

Early Investigations of MERS-CoV

Use and adaptation of CONSISE materials

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World Health
Organization

The Big Questions – MERS-CoV

- **How transmissible?**
 - Secondary attack rate – in households, HCF, work place.
 - R_0
 - 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: R_0 , 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