STH Board Infection Update

November 2015

Dr C Bates

CPE Infections

- Dame Sally Davies, Chief Medical Officer, made the following statement in January 2013

- *“It is clear that we might not ever see global warming; the apocalyptic scenario is that when I need a new hip in 20 years I'll die from a routine infection because we've run out of antibiotics."*

Really?

- This may seem far fetched
- However organisms that are resistant to almost all available antibiotics are already being detected within the UK including Sheffield
- The most worrying organisms at present are know as ‘Carbapenemase-resistant *Enterobacteriacae*’ (CPEs)

What are CPEs?

Carbapenemase producing Enterobacteriaceae

- **Enterobacteriaceae are also know as "Coliforms"**
- **Gram negative bowel germs, commonly responsible for urinary tract infections and abdominal collections**
- Include *E. coli, Klebsiella, Serratia, Enterobacter, Citrobacter, Proteus*
- **We all have large numbers of these germs, especially in our gut but also in moist areas including moist wounds**

What are CPEs?

Carbapenemase producing Enterobacteriaceae


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Chris Smyth Health Correspondent

Britain will lead a global fightback against

at an almost unthinkable scenario where antibiotics no longer work and we are cast back into the dark ages of medicine where treatable infections and injuries will kill

- **Carbapemenem antibiotics (e.g. meropenem)**
  - **Extremely broad spectrum of activity i.e. can kill many species of bacteria**
  - **Able to get into most body tissues e.g. head, bone**
  - **They have been the last resort antibiotic for Gram negative bacteria over the past 2 decades as resistance to other agents like cephalosporins and piperacillin-tazobactam has increased**
- **Carbapenemases are enzymes that destroy carbapenems**
- **The genes for these enzymes can be transmitted between bacteria**

Where do we find CPEs?

- MUCH more common in some parts of the world than others (Indian sub continent, China, Greece,South Europe, North America)
- Principally found in those with hospital exposure in most areas

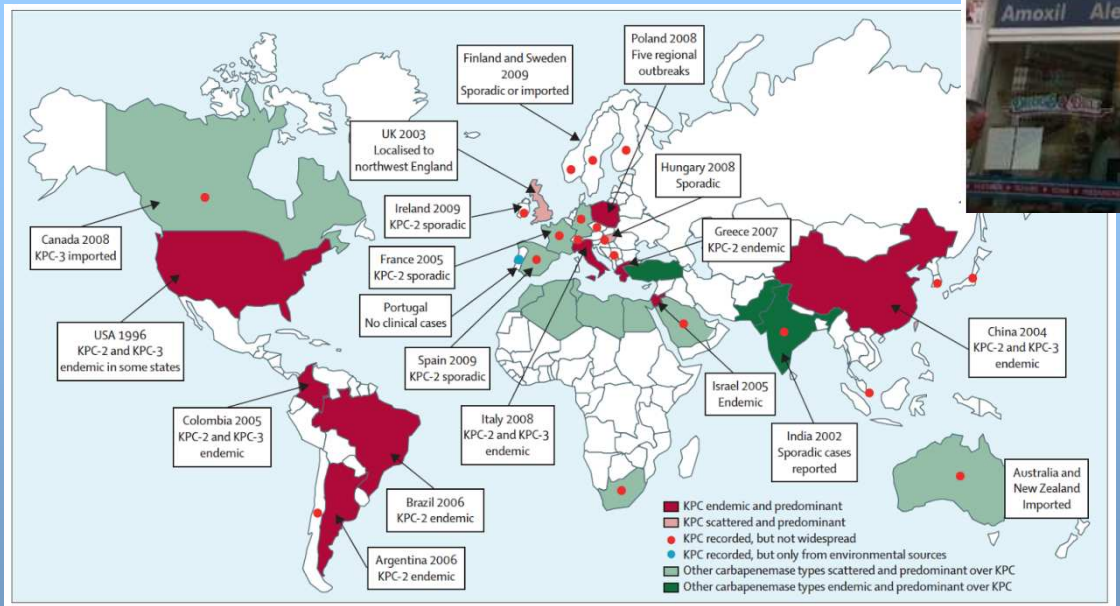
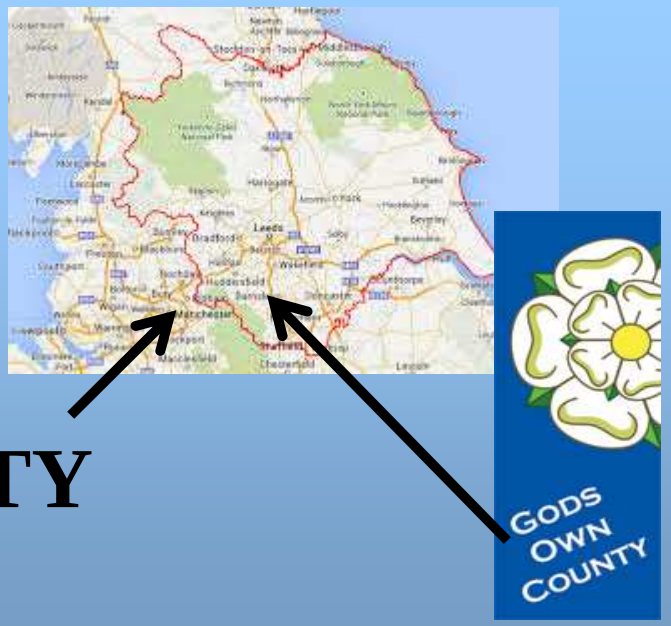


