

Antimicrobial Resistant Organisms Another “Inconvenient Truth”

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Thanks To

- Colleagues In NUIG, GUH, EHS, Public Health, Local Authorities, Irish Water, EPA, F of GWS
 - In particular
- Dearbhaile Morris, Carina Brehony, Balthnaid Mahon, Elaine McGrath, Wendy Brennan, Paul Hickey



**CURIOSLY ENOUGH, THE
ONLY THING THAT WENT
THROUGH THE MIND OF
THE BOWL OF PETUNIAS
AS IT FELL WAS OH NO,
NOT AGAIN.**

-DOUGLAS ADAMS



Hello ground!

*If You Did This Today You Probably Got
Poo On Your Hands
Do You Know How to Get it Off !*



For Those Who Have Not Heard Me Go On About This Before

•

- **1. Why should you care ?**
- 2. What is antimicrobial resistance ?
- 3. What has it got to do with water ?
 - 4. What can be done ?



Stories About People With a Bug Called "CPE"

50 Year Old Acute Pancreatitis. CPE acquired in Hospital.
3 weeks later blood stream infection with CPE. Multiple antibiotics none of them ideal. He survived.

40 Year old woman. CPE acquired elsewhere. Bladder infection. Previous Kidney Disease. Feeling miserable. Looking a hospital admission for treatment of cystitis (and not without risk)



What Is Antimicrobial Resistance ?

- This is **already** shortening lives and costing misery and money
- There is a high chance that it will harm someone you care about in the next 10 to 20 years (if it has not already done so)



Important People Think This Is A Big Deal

21 September 2016

New York

Secretary-General's remarks to High-Level Meeting on Antimicrobial Resistance [as delivered]

I am pleased to join you to address this important topic.

Antimicrobial resistance poses a fundamental, long-term threat to human health, sustainable food production and development.

It is not that it may happen in the future.

It is a very present reality – in all parts of the world, in developing and developed countries; in rural and urban areas; in hospitals; on farms and in communities.

We are losing our ability to protect both people and animals from life-threatening infections.



Plans: Global Action Plan

GLOBAL ACTION PLAN ON ANTIMICROBIAL RESISTANCE



Plans: National Action Plan



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Library of national action plans

A library of existing, publicly available national action plans on antimicrobial resistance has been compiled which countries may wish to consult. WHO will update this library regularly as new information becomes available on existing national action plans, and as new plans are published. WHO welcomes any additional information of relevance to existing and newly developed national action plans.

- [National Action Plans \(NAP\)](#)
- [A manual for developing national action plans](#)

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What Is Antimicrobial Resistance ?

- Antibiotic/Antimicrobials – kill bacteria and don't kill humans
animals
- Injected /swallowed to kill bacteria that are causing harm
- In 2017 a lot of bacteria are a lot harder to kill than they were in
1967 – antibiotics are much less effective



Status of AMR in Ireland



CPE: The Horse That is Half Out of the Stable

First the E = Enterobacteriaceae

E: = normal gut bugs

E: a group of bacteria that belong normally in the gut (normal colonisation)

But: Can get into urine (cystitis/pyelonephritis), gall bladder (cholecystitis) and blood (blood stream infection/septicaemia)



E (=Gut Bugs) are Harder to Kill

1986 – pretty to easy to kill them when they cause trouble (ampicillin and gentamicin with **ceftriaxone** as big gun)

1996 – getting harder to kill them (**ESBL**)
(ceftriaxone not so reliable- **meropenem** as big gun)

2017 – sometimes nearly impossible to kill them
(**CPE**)

(meropenem not sure – what is next big gun)



Now the **C** in CPE: What it is

C = Carbapenemase – an enzyme that destroys carbapenem antibiotics

Carbapenems (a family of antibiotics) meropenem is best know example



So CPE: What is it ?

