

WHO events addressing public health priorities

MERS-CoV: new initiatives in research and scaling up infection prevention and control measures in healthcare settings

Approaches to dealing with the threat of MERS-CoV

The novel coronavirus now known as Middle East respiratory syndrome coronavirus (MERS-CoV) is responsible for a respiratory disease that so far killed over 300 people since the virus emerged between April and June 2012. Since that time, sporadic cases, small clusters and large outbreaks have been reported in several countries. Concerns about the gaps in knowledge about MERS-CoV and how it is transmitted have prompted several new initiatives in the Eastern Mediterranean Region (EMR), involving WHO and other international health partners, to improve research, infection control and training.

Recent evidence suggests that camels and possibly bats may harbour the virus. Although finding the animal reservoir of MERS-CoV is an important step in understanding the origin of the virus, an immediate need is for more research to understand the route and mode of transmission of the virus to humans from animal sources, and the types of exposures that result in infection. As recent evidence has also shown that poor infection control measures in healthcare settings can result in amplification of outbreaks caused by MERS-CoV and any other novel infections of zoonotic origin, appropriate and systematic infection prevention and control practices need to be considered for all health facilities to prevent any healthcare-associated transmission of these infections. Finally, the emergence of MERS-CoV and recent re-emergence of a number of other communicable diseases in the Region highlight the need to develop a network of technical institutions and agencies in the EMR which would be ready for rapid deployment in the event of any outbreaks. WHO has thus held a number of events in 2014 to address these needs.

Multi-country research into risk factors for MERS-CoV infection

What do we know already?

While there is evidence that MERS-CoV has been circulating widely for more than two decades in camels in the Middle East,¹ it remains unclear how humans get infected

from camels, as more than three-quarters of total laboratory-confirmed human cases of disease due to MERS-CoV reported to WHO have not had a history of direct contact with camels or any other animals.² Clearly, further research is needed to study the route of transmission and exposures that result in human infection from animals.

Drawing up the protocol for a multi-country case-control study

At a meeting held in Cairo in December 2013 a research agenda for MERS-CoV was determined.³ As a follow-up to this, WHO organized a technical consultative meeting in Riyadh, Saudi Arabia in March 2014, to finalize the protocol for conducting a multicountry case-control study on MERS-CoV in the affected countries. The meeting was attended by representatives from the ministries of health and ministries of agriculture of the affected countries in the Region (Jordan, Saudi Arabia, Kuwait, Oman, Qatar, Tunisia and the United Arab Emirates), the UN Food and Agriculture Organization, the World Organization for Animal Health, WHO collaborating centres as well as other international health agencies involved in the global response to MERS-CoV.

Aims and design of the study

The case-control study has been designed to be able to combine data from the participating countries by applying the same study design and data collection tools consistently across all the countries. Countries will collaborate closely with WHO and implementation will be supported by an international team of experts and national focal points.

Several possibilities for human exposure to the virus exist, including: direct contact with an infected animal; contact with or consumption of unprocessed animal products; contact with the environment where an infected animal has recently been; or consumption of a food or beverage contaminated by animal excreta. All of these have been implicated in other zoonotic infections. Determining the

1 Alagaili AN, Briese T, Mishra N, Kapoor V, Sameroff SC, de Wit E, et al. Middle East respiratory syndrome coronavirus infection in dromedary camels in Saudi Arabia. *mBio*. 2(5);2014):e14-00884.

2 The WHO MERS-CoV Research Group. State of knowledge and data gaps of Middle East respiratory syndrome coronavirus (MERS-CoV) in humans. *PLoS Curr*. 2013 Nov 5;12. doi: 10.1371/currents.outbreaks.0bf719e352e7478f8ad85fa30127ddb8.

3 WHO-EM/CSR/068/E (http://applications.emro.who.int/docs/IC_Meet_Rep_2014_EN_15224.pdf?ua=1, accessed 11 September 2014).

exposure risk factors for MERS-CoV that result in transmission to humans will enable the affected countries to formulate appropriate public health measures that can be implemented to interrupt transmission.

The proposed case-control study therefore aims to identify non-human exposures that lead to human infection from MERS-CoV and to describe other risk factors for infection, such as pre-existing medical conditions. It will use a case-control study design that examines the differences in types of exposures between human cases with laboratory-confirmed MERS-CoV infection and healthy controls in order to determine the risk associated with that exposure. Because exposures vary greatly by season and memory of exposures can be forgotten over time, the study will focus on recently reported laboratory-confirmed primary cases only. Data will be collected through a detailed questionnaire about participants' living conditions, behavioural factors, animal exposure and types of food consumed (especially meat and milk from camels and other animals).

