Antimicrobial resistance – Surveillance of on-going problems and new threats

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Outline

- What and why?
  - What is AMR?
  - Why is surveillance needed?
  - What types of resistance are most topical?
- Surveillance of AMR
  - What surveillance is undertaken?
  - Statutory surveillance
  - Non-statutory surveillance
- What do my results mean?

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AMR – What and Why?

- Antimicrobial resistance is defined as the ability of a microorganism to withstand the effects of an antimicrobial drug
- There is a “rising threat” of AMR for both animals and humans
- There is increasing focus on the role of animals and the environment and the ways in which resistant bacteria or resistance genes can be transmitted between species
- Monitoring/Surveillance of AMR is important for identifying trends, patterns and emerging resistance in bacteria from animals

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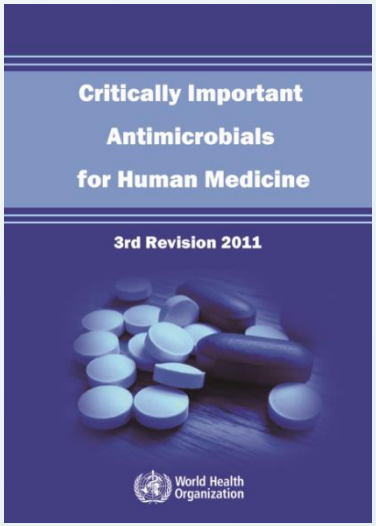
Critically Important Antimicrobials (CIAs)

- WHO list (3rd Revision, Oslo 2011)
- All antimicrobials used in human medicine worldwide classified
  - Critically Important (meets criterion 1 and 2)
  - Highly Important (meets either 1 or 2)
  - Important (meets neither 1 or 2)
- Highest priority CIAs are
  - Fluoroquinolones
  - 3rd and 4th generation Cephalosporins
  - Macrolides
- Veterinary list has been compiled by OIE



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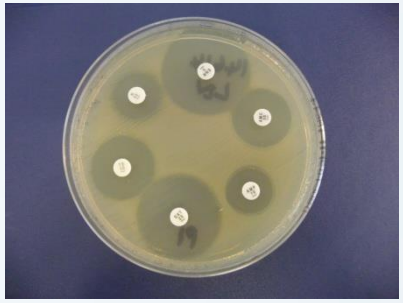
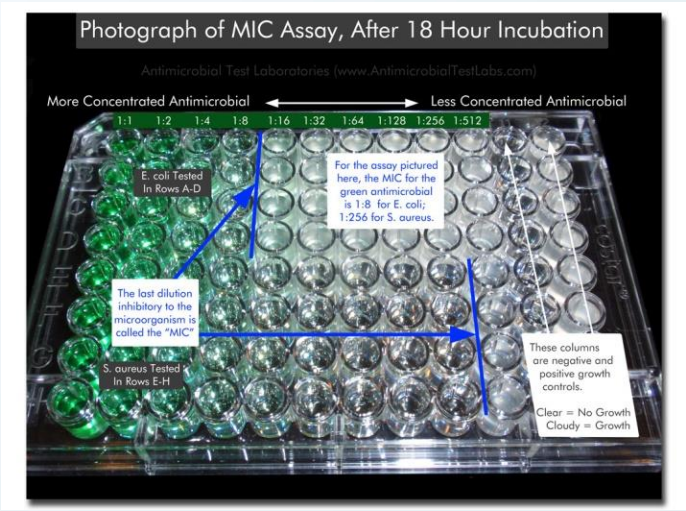
Current Surveillance

- Non-Statutory – scanning surveillance of clinical diagnostic samples.
  - Resistance panels determined locally
  - Disc sensitivity testing with some molecular confirmation for specific isolates



- Statutory programme
  - Samples, methods and Antimicrobial panels standardised across the EU
  - MIC method used
  - Salmonella
  - From 2014 EU requirement for additional testing of commensal *E. coli, E. coli* with specific resistance genes and *Campylobacter jejuni* in pigs, poultry, turkeys and some meat/food samples



http://www.antimicrobialtestlaboratories.com

- Discrete surveys e.g. UK pig abattoir survey 2013

- Surveillance results reported to practitioners, DARD, and through the North/South surveillance report and DARC.

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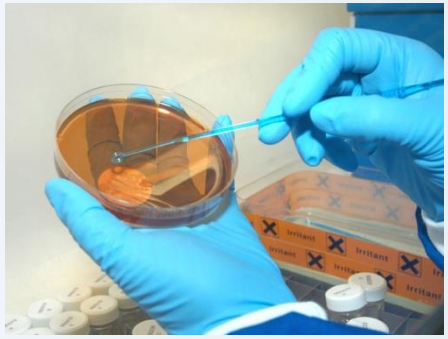
Salmonella

- *S.* Dublin and *S*. Enteritidis – level of resistance is low
- Majority of concern surrounds *S.* Typhimurium
  - Pentavalent strains
  - Currently monophasic derivative (since mid 2000's)
  - Fluoroquinolone resistance
  - ESBL resistance
- In GB resistance in Salmonella to 3rd/4th generation cephalosporins has been detected (ESBL resistance). Surveillance of all *Salmonella* isolates from animals in NI negative to date



