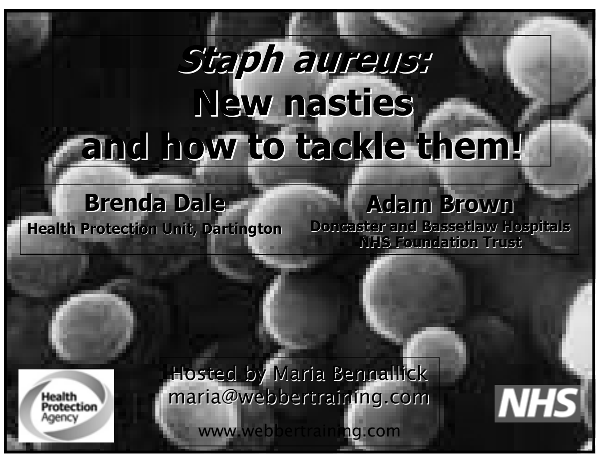


Overview

- What is PVL and how does it work?
- What is the situation in the SW of England?
- Experiences of managing this in the real world.
- What about MRSA?
- Are we all doomed?

Virulence Factors

Products that enable a bug to establish itself on or within a host, and enhance its potential to cause disease.

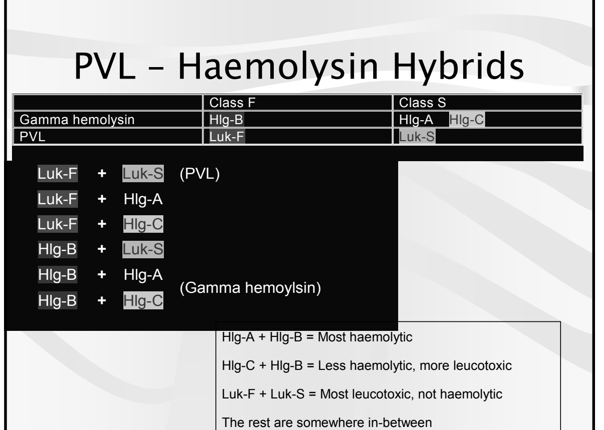
Staphylococcal Toxins

- Help to modulate pathogenicity
- Wide selection that do different things:
  - Enterotoxins: Food Poisoning
  - TSST: Toxic Shock Syndrome
  - Haemolysins (and others): Enable bug to feed off host (haemolysis)
  - PVL: Toxic to leucocytes

Panton-Valentine Leucocidin

- Synergohymenotrophic toxin
- Gamma-haemolysin (~100% strains)
- PVL (2-5% strains)
- Bi-component toxin, can share subunits with Gamma-haemolysin
- Spectrum of hybrid toxins

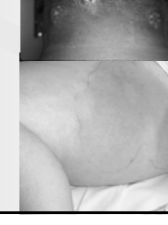
PVL - Haemolysin Hybrids



	Class F	Class S
Gamma hemolysin	Hlg-B	Hlg-A Hlg-C
PVL	Luk-F	Luk-S

Clinical Implications

- Kills polymorphs & macrophages
- Causes tissue necrosis - skin, lungs, soft tissue
- 2-5% of all isolates.
- % by type of infection:
  - Furunculosis: 93%
  - Cellulitis: 55%
  - Cutaneous Abscess: 50%
  - Osteomyelitis: 23%
  - Finger-pulp infection: 13%



Clin Infect Dis. 1999; 29: 1128-32

Clinical Implications

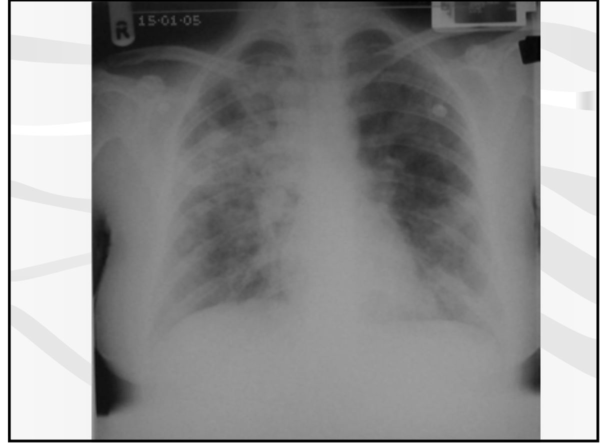
- Can rapidly cause fulminant infection
- Severe necrotic haemorrhagic pneumonia
  - Usually community-acquired
  - Usually young & fit
  - Mortality >75%
  - It is the toxin that does the damage

