

Calls out of hours GP – ? go to ED

Does not want to go to ED

Out of hours GP gives ciprofloxacin



Antibiotic Resistance- Story 1

Joan 56 years old

Sunday morning – worse

ED – blood and urine tests taken

Started on intravenous antibiotic (piperacillin/tazobactam)



Antibiotic Resistance- Story 1

Joan 56 years old

**Sunday evening – Laboratory says bacteria in blood
Not better maybe worse – microbiologist advises change
antibiotic to meropenem**

**Monday morning laboratory confirms blood has *E. coli* ESBL
Resistant to cephalosporins (what GP gave)
Resistant to piperacillin tazobactam (what hospital gave first)
Susceptible to meropenem (what she got on Saturday night)**



Antimicrobial Susceptibility Testing (AST)

E. coli from
Joan



Antibiotic Resistance- Story 2

Peter 62 years old

Has rheumatoid arthritis – on treatment

**Sunday morning – headache & mild nausea
(regrets Saturday night)**

Sunday evening – diarrhoea & feels miserable

Monday – temperature, bad diarrhoea, little blood – GP

GP gets a sample of diarrhoea

Drink fluids, rest and gives antibiotic (ciprofloxacin)



Antibiotic Resistance- Story 2

Peter 62 years old

Has rheumatoid arthritis – on treatment

Wednesday – diarrhoea worse, hardly able to get out of the bed

Lab result - Salmonella in sample

**Resistant to Ampicillin, Sulphonamide, Trimethoprim,
Ciprofloxacin**

Susceptible to Ceftriaxone, Azithromycin



Antibiotic Use Story 1

Tom is 32

Tom has a cough, sore throat, runny nose since Monday

He started to have green snot from his nose Thursday

He has a match on Sunday

GP – “I think I need an antibiotic”

**Haggling – he leaves with advice to rest, fluids, take paracetamol
and a prescription for amoxicillin**

Saturday – feeling a bit better

Why ?





Antibiotic Use Story 1

Tom is 32

Sunday – morning red itchy rash all over his face & body





Antibiotic Resistance/Use - Stories

Stories I am not qualified to tell about animal infection that does not respond to antibiotics that used to work and harm to animals from antibiotic they did no good





What has antibiotic resistance got to do with antibiotic use ?

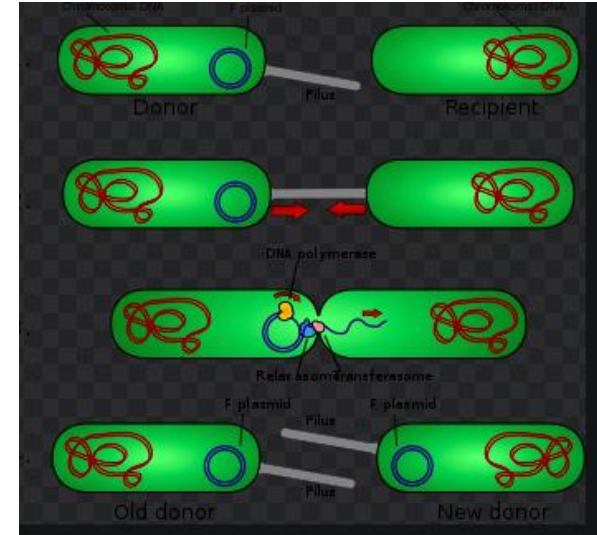


Bacteria like Mary's *E. coli* and Peter's *Salmonella* swap sets of genes (download updates)

Thousands of genes that code for resistance circulating among gut bacteria

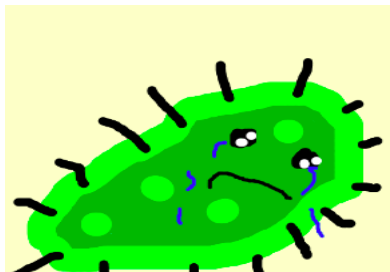
The genes often come from other places (water & soil bacteria)

The genes often travel as a package of different resistance genes (a memory stick)