How will we use the findings?

WHO is coordinating with countries to ensure that the study is conducted simultaneously in all the countries where human cases of MERS-CoV have recently been reported. Studies are currently underway in Saudi Arabia but the results may not be available soon as, in order to avoid recall biases, only recently reported primary cases with a known or unknown exposure to camels are being enrolled in the study. The data collected from this study will also be used to refine/update recommendations for surveillance and case definitions, to characterize the key epidemiological transmission features of MERS-CoV, to help understand the spread, severity, spectrum of disease, impact on the community and to inform operational models for implementation of countermeasures such as case isolation, contact tracing and quarantine.

Scaling up infection prevention and control measures for MERS-CoV

Evidence for poor infection control measures

In the face of a recent spike of infection from MERS-CoV reported in the United Arab Emirates and in Saudi Arabia between March and June 2014, the Member States of the Region have pledged to urgently scale up infection prevention and control measures in healthcare facilities. Recent outbreaks of MERS-CoV have been fuelled by large-scale transmissions in hospitals in Jordan, Saudi Arabia and the United Arab Emirates with significant numbers of healthcare workers also reported to have been infected. A recent WHO mission to Saudi Arabia to investigate the spike of MERS-CoV infections, conducted in late April 2014, concluded that poor infection control practices by health-care workers as well as a lack of systematic and consistent application of

infection prevention and control practices in health facilities had exacerbated the hospital outbreak of MERS-CoV.

Preparedness plan for health facilities

In light of the above, WHO organized an urgent meeting of infection control experts in Riyadh, Saudi Arabia in June 2014. The meeting was attended by participants from 12 Member States in the Region as well as other experts from WHO Collaborating Centres for Infection Prevention and Control. The participating countries, through a consultative process, finalized the essential components of a health-facility preparedness plan for improving infection prevention and control measures and practices for MERS-CoV and any other novel respiratory disease, taking into consideration the reasons behind the amplification of outbreaks of MERS-CoV in the hospitals of Jordan, Saudi Arabia and the United Arab Emirates.

The meeting concluded with countries pledging to scale up their infection control measures in health facilities and WHO offering assistance to help countries establish national programmes for infection control.

Training on outbreak response for GOARN partners

Need for early detection of disease outbreaks

Established in April 2000, the Global Outbreak Alert and Response Network (GOARN) is a WHO network comprising institutions and health agencies that have the capacity to contribute technical resources for international disease outbreak response operations. The emergence of MERS-CoV and recent re-emergence of yellow fever, Rift Valley fever, dengue fever, Crimean-Congo haemorrhagic fever and cholera in the Region exemplify that outbreaks are not predictable. The only way to minimize their health impact is to detect these outbreaks early and respond rapidly and effectively.

Building team leadership and coordination skills for outbreak response

In March 2014, the Regional Office hosted the first pre-deployment course on international outbreak response for regional partner institutions of GOARN. A total of 24 participants, selected mostly from health institutions and the ministries of health of the Region, attended the course at the Dead Sea, Jordan. This training course was part of WHO's efforts to establish the regional arm of GOARN. The aim is to develop a network of technical institutions and agencies in the Region that can offer multidisciplinary experts who would be ready for rapid deployment in the event of any outbreaks in the Region that necessitated an international response. The creation of this network will also enable the Regional Office to effectively fulfil its alert and response responsibilities through establishing a mechanism for rapid deployment. The course involved a scenario-based simulation exercise

intended to build team leadership and coordination skills for outbreak response operations in the field.

Following conclusion of this pre-deployment course, the Regional Office has established a roster of experts who can be called for deployment in the event of an outbreak that requires international response. A number of these trained experts from the roster were deployed in some countries of the Region during May–June 2014 to respond to hospital outbreaks

caused by an increasing number of hospital-acquired infections of MERS-CoV. Some of these experts were also recently deployed to West Africa as part of the GOARN team for international outbreak response to Ebola virus disease. This training has offered the Regional Office an opportunity to keep a team of trained experts on stand-by should there be any need for surge in the event of an importation of cases of Ebola virus disease in the Region.