Figure: **Epidemiological features of producers of *Klebsiella pneumoniae* carbapenemases by country of origin**
Other carbapenemase types include VIM, OXA-48, or NDM. KPC=*Klebsiella pneumoniae* carbapenemase.

Carbapenemases - Where do they come from?

- Indian subcontinent
- Middle East
- Greece, Italy, Malta, Cyprus
- N Africa, Turkey
- Brazil

- Most significant pockets of high prevalence in the Northwest and London



Natural History of CPE colonisation

Day 0 – ingested in food or from hands

Day 21 – detectable in stool

More likely to be colonised if:

- On antibiotics
- Reduced gastric acidity

Not clear as yet how long patients remain colonised for

KEY POINT

Colonisation vs Infection

What is infection vs. colonisation?

- We contain more bacterial cells than human cells – **COLONISATION**
- **INFECTION** requires harm to be done to the individual – invasion, toxin, host response
- In the correct environment (i.e. the gut) CPEs are no more dangerous than their antibiotic susceptible cousins

Why are CPEs a problem?

- Most people identified with CPE are colonised but a) remain at risk of infection for as long as they are colonised and b) can spread to others whether colonised or infected

- **If infection does develop there are usually very few treatment options and often agents have nasty side effects**

CPE Organisms - Screening

- Identify carriers:
  - Screen all patients coming from ‘high-risk” areas both abroad and within the UK
- Incubate on meropenem containing plate
- Local confirmatory testing - steps take 2 days
- Send to reference lab for molecular confirmation - takes up-to 1 week
- **Therefore slow and need to take precautions in the meantime**
- **No treatment available to reduce or eliminate carriage**

CPE Organisms - What do the ward do if positive?

- Isolate patient
- Take particular care with bowel contents
- Wear gloves and aprons/gowns with the patient or their immediate environment
- Single patient use items should be used wherever possible
- Screen bay contacts – 3 screens, at least 3 weeks after last possible exposure

CPE Organisms – local data

Number of patients identified by the Sheffield laboratories	2013/14	2014/15	2015/16 to date
Infected with or carrying CPE	10	16	5
CPE thought to have been acquired within the STH	4	12	3

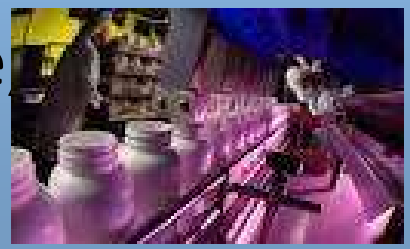
Actions in response to Rising Antibiotic Resistance

- Prevention is better than cure
- 'Old fashioned' therapies will become more important – e.g. surgery, quarantine, good basic hygiene, vaccination
- Debate needed re individual 'human-rights' re the greater good
- Needs a UK, Europe and world-wide approach as bacteria do not respect national boundaries and our modern lifestyles and trade aid in bacterial spread
- Be aware of and screen returning travellers

Actions

- Need to reduce antibiotic pressure (human and animal) to give ourselves time to develop news strategies and therapies but learn from experience with antibiotics.

- New diagnostic tests to determine if an infection is bacterial or not quickly, ideally also with sensitivity as well
- Incentivise pharmaceutical companies – not in their interests to develop a drug that people like me limit as much as possible and give only 3-7 days worth



Local Actions

- Culture shift
- Public expectation
- Reduce antibiotics prescribing locally including working with GPs
- Electronic prescribing useful
- Restricted antibiotic list
- Continue basic IPC strategies
- Screen all or various subsets of patients for certain organisms
- Label notes/electronic records of those known to have certain organisms
- Enhanced isolation for certain organisms
- Good environment – single rooms, bed spacing, air-flows
- Time to do basics right – including cleaning

Summary

- As a species we are likely to survive!
- We are not going to sterilise the planet
- We need to learn to live along side bacteria and when to intervene and when not
- In the ‘post-antibiotic era’ we will still have many advantages compared to our ancestors
- We may have to modify our expectations in the short/ moderate term
- Will are likely to see increasing numbers of patients dying of infection that would survive currently or with long-term conditions secondary to infection
- Longer term – new technologies – will they be in time?