Early Investigations of MERS-CoV

Use and adaptation of CONSISE materials

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The Big Questions – MERS-CoV

• How transmissible?
  – Secondary attack rate – in households, HCF, work place.
  – $Ro$
  – Roll of risk factors and settings – e.g. chronic illness and institutions

• Source of the virus
  – Animal reservoir
  – Time of emergence

• Clinical spectrum of severity
  – Proportion of severe/mild cases
  – Types of complications – e.g. renal failure

• Exposures that result in human infection
Getting the Answers

- **Outbreak investigations**
  - Transmission rates, exposures
- **Case control study of index/sporadic cases**
- **Surveillance monitoring**
  - Rates of occurrence over time: Ro, comparison to historical trends
  - Severe disease presentation and natural history
  - Risk groups, esp. for severe disease
- **Genetic analysis of multiple viruses, animal and human**
- **Cellular binding studies, animal pathogenesis**
- **Serological surveys:**
  - Rates of mild infection in contacts
  - Rates of positivity in risk groups
  - Serial cross-sectional surveys for rates of infection
  - Secondary attack rates in presumed human-to-human clusters
Types of Protocols Needed

- Generic interview form with open ended questions
- Case control study of exposures
  - Determine exposures that result in transmission from non-human sources
  - Comparison of index/sporadic cases to random, matched controls
  - Could use serology to determine controls but not critical for a novel, rare infection.
- Health Care Facilities
  - Evidence of human-to-human transmission
  - Types of exposures that result in infection (e.g. medical procedures)
  - Case control study of exposed and unexposed HCW
  - Infections or seropositives in cohort of all exposed
Types of Protocols Needed

• **Contact study**
  - Rates of human-to-human transmission (difficult)
  - Spectrum of disease, rates of mild disease (if prospective w/ acute and convalescent sera)
  - Rates of sero(+) in different exposure-type cohorts of case exposure environment(s): e.g. farm, home, workplace, bridge club – not really about contact w/ case

• **Serial cross-sectional surveys of risk groups**
  - Population studies can look at rates of infection
  - Prospective cohort study to determine exposures that result in infection

• **Animal surveys: source of virus**
Lessons Learned

• Impossible to anticipate all the questions in advance
  – Specific exposures vary much by place and organism
  – Having a questionnaire helps; tailor with initial interviews and local knowledge

• Primary questions change over time
  – HCW study initially about whether h-to-h transmission occurs but became about risk factors for transmission

• Not every critical question can be answered with a sero study
  – Don't force it – other protocols are needed

• Serological assays can take a long time to perfect
  – But imperfect assays are useful.

• Much misunderstanding among epi about what test means in an individual
Thank you for your kind attention