

NIH, USDA, CDC, EPA, FDA, HHS

An emerging infectious epidemic in people from livestock???



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Opening the Gates for Farmer Health

National Center for Farm Health

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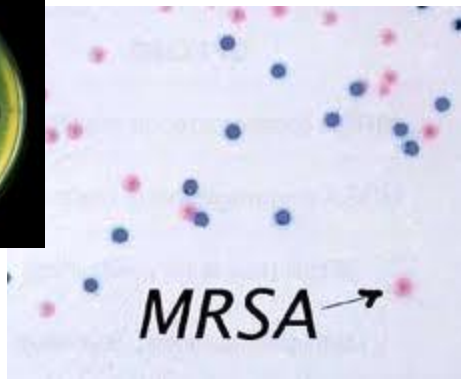
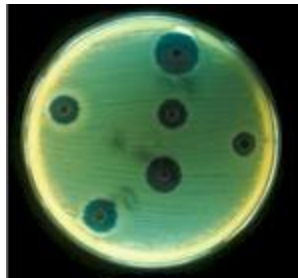


Objectives

- What is MRSA?
- History and Epidemiology
- Should we be concerned?
- Significance for animal agriculture
- Significance for Farmer health
- Treatment
- Research on going at University of Iowa
- Questions for the future

Methicillin Resistant Staphylococcus aureus MRSA

What's all the fuss about MRSA!



What is MRSA (Methicillin Resistant *Staphylococcus aureus*)?

- The “super bug”
- Since 1981 in the U.S.
- Resistant to Methicillin and often several other betalactams (penicillin group)
- Tetracycline resistant also common-swine
- Initially hospital acquired. Now community acquired and animal associated as well.
- 1% of the general population are carriers



History and Epidemiology

1970's – Mastitis in Dairy Cow (DeVrise, 1975)

1980's – Hospital acquired infections (HA MRSA)

1990's - Community Acquired infections (CA MRSA)

- Athletics and facilities
- Nursing homes
- Child care facilities

2000's – Livestock Associated MRSA (LA MRSA) (Smith 2010)

- Dutch Child and Veterinarian infected (Huizsdens 2006)
- Pigs, Cattle, Poultry,

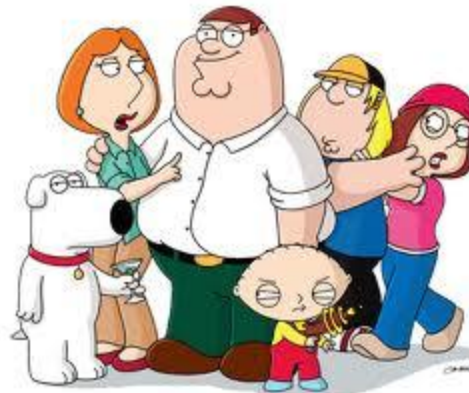


Livestock Associated MRSA (LA MRSA)

- A distinctive ‘Spa type’ – (LA MRSA = ST 398)
- Human carriers common; serious disease rare
- Animal carriers common; disease rare (outside of mastitis in dairy cows)
- Most ST 398 strains do not have serious toxins
- However, many ST 398 strains, and genetic transfer of toxin genes are possible
- It is not know if livestock or people are long term or temporary carriers

MRSA in animal populations (this is an Amphizoonosis)

- Horses, Cattle, Pigs, poultry, Dogs, Cats,
- A distinctive ‘Spa type’ – ST 398
- Transmission between animals and workers and family members and community documented (Curry 2009)



<http://img.photobucket.com/albums/h312/wallpet/mrsaindog2.jpg>



Why should we be concerned?

A Public Health issues ? A livestock production issue?

1. A window into antibiotic resistant bacteria generally?
2. An occupational health issue?
3. An public health issue?
4. It is in the public media and agriculture
Could be held accountable
5. A livestock production issue?
6. Present almost world wide



Why should we be concerned about MRSA?

Antibiotic Resistant bacteria

1. Human Disease that is difficult to treat
2. Hospital Acquired
 - a. 94,000 (US)
 - b. 18,000 deaths (US)
 - c. MRSA head and neck infection in kids increased from 12% - 28% (01 – 06) (Sobel 2009)
3. Community
 - a. 1% of US population colonized
4. A Window/ reservoir to the larger picture of antibiotic resistance



Significance for Agriculture

- Animal Health Problem?
 - Mastitis in cattle – 1970's
 - Carriers in pigs (40%), calves, Poultry, Horses, in N America, Europe and Asia
 - Not a large obvious clinical veterinary Problem at present
- An occupational health problem?
 - High 40% of livestock farmers and veterinarians are carriers
(Smith, 2009)
- Public Relations Problem – YES!
 - e.g. H1N1, Salmonella, E coli H157



Significance for Famer Health

Possible Farmer, family, worker health?

- Occupational and Public infections more common in Europe (LA MRSA = 20% of human cases) VanLoon 2007
- No reported human livestock MRSA in US at Present
- Mainly skin infections, but septicemia, pneumonia, head and neck abscesses, also
- Not a huge occupational problem generally at present
- Transmits within family



Significance for Public Health risk?

- LA MRSA seems to be “spreading” into the general community.
- 20% of MRSA in Netherlands is ST 398
- Sources include Meat and Poultry
- Air from Animal facilities
- Person to person spread



MRSA – Treatment

- Drainage and dressing
- Alternative antibiotics for Community acquired:
 - Trimethoprim/sulfamethoxazole (Bactrim)
 - Clindamycin
 - Gentamycin
 - Rifampin
- Decolonization – mupirocin (bactroban)
- Request SPA typing of MRSA isolates

Research ongoing at Iowa

- Prevalence in livestock populations (smith, 2009)
 - 45% CAFO Farms +, 0/14 organic farms
 - Pigs (40% of pigs sampled)
 - Poultry ?
- Prevalence of human cases of LA MRSA
 - Questionnaire data = 3% of workers had clinical infections (Leedom-Larson, 2010)
 - Case finding mechanisms from Physicians
- Mechanisms of transmission
 - Air – inside and outside of swine barns
- Prevention of transmission
 - Shower facilities (leedom-Larson 2010)
 - Dust Masks
 - Biofilters



U. IA. Research on MRSA

Tara Smith PhD, Mike Male DVM, Dwight Ferguson,
Kerry Leedom DVM, MPH, Kelley Donham DVM

- With funding from IPPA and The Great Plains Center for Agricultural Health, U. IA.
- How common is it?
- What is its ecology?
- Is it an important occupational or public health concern?
- Biosecurity Issues?
 - Where does it live in swine buildings?
 - How do we prevent its spread?

Questions for the future

- Presence of LA MRSA in Australia?
- Ecology of MRSA
 - Are animals or people long term carriers
 - Disease burden in Animal and human hosts?
 - Relationship to antibiotic use in Livestock production?
 - Toxic producing genes in LA MRSA?
- Risk of a antibiotic resistant reservoir?

Summary/Take home message of LA MRSA

- It's Probably present in Australia if one looks for it
- Health and veterinary professionals should request SPA typing of MRSA strains
- It is apparent that farm animals and farmers are a reservoir for MRSA
- Currently an apparent low burden of human and livestock disease (lack toxin producing gene)
- There are new strains developing in the animal population
- Relationship to antibiotic use in livestock not certain at present
- The occupational and public health risk is not known, but active research is ongoing.

MRSA, MRSA,

- The nose knows all
- Stay tuned
- Stay informed

Thanks for all you do!

Kelley Donham DVM

