

## **Antibiotic Resistance**

**Every time you use an  
antibiotic you exert  
selection pressure for  
resistance on pathogens  
and commensals**

### **resistance**

- in the animal being treated
- in contact animals
- in the owner
- in the environment / NZ population

## **resistance mechanisms**

- **drug does not reach its target**
  - Pseudomonas
- **drug is inactivated**
  - Staph aureus
  - E.coli
- **target is changed**
  - MRSA
  - streps

## **resistance**

- **intrinsic**
- **acquired**

## **resistance genes**

- **chromosomes**
- **plasmids**
- **transposons**
- **integrons**
- **gene cassettes**

## acquired resistance

- **conjugation**
  - coliforms
  - cocci
- **transduction**
  - Staphs
- **transformation**
  - cocci?

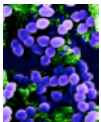
## resistance

- **pathogens**
- **commensals**

## human pathogens



- **MRSA**
  - Methicillin resistant *Staph. aureus*



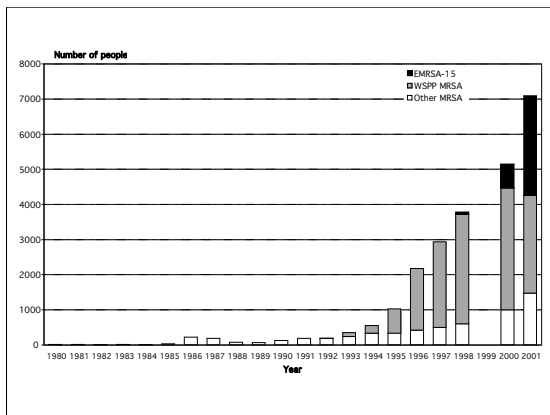
- **VRE**
  - Vancomycin resistant enterococci

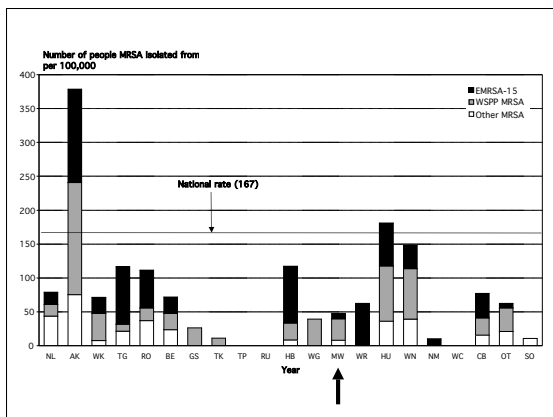
## MRSA

- **14% SA isolates 2001**
- **Western Samoan phage pattern**
  - 39% MRSA isolates 2001
  - community acquired
  - Pacific islanders
  - Auckland
- **epidemic MRSA 15**
  - 40%MRSA isolates 2001
  - from UK
  - acquired in hospital

## MRSA 2002

- **EMRSA 15 (UK)**
  - 67.5% isolates
- **AKh4 (Aus)**
  - 12.3%
- **WR/AK1**
  - 7.1%
- **WSPP (Samoa)**
  - 2.1%
- **EMRSA 16 (UK)**
  - 1.9%





## VISA

- vancomycin intermediate *Staphylococcus aureus*
  - 2 isolates this year
  - MRSA patients treated with vancomycin

## VRE

- 15 human isolates in NZ so far
- chickens in Otago

### **animal *Staph aureus***

- **more resistant than human to**
  - clindamycin / licomycin
  - co-trimoxazole
  - fluoroquinolones
  - gentamicin
  - tetracyclines

### **animal *Staph aureus***

- **fluoroquinolone resistance**
  - 1999 - 0%
  - 2000 - 6.6%
  - 2001 - 12.5%
  - mostly dogs

### **food poisoning**

- **Salmonella spp (DT104)**
  - rare in NZ
    - 39 human & 3 animal isolates 1992 - 2001
- **Campylobacter**
- **E.coli O157**
- **(Shigella)**

## **fluoroquinolone resistance**

- **Salmonella spp (DT104)**
  - NZ 1998 0%
- **Campylobacter**
  - no figures
- **E.coli (all)**
  - animals 2000/1 2.4%, 1999 0.9%
    - 2001 4.3% dog isolates
  - people 2000 1.3%
- **(Shigella)**

## **TB**

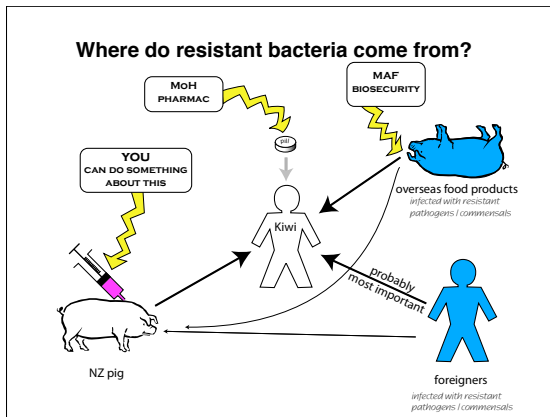
- **2002 0.6% MDR, 13% single drug resistant**
- **most cases in people born overseas**

## **TB drugs**

- rifampicin
- clarithromycin / azithromycin
- ethambutol
- isoniazid
- pyrazinamide
- streptomycin

## veterinary pathogens

- ***Pseudomonas aeruginosa***
  - large genome
  - lots of drug efflux pumps
  - lots of redundant systems
  - common after inappropriate antibiotics
  - causes problems in people too



## controlling resistance

- use drugs to which significant resistance is unlikely to develop
- infection control



## **4 yr old bull terrier**

- **scratching ears**
- **previously treated**
  - broad spectrum antibiotics
  - steroids
  - acaricides



**What do you do?**

## **antibiotic treatment**

- are the bacteria sensitive to the drug?
- does the drug get to where the bacteria are?
- is significant resistance likely to develop?

## **What do you do?**

- check for generalised skin disease
- culture and sensitivity?
- flush and check ear
- parenteral antibiotics?
- parenteral steroids?
- non-antibiotic treatment?
- alter environment?

## **reducing resistance**

- Choose a drug on resistance testing, where practicable.
- Use narrow spectrum antimicrobials whenever possible.
- Use the full effective dose for as short a period as possible.
- Isolate the patient (and wash your hands / gumboots!).
- Use antibacterials not prone to producing resistance.
- Restrict the prophylactic use of antimicrobials to high risk patients only.
- In chronic care patients, regularly (but not frequently) change antimicrobial drugs.
- With aminoglycosides, use the longest effective dosage interval.