C = Carbapenemase

P = Producing

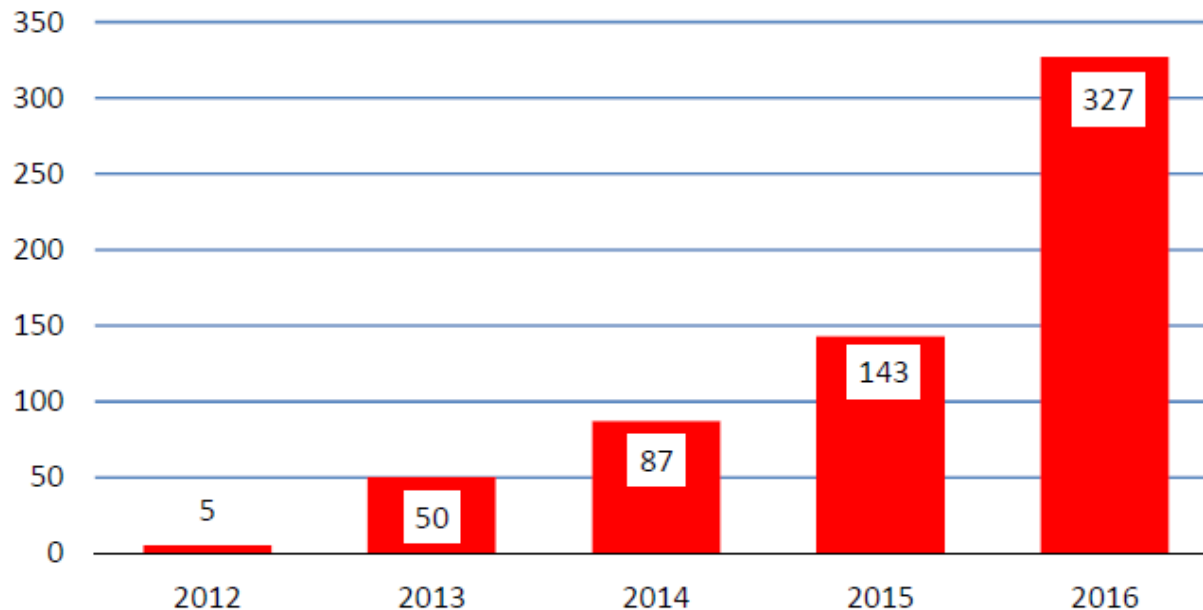
E = gut bugs

(Term **CRE** widely used means more or less the same thing most of the time)



CPE: The Scale of What We Know About

**Figure 1: Carbapenemases - Ireland Sept 2012 to
Dec 2016 CRE Ref Lab**



CPEs Come In Different Colours

(this is not an endorsement of smarties, Nestlé, or any other food high in refined sugar (although I do like smarties I like giant chocolate buttons even more but they are all the same colour so they were not suitable to illustrate this point)



OXA 48

KPC

NDM-1



www.alamy.com - E1030HP



CPE: A Different Kind of Pandemic

What is the Connection ?

Patient 1 has *Escherichia coli* CPE (**OXA 48**)

Patient 2 has *Klebsiella pneumoniae* CPE (**OXA 48**)

Patient 3 *Citrobacater freundii* CPE (**OXA 48**)

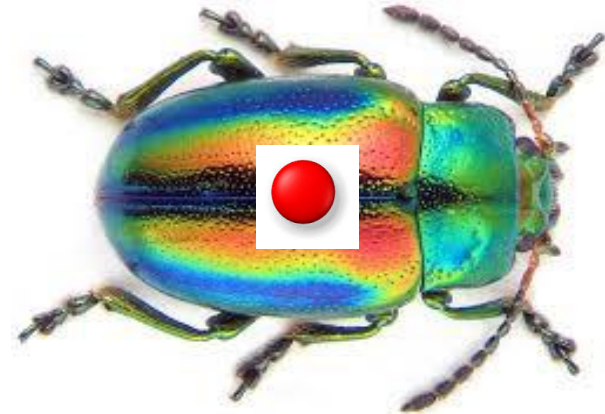
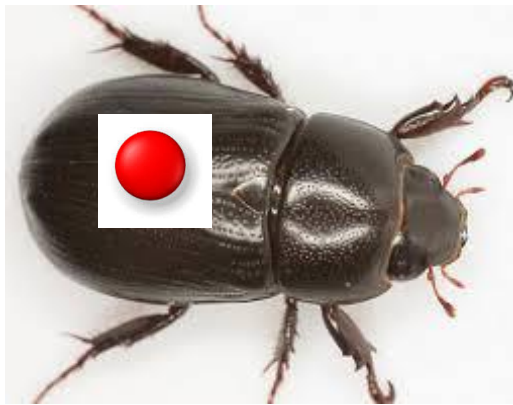
Three different species of bacteria

