The Carbapenemase Producing Enterobacteriaceae (CPE) Epidemic: The Sharp End of HCAI/AMR

Why it matters? / What it is?
What Can You Do About It?

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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.
What Am I Asking of You
(Hospital & Group CEOs and GMs)

1. If not already very high on you list of priorities to put it there
2. A hospital group IPC/Stewardship Committee chaired by the CEO
3. Help me find out about your current capacity and gaps
4. Some more information through the acute hospitals office (Therese Dalchan)
5. Implement the national policy on screening (if not already done)
6. Implement the national policy on meropenem restriction (if not already done)
7. Meet with me a couple of times a year and let me know in between if there are problems the national team can help with.
8. If you have outbreaks or major events please let me know
If You Did This Today
You Probably Got Poo On Your Hands
Do You Know How to Get it Off!
54 Year Old Man Acute Pancreatitis. CPE acquired in ICU.

3 weeks later blood stream infection with CPE. Multiple antibiotics none of them ideal. He survived.

38 Year old woman. CPE acquired in India. Bladder infection. One kidney. Miserable. Looking at hospital admission for treatment of cystitis (maybe OPAT)
Status of AMR in Ireland
Doing Better on AMR
(National Action Plan Required by WHO Developed by DOH)

1. Use Less Antibiotics (everywhere)

2. Get Better at Stopping the Resistant Bacteria From Spreading
Back to CPE: The Main Messages

CPE – faecal oral spread

If someone got CPE they swallowed traces of someone else’s faeces

That should happen a lot less often in health care delivery than it does
CPE: What it is

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 (co-amoxiclav with ceftriaxone as big gun)

1996 – getting harder to kill them (ESBL) (ceftriaxone not so sure: meropenem as big gun)

2017 – sometimes nearly impossible to kill them (CPE) (meropenem not sure – what is the 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

(The term CRE is widely used means more or less the same thing most of the time)
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
CPE: The Scale of What We Know About

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

Year:
- 2012: 5
- 2013: 50
- 2014: 87
- 2015: 143
- 2016: 327
CPE: The Scale of What We Know About

Fig 1: Carbapenamase Genes Jan - June 2017
CPE: The Scale of What We Know About

Fig 2: Distribution of Carbapenemase Genes by Species Jan - June 2017

- OXA-23
- OXA-58
- IMP
- VIM
- NDM
- OXA-48
- KPC
CPE: The Scale of What We Know About

Fig 3: Geographic Distribution of Carbapenamase Genes Jan - June 2017

- OXA-58
- OXA-23
- OXA-48
- NDM-1
- VIM
- IMP
- KPC
CPE: A Different Kind of Pandemic

JM on ward 1 has *Escherichia coli* CPE *(OXA 48)* January 15

MC on ward 3 has *Klebsiella pneumoniae* CPE *(OXA 48)* February 1

PD on ward 4 has *Citrobacter freundii* CPE *(OXA 48* February 17)

*And none of the three has an infection*
CPE: A Different Kind of Pandemic

JM on ward 1 has *Escherichia coli* CPE (OXA 48) January 15

MC on ward 3 has *Klebsiella pneumoniae* CPE (OXA 48) February 1

PD on ward 4 has *Citrobacater freundii* CPE (OXA 48) February 17

A piece of DNA (plasmid /transposon) moving so fast between bacteria that the name of the bacteria does not matter
CPE: Three Different Kinds of Bugs
All Carrying the Same Red Smartie
CPE: A Different Kind of Pandemic
How Did It Get from JM to PD?
Silent Transmission

JM on ward 1 has Escherichia coli CPE (OXA 48) January 15

E. coli – doctor hand – patient X – nurse – bed pan – patient Y – moved to ward 4 on February 6 – newspaper – PD in the next bed – DNA hops into Citrobacter freundii living in gut of PD

PD on ward 4 has Citrobacater freundii CPE (OXA 48) February 17
PD on ward 4 has Citrobacater freundii CPE (OXA 48) February 17

March 14 PD has a bone marrow transplant

March 19 fever, rigors, rising heart rate, falling blood pressure

Take blood cultures, start antibiotics but which ones?

If CPE is in his blood mortality is about 50%
Why Does It Matter If No One is Sick?

*N. meningitis* (meningococcus)

Probably less than 1 in 1000 people colonized with *N. meningitidis* gets sick

But we have a vaccination programme and chemoprophylaxis because it kills quite a few of the people who get sick.
Summary

• Antimicrobial /Antibiotic Resistance Massive Problem
• CPE is a creeping pandemic that is easy to overlook
• You can’t see it spread if you are not looking (and many hospitals are not looking hard enough)
• It is already shortening lives and costing misery and big money
• We are paying and we will pay more – the choice

Pay now to try to control it
Pay in perpetuity for our failure to control it
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