Zoonoses - Current & Emerging Issues

HUMAN HEALTH & MEDICINE

VETERINARY HEALTH & MEDICINE

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Scope

• Zoonotic Disease
  – What is it?
  – Why is it significant?

• Current Issues & Future Threats

• Questions and Answers
A Zoonosis is defined by the World Heath Organisation as: “Those diseases & infections which are naturally transmitted between vertebrate animals and man.”

- Plural – Zoonoses
- Adjective - Zoonotic
Zoonoses - Characteristics

- Can cross the species barrier
- Causes clinical disease
- Threat
  - Ease of transmission
  - Pathogenicity
  - Potential
Types of Causative Agent

- Bacteria
- Fungi
- Helminths
- Prions
- Protozoa
- Rickettsia
- Viruses
Mode of transmission

- Aerosol
- Blood, Saliva
- Faeces, Urine
- Fomites, Skins, Hair
- Food, Milk, Meat
- Oral or Physical contact
- Parasitic Vectors
- Scratches, Wounds
- Water
Main Risk Groups

- Animal handlers
- Children
- Elderly & Infirm
- Food Industry workers
- Immuno-compromised
- Pregnant women
Drivers for Preventive Action

Commercial farming
- Healthy Animals = Healthy Profits
- Low Disease Load = Cleaner Produce

Public Health
- Reduce risk of serious illness or death
- Reduce cost to NHS of treatment
Current Risks & Future Threats

The turkeys have bird flu. The cows have mad cow disease.
I'm telling you, boys... unless we want to see more ham served on Thanksgiving, we're going to have to get our own disease!
Current Risks - Emerging Diseases

- 80% of Emerging disease assessed as zoonotic
- Mostly viruses however other diseases which were once considered to be eradicated may re-emerge
Lyme Disease

Lyme Disease - Three Year Tick Lifecycle

- In early summer, adult female tick attaches and feeds on large mammals including humans.
- Overwintered larvae become nymphs and feed on larger mammals.
- After hatching, larva feed on small birds and mammals.
- Year 3: Eggs Laid
- Year 2: Eggs Hatch
- Year 1: Nymph

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Disease Details

• Causative – *Borrelia burgdorferi* (afzelii)
• Notifiable disease in both England & Wales (RIDDOR) & Scotland (Public Health)
• Initial symptoms usually include dermatological manifestations – incl *erythema migrans*
• Neuroborreliosis may follow, with facial palsy, meningitis, cranial nerve damage and peripheral neuropathies
• Chronic dermatological conditions and arthritis may also occur
# Lyme Disease – Human Case Rates

<table>
<thead>
<tr>
<th>Year</th>
<th>Scotland</th>
<th>% Increase / Decrease over previous year</th>
<th>England &amp; Wales</th>
<th>% Increase/ Decrease over previous year</th>
<th>UK Overall</th>
<th>% Increase/ Decrease over previous year</th>
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<tbody>
<tr>
<td>2005</td>
<td>63</td>
<td>- 32%</td>
<td>595</td>
<td>19%</td>
<td>658</td>
<td>12%</td>
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<tr>
<td>2006</td>
<td>177</td>
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<td>768</td>
<td>29%</td>
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<td>43%</td>
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<td>2007</td>
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<td>31%</td>
<td>797</td>
<td>4%</td>
<td>1036</td>
<td>9%</td>
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<td>2008</td>
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<td>813</td>
<td>2%</td>
<td>1114</td>
<td>7%</td>
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<tr>
<td>2009</td>
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<td>47%</td>
<td>973</td>
<td>19%</td>
<td>1395</td>
<td>25%</td>
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<td>2010</td>
<td>308</td>
<td>- 26%</td>
<td>1053</td>
<td>8%</td>
<td>1361</td>
<td>- 3%</td>
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<tr>
<td>2011</td>
<td>229</td>
<td>- 26%</td>
<td>959</td>
<td>- 9%</td>
<td>1201</td>
<td>- 13%</td>
</tr>
<tr>
<td>2012</td>
<td>121</td>
<td>- 47%</td>
<td>1,040</td>
<td>8%</td>
<td>1163</td>
<td>- 3%</td>
</tr>
</tbody>
</table>

Source HPA & DEFRA
Underlying Factors - Lyme Disease Trends

- Increase in Deer populations
- Deer Habitat expansion
- Reduction in blind use of broad spectrum antibiotics
- Increase in outdoor pursuits
- Mild wet winters
- Increased diagnosis and awareness
Lyme Disease

Tick distribution map for *Ixodes ricinus*, as recorded by the Public Health England Tick Recording Scheme, and the Biological Records Centre (BRC) - 2013

Lyme Disease Regional foci for Lyme disease include:

- The New Forest
- Salisbury Plain
- Exmoor
- The South Downs
- Thetford Forest
- Parts of Wiltshire and Berkshire
- Scottish West coast
- Highlands & Islands of Scotland
Ixodes ricinus
Current known distribution: October 2013

- Present
- Antic. Absent
- Obs. Absent
- No data
- Unknown

Outermost regions
- Azores (PT)
- Canary Islands (ES)
- Madeira (PT)
- Svalbard/Jan Mayen (NO)
Hantavirus

- Zoonotic Viral pathogen – Bunyaviridae
- Originally identified in Korea – (Hantaan Virus)
- 40 strains worldwide
- Carried by rodents
- Can cause severe disease in humans
  - Haemorrhagic Fever with Renal Syndrome (HFRS)
  - Hantavirus Cardio Pulmonary Syndrome (HCPS)
European Situation

- Detected European strains
  - Puumala Virus (PUUV)
  - Saaremaa Virus (SAAV)
  - Dobrava – Belgrade Virus (DOBV)
- DOBV carries a 15% fatality rate
- UK was considered to be disease free
2013 – UK Hantavirus Year

- January 2013 – Single case in Humberside/North Yorkshire, Patient with Acute Kidney Injury (AKI)
- Rats trapped around patients home tested positive for Hantavirus – Seoul (normally only found in SE Asia)
- Now designated Humber strain)
- Believed to have come in by sea
2013 – UK Hantavirus Year

• March 2013 – Fancy Rat owner and breeder in North Wales taken ill with Acute Kidney problems
• Subsequent investigation of associated breeder led to identification of sero-markers in her partners blood, and a history of Acute Kidney Disease in 2011
• Identified as a strain of Seoul Hantavirus, distinct from Humber – now designated Cherwell
2013 – UK Hantavirus Year

- Novel Hantavirus identified in a Field Vole (Microtus agrestis) in North West England
- Designated Tatenale Virus
Outcomes

• Not the first recorded cases in UK – Liverpool University, AHLVA, NCZR, DEFRA retrospective.
• 40 confirmed cases in previous 30 years across UK
• Many human cases likely to go unrecognised/misdiagnosed
• Past investigations (1980’s and 1990’s) showed presence in wild rodent populations and domesticated cats – identified as Seoul Virus
• Surveillance of UK Rodent Populations to be undertaken to determine spread
HPA Advice to Rodent Owners

• Do not eat, drink or smoke while tending to your pet rodent.

• Keep rodent cages clean and remove soiled bedding often.

• Always wash your hands thoroughly with soap and water immediately after handling your rodent or cleaning their cage or any other materials such as bedding, toys etc.

• Do not kiss pet rodents or hold them close to your face.

• Cover cuts, scratches or sores with a waterproof plaster before handling animals.

• Keep your pet rodent out of rooms where food is prepared and eaten, and limit the parts of the house where it is allowed to roam freely.

• Do not use kitchen sinks for washing cages or equipment.

• If you use a bathroom sink, shower or bathtub, it must be cleaned thoroughly with disinfectant afterwards.

Source: HPA
Future Threats

• Climate change
• Altering habitat
  – Human
    • Lifestyle
  – Animal & Vectors
    • Range and Population
• Changes in diet
• Combinations of single Factors

Source - UNHCR
West Nile Virus

WNV – Transmission Pathway

Dead End Hosts

Domestic Birds

Migratory Birds

Transovarian Spread

“Die-Off”

“Die-Off”
West Nile Virus – Why the concern?

• Need presence of :-
  – Infected Birds
  – Vectors
  – Abnormal of altering weather patterns

• Once established, spreads rapidly

• Disease is variable, however of 5674 clinical cases in humans in the US during 2012, 286 fatalities (5%) and 2873 suffered paralysis, meningitis or encephalitis (51%)  
  
Figures - CDC
West Nile Virus

West Nile virus neuroinvasive disease incidence reported to ArboNET, by county, United States, 2012
The Asian tiger mosquito, *Aedes albopictus* — Daily Mail

**Aedes albopictus**

Current known distribution: October 2013

- **Established**
- **Introduced**
- **Absent**
- **No Data**
- **Unknown**

Outermost regions:
- Azores (PT)
- Canary Islands (ES)
- Madeira (PT)
- Svalbard/Jan Mayen (NO)
Prevention & Harm Reduction

"Prevention is always better than cure"
Education, Education, Education

• Lack of understanding of risks and risk behaviour
• Majority of population have little direct contact with animals on a daily basis
• Much human zoonotic disease stems from a lack of knowledge or poor basic hygiene routines
• Children particularly at risk
• Harm reduction essential to mitigate societal costs from serious disease
Roles for Animal Health Advisors

- Awareness of risk groups
- Knowledge of signs and symptoms
- Contact with farmers, professionals and public
- Harm reduction by information & education
- Signposting and referral
- Product recommendations