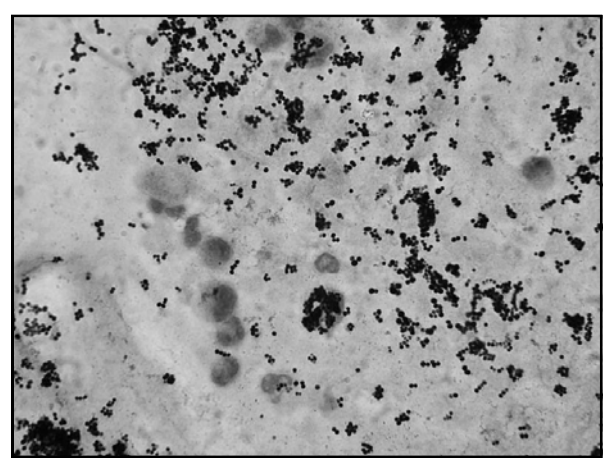
Clinical Implications

- Lancet 2002; **359:** 753-59:
  - 8 cases of CAP due to PVL+ve *Staph aureus*
  - 6 fatal
  - Young healthy children & adults
- J Clin Micro 2001; **39(2)**: 728-9
  - Infant, breastfed
  - Mum had furunculosis
  - Baby -> periorbital cellulitis -> pneumonia
  - Survived after partial lung resection

Pneumonia – Case Study

- 30 yr old woman
- Fit & Well
- Flu like symptoms
- Rapid onset pyrexia, hypoxia, shock, haemoptysis, tachycardia, dyspnoea
- High CRP, low WCC



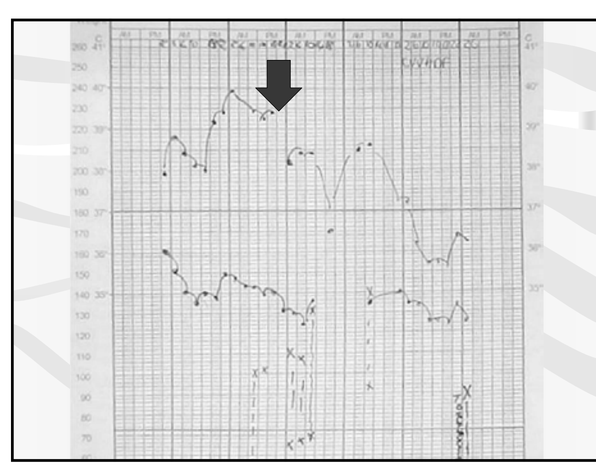


Pneumonia – Case Study

- Sputum grew *Staph aureus*
- So did blood cultures

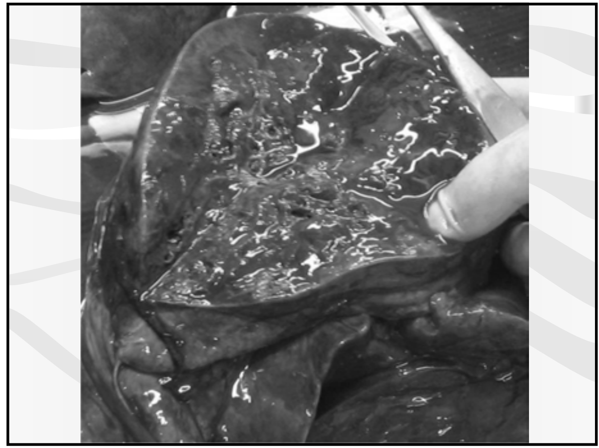
So…

- Heroic antibiotics & pan-European input!
- Immunoglobulin 2g/kg
- Intensive Care



Pneumonia – Case Study

- Apyrexial
- Culture negative (sputum, blood) at 24hrs
- Stabilised for several days
- Deteriorated, harder to ventilate
- RIP



PVL in SW England

- Marine Camp:
  - Sensitive strain
  - Lots of soft tissue infection (often trauma related)
  - One fatality

PVL in SW England

- The 'Plymouth Strain'
- Multiresistant (NOT MRSA!):
  - Methicillin sensitive
  - No evidence of *Mec*
  - Always resistant to gentamicin
  - Majority resistant to trimethoprim
  - Usually resistant to macrolides
  - Many resistant to quinolones and fusidic acid
  - Some resistant to tetracyclines