All carrying the same mobile piece of DNA



CPE: Epidemic Spread of a Piece of DNA

Three Different Kinds of Bugs All Carrying the Same Red Smartie



How Does CPE Spread



CPE – faecal oral spread

You get CPE by swallowing traces of someone else's faeces



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- **3. What has it got to do with water ?**
- 4. What can be about AMR?



What Has This Got To Do With Water ?

RAPID COMMUNICATIONS

Indistinguishable NDM-producing *Escherichia coli* isolated from recreational waters, sewage, and a clinical specimen in Ireland, 2016 to 2017

BM Mahon¹, C Brehony¹, E McGrath^{2,3}, J Killeen¹, M Cormican^{1,2,3}, P Hickey⁴, S Keane⁴, B Hanahoe³, A Dolan⁵, D Morris¹

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Citation style for this article:

Mahon BM, Brehony C, McGrath E, Killeen J, Cormican M, Hickey P, Keane S, Hanahoe B, Dolan A, Morris D. Indistinguishable NDM-producing *Escherichia coli* isolated from recreational waters, sewage, and a clinical specimen in Ireland, 2016 to 2017. *Euro Surveill.* 2017;22(15):pii=30513. DOI: <http://dx.doi.org/10.2807/1560-7917.ES.2017.22.15.30513>

Article submitted on 15 March 2017 / accepted on 12 April 2017 / published on 13 April 2017



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Where is it Coming From ? Human / Animal

CPE – almost certainly from humans

(because we do not think it has crossed over to animals yet)

Other AMR – harder to tell but molecular biology may provide answers (molecular source tracking)



So What

But does anyone really get CPE from water ?

We have no evidence that they do

But !



But !

It would be hard to know because they do not get sick at the time (and mostly never will)



But! Water is a Very Good Way of Mass Spreading of Faecal Microbes From Person to Person



But! Water is a Very Good Way of Spreading Faecal Microbes Between People In Ireland Also

Drinking Water
&
Bathing Water Outbreaks
&
Filter Feeding Shellfish



But! Water is a Very Good Way of Spreading Faecal Microbes From People to Animals: One Health



The One Health Triad



Summary

CPE Is The Biggest Immediate AMR Threat

Healthcare Is The Greatest Factor in Spread The Early Stages of a new AMR Organism

Contamination of Water is Likely to Contribute to AMRO escape into community, animals and food chain



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What Can Be Done Simple Really (like climate change)

- Use less antimicrobials
- Clean up our mess



Wicked Problem

- complex, open-ended, and intractable. Both the nature of the ‘problem’ and the preferred ‘solution’ are strongly contested.
(Brian W Head University of Queensland)

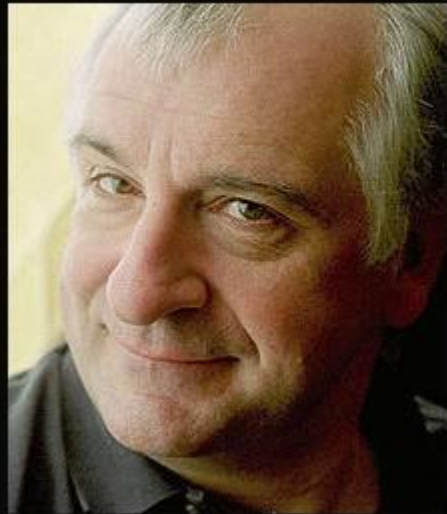


What Can You Do ?

- Talk to people about AMR
- Antibiotics are very valuable but drugs but with side effects
- Antibiotics you don't need are more likely to do harm than good
 - Harm to you : Diarrhoea/thrush/skin rashes
 - Harm to your neighbours and your children: Antimicrobial resistance



The Hitchhikers Guide



Human beings, who are almost unique in having the ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so.

(Douglas Adams)

izquotes.com

