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**

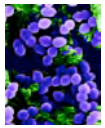
acquired resistance

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

resistance

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

human pathogens



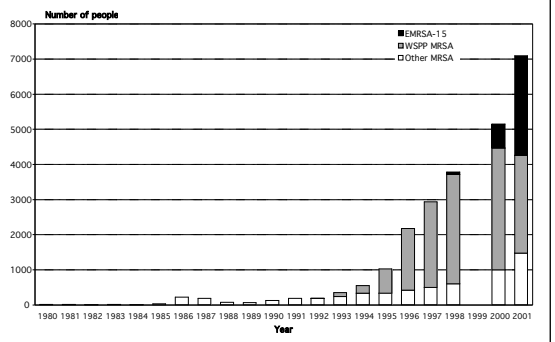
- **MRSA**
  - Methicillin resistant *Staph. aureus*
- **VRE**
  - Vancomycin resistant enterococci

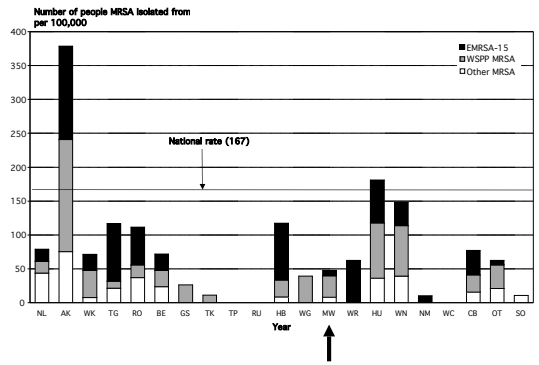
MRSA

- **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**

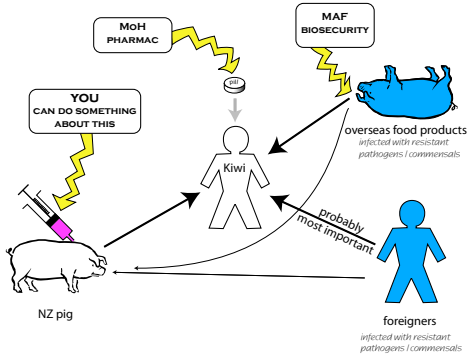
TB drugs

- **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

Where do resistant bacteria come from?



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.