PVL in SW England

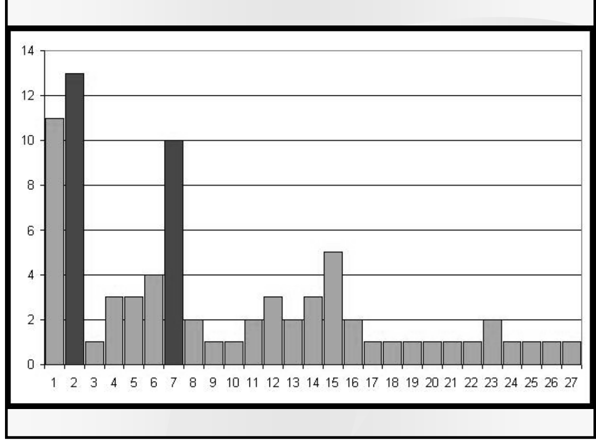
- Plymouth (April 1997 – Nov 2004):
- 315 patients (some with many samples)
- 2d – 99yrs
  - 134 from GPs
  - 16 from Surgical Assessment Unit
  - 21 from A&E
  - 18 from CCDC
  - Remaining from surgical wards

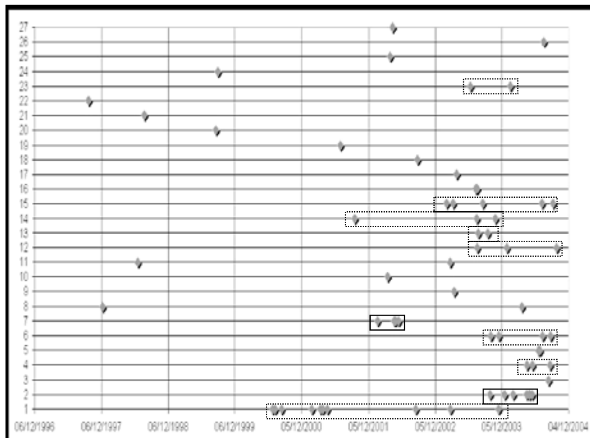
PVL in SW England

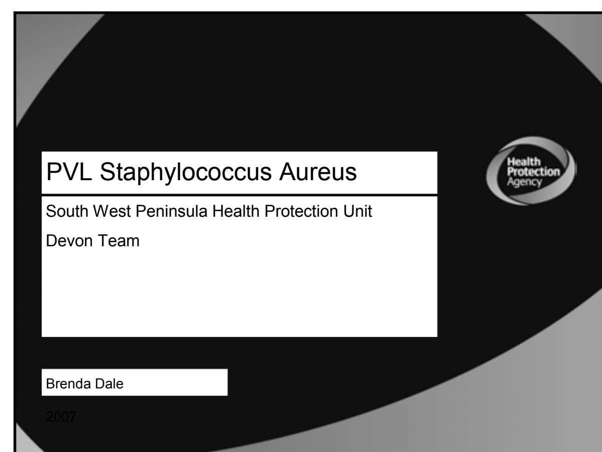
- Boils & abscesses
- 10 sputum +ve
- 5 cystic fibrosis – well
- 4 pneumonia (3 fatal, all elderly)
- Outbreak of mastitis in Derriford Hospital (the only nosocomial cases)

PVL in SW England

- Likes nursing homes.
- 27 different nursing homes!
- 1st NH isolate in Sept 1997.
- 10 Nursing homes with 2+ cases.
- 2 of these notified as outbreak.







Outbreaks in care homes in Plymouth

4 Outbreaks (1 home treated twice)

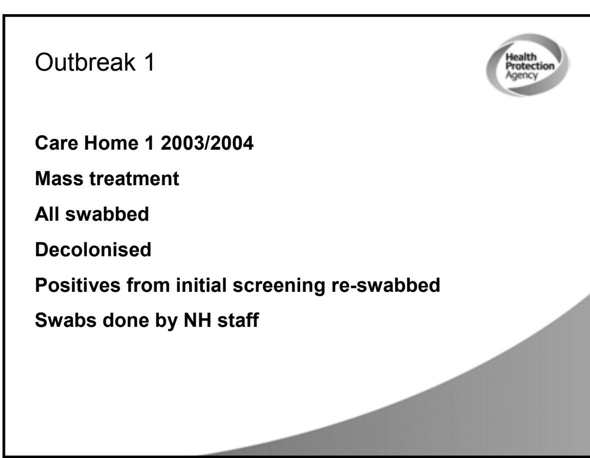
Review of state of hygiene and infection control measures

Mass decolonisation treatment

Screening for carriage

Liaison with Microbiologists, PCT, GPs

National guidance



Outbreak 2

- Residential home September 2005
- 1 death from PVL Pneumonia
- Enquiries revealed cases with boils
- Swabbed by HPU nurse 90 +
- Mass decolonisation treatment
- Those still colonised at first screen retreated
- Problems - some EMI clients non compliant with treatment
- No further cases to date