Old fashioned *E. coli* and Salmonella – hard to survive

100s of thousands of tonnes of antibiotics and antibacterial agents



E. coli & Salmonella
that do not carry the memory stick

New & Flashy *E. coli* and Salmonella – life is good

100s of thousands of tonnes of antibiotics and antibacterial agents



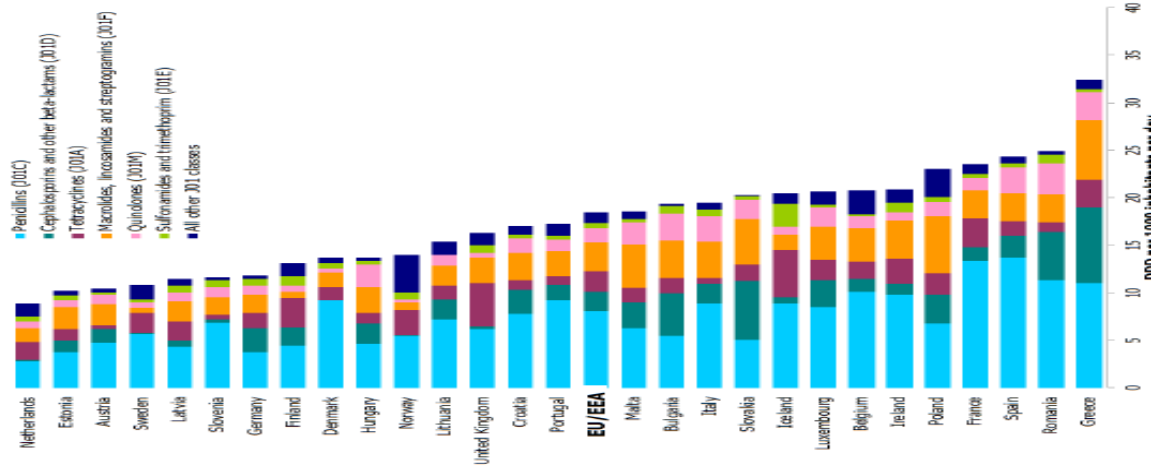
E. coli & Salmonella have the memory stick

If you use any file on the memory stick now and again it is worth carrying the memory stick



Doctors do not make Ireland a happy place for old-fashioned *E. coli*

Figure 2. Consumption of antibacterials for systemic use (ATC group J01) by country and ATC group level 3 in the community in EU/EEA countries in 2018 (expressed as DDD per 1 000 inhabitants per day)



What has story 2 it got to do with farming ?

Did Peter get his Salmonella from a farm ?

(probably yes)

Salmonella is primarily a food borne zoonotic disease

**How often do farmers use
Ampicillin, Sulphonamide, Trimethoprim or Ciprofloxacin**



Ciprofloxacin & the “class concept” ?

Ciprofloxacin belongs to a class /family – fluoroquinolones

**All fluoroquinolones hit bacteria on the the same chink in their
suit of armor (DNA gyrase)**

**Bacteria that make a patch for that chink are resistant all
fluoroquinolones**



What has story 1 got to do with farming ?

Did Joan get her *E. coli* from a farm ?

(probably not)

But the resistance “memory stick” her *E. coli* carries may be the same “memory stick” in animal *E. coli*



The Imperative / The Choice

Antimicrobial Resistance Science and Charles Dickens Christmas Carrol

Antibiotic resistance - Christmas Past – Not a problem

**Antibiotic resistance - Christmas Present – Misery & empty
chairs and**

Antibiotic resistance Christmas Future - Prediction & Choice



The Imperative / The Choice

Antimicrobial Toxicity

**Powerful but potentially harmful drugs for humans
? For animals**

**Giving drugs that do not work for the illness that is diagnosed is
no gain and a fair to good chance of pain**



The Imperative / The Choice

There may be a market imperative

There may be a moral imperative – animal & human welfare

**The objective in people and animals as much as necessary and
as little as needed**



Thank you