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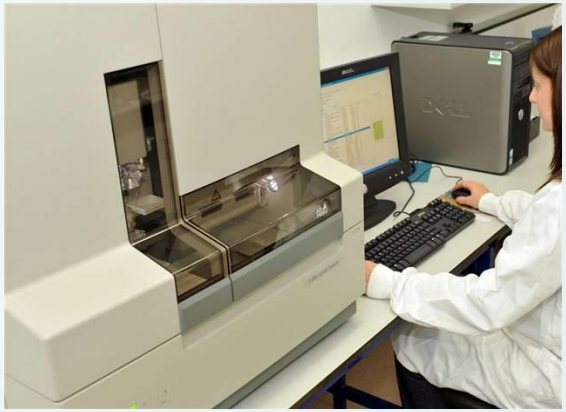
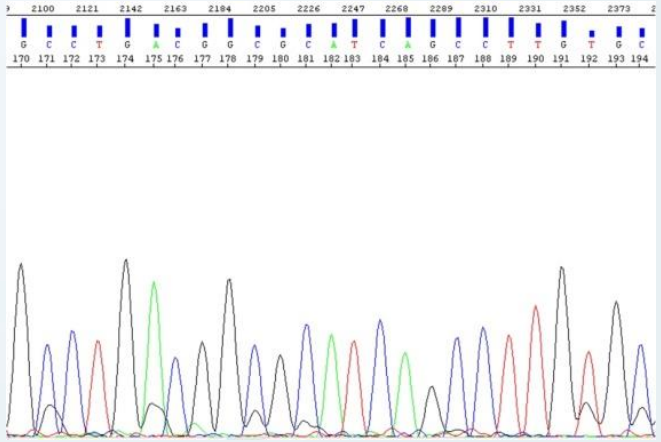
E. coli

- Main concerns in Gram–negative bacteria are resistance to Beta-lactam antimicrobials
  - Penicillins
  - Cephalosporins (especially 3rd and 4th Gen)
  - Carbapenemases



- 2004 - first report of a CTX-M E. coli from animals in the UK; calves in Wales (CTX-M-14)



- First report in NI was in 2008 (CTX-M-1) from diarrhoeic neonatal calves.
- Since 2008 CTX-M ESBL *E. coli* have been isolated from cattle and pigs in NI
- In 2013 out of 1584 isolates tested 16 confirmed CTX-M *E.coli* (mainly CTX-M 15). Twelve of these isolates were from samples from neonatal calves.

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MRSA

- When MRSA first emerged it was mainly a hospital acquired infection (HA-MRSA) and subsequently separate strains have been isolated in the community (CA-MRSA)
- Livestock associated MRSA (LA-MRSA) was first reported in The Netherlands in 2005. It has been detected in pigs, cattle and other livestock species. The first LA-MRSA detected in the UK was in turkeys (Dec 2013).

- MecC MRSA was first isolated in England in bulk milk samples in 2007. The earliest known isolate is from Denmark in 1975.
- In NI all *S. aureus* isolates are tested for resistance to cefoxitin which is an indicator of possible MRSA. Molecular confirmation is then required
- There has been 1 confirmed case of MRSA in NI from a horse in 2008
- Cefoxitin is not a reliable indicator of MRSP

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What do my results mean?

- Disc sensitivity testing needs to be standardised in order to produce meaningful results.
- Resistance is determined by comparison of zone size round the disc to pre-determined clinical breakpoints.
- Indicator antimicrobials are used e.g. enrofloxacin for the fluoroquinolone group
- Resistance to cefpodoxime in *E. coli* indicates probable resistance to all penicillins and cephalosporins. Confirmation of ESBL resistance may be reported subsequently.
- Cefoxitin resistance in a *S. aureus* isolate may indicate the presence of MRSA

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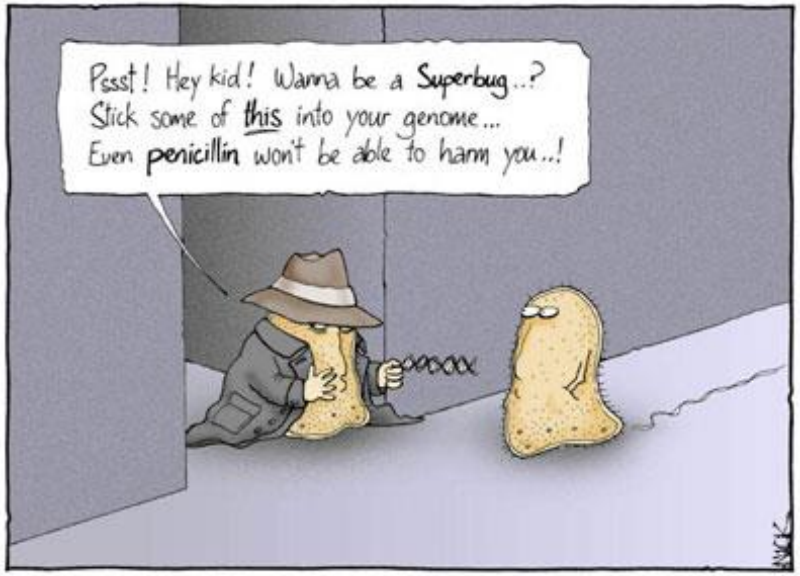
Summary

- Use of antimicrobials exerts a selection pressure which can act as a driver for the emergence and spread of AMR clones
- Surveillance is an important component of the steps to limit the emergence and spread of resistance
- It's more complicated than sticking a few discs on an agar plate!



It was on a short-cut through the hospital kitchens that Albert was first approached by a member of the Antibiotic Resistance.

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