Outbreak 3

- January 2006
- Care home 1 – further cases
- 1 staff member and 2 clients confirmed PVL decolonised and treated
- Re-swabbed by NH staff and MSSA identified no further PVL

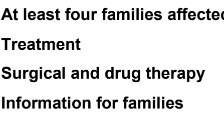
Outbreak 4

- Nursing/Residential Home
- 2 year history of boils/abscesses in staff and clients
- Recognised by DN
- ?Index case linked with Derriford Hospital mastitis outbreak 03
- Mass decolonisation then screening – in progress results awaited

Isolated cases in care homes

- Information regarding organism
- Transmission
- Cleaning
- Linen
- Equipment

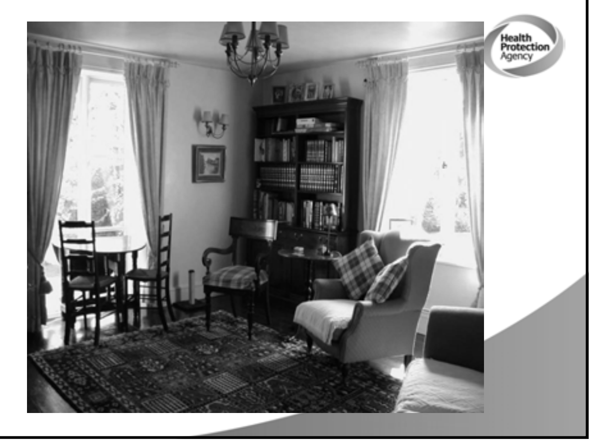
Families



- At least four families affected
- Treatment
- Surgical and drug therapy
- Information for families
- Support

Issues with care homes

- Poor standard of infection control measures
- Environmental hygiene is generally poor
- Not recognising outbreaks
- Lack of compliance with PPE



Issues for HPU

Increasing problem in the region

Particularly Devon? Or better recognised ('Plymouth strain')?

GP newsletter/ care homes

Recent national guidance – welcome, but needs development

Regional Microbiology Forum - > working group

Burden on resources

- **lab staff, microbiologist**
- **HPU**
- **Care home**

What's this got to do with MRSA?

- PVL +ve MRSA strains exist.
- Community strain(s)
- Not related to hospital strains.
- On the increase –
  - USA
  - Canada
  - France
  - Germany
  - United Kingdom

PVL +ve MRSA

- *CID* 2005; **40:** 100-7
  - 4 patients
  - 20-52 yrs
  - 25% mortality
- *N Engl J Med* 2005;**352:**1445-53
  - Los Angeles 2003-4
  - 14 cases of nec. Community-acquired pneumonia
  - 28-68 yrs, 71% male, 43% current or past IVDU
  - No deaths!

PVL +ve MRSA

- France 2000[1,2] – >14 cases
  – Also Germany, Norway
- Alaska 2000[3] – 34 cases linked to sauna
  – Soft tissue infections

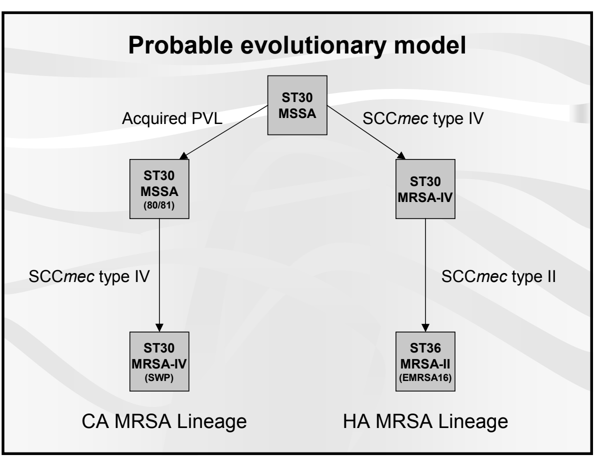
1. *Clin Infect Dis* 2002;35:819-24
2. *Euro Surveill* 2004;9(1):16-8
3. *J Infect Dis* 2004;189:1565-73

PVL +ve MRSA

- Steam Rooms of California
- San Francisco jail outbreaks (2001)
- University athletes of LA

PVL +ve MRSA

- CA MRSA – not the same pedigree as HA MRSA
- ?Descended from 80/81 strain
- Scourge of 50's – 60's
- Eliminated by use of methicillin & fluclox
- Subsequently found to be PVL+ve



Are we all Doomed?

- Undoubtedly a successful strain
- Ecology of MRSA is always changing
- Be aware
- Watch this space – pandemic influenza

(I am a pessimist by the way)