UK research needs/gaps in Influenza research

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EU/OIE/FAO reference laboratory for AI/SI

Key Common Gaps/Needs

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- *STAR-IDAZ aim:*

To identify UK research needs/gaps/unmet needs in Influenza research

- *Continued Surveillance – AI, non-human mammalian and the human-animal interface (virology and serology)*
- *Fit for purpose tools – detection, diagnostic and research*
- *Control measures – prevention / intervention*
- Transmission dynamics – inter and intra species factors
- Risk assessment tools

Surveillance and Epidemiology

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- Means of detecting emergence prior/during major event, need to know what's out there to detect something new…
- Integrated surveillance between host sectors
- Molecular epidemiology
  - Predicting future trajectories
- Need to join up surveillance/outbreak reporting linking epi and virological data
  - More consistent and systematic reporting of detailed epi information – location, species, time
  - Linking detailed sequencing information with the epidemiological information
- Essential for risk modelling

Host susceptibility and resistance

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- Understanding host-pathogen interaction as it relates to virus pathogenicity
- Host susceptibility/presentation
- Genetic correlates of host range; understanding basis of host susceptibility: virus and host
- Innate immunity
- Adaptive immunity
- Resistance factors
- Role of normal microflora and concurrent infections;

Pathogenicity and virulence

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- Virulence markers
- Risk factors and drivers for HPAI in avian species
- Understanding viral evolution in naïve and protected populations

Virus Transmission:

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- Define correlates of transmission
  - inter- and intra-species
- Factors characterising/influencing transmission dynamics
  - Infection windows
- Understand and quantify virus evolution in naïve and partially protected populations
- Refined transmission models – standardised for better comparisons and avoid duplication
  - Study design, mode of contact, maintenance dose
- Describe the local and systemic immune responses that are associated with blocking transmission
- Virus survival and persistence including environmental impacts

Human-animal interfaces

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- Study the occupational interface for two way transfers and potential for onward events
  - Frequency of events
  - Defining improved and proportionate intervention strategies
- Genetic correlates of initial host jumping; successful maintenance
- Factors favouring genetic reassortment; establishing stable lineages

Tools and technologies/Diagnostics

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- Up-to-date tools and expertise to detect the emergent and novel viruses across range of subtypes and species
- Standardisation of tools across labs
- Responsiveness to outbreak / emergent events
- Use of modern technology for rapid , field/penside tests for diagnosis with good specificity/sensitivity

Risk assessment tools

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- Indicative but not predictive
- Quantification not possible due to data gaps
  - ie demographic data
- Incorporate models into their epi/surveillance activities and databases

Vaccines/therapeutics:

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- Effective vaccines – not disease prevention (limitation of clinical signs/symptoms) but prevention of infection and transmission. Community/sector efficacy data
- Species level specificity as there are different requirements for different livestock scenarios – equine, swine & other
- Broad spectrum vaccines that will protect against a number of subtypes or strains within a subtype
- Universal vaccines – all flu, cross species barriers
- Linking virus antigenicity to vaccine selection
  - Vaccines that prevent/reduce escape mutations?
- Intervention products e.g. antivirals that overcome resistance

Other issues

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- Specialist facility availability
- Appropriate animal models
- Ethics and logistics for gain of function research
- Coordinating activities to respond to emerging threats

Acknowledgements

- Over 60 UK researchers from 14 institutes involved in influenza research

- Meeting sponsors below