



## RAPID RISK ASSESSMENT

# Severe respiratory disease associated with Middle East respiratory syndrome coronavirus (MERS-CoV)

19th update, 31 July 2015

### Main conclusions and options for response

The Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak continues to pose a low risk to the EU with regards to the importation of MERS cases. Although sustained community transmission has not been observed, transmission to close contacts of imported cases, including to healthcare workers, and other patients and visitors in hospitals has been reported, most recently in South Korea, and in France, the United Kingdom and Iran.

Although the outbreak in South Korea has not been declared over yet, the risk for visitors to South Korea can be currently considered as negligible. The risk for visitors to Saudi Arabia remains low, most likely related to exposure either to live camels and camel products or to healthcare facilities.

WHO does not recommend travel restrictions with regards to MERS-CoV, but rather to raise awareness among travellers to and from affected countries. EU citizens travelling to Middle Eastern countries, in particular Saudi Arabia and the United Arab Emirates, need to be made aware that MERS-CoV is circulating in these areas and should be reminded of the importance of good hand and food hygiene, and to avoid contact with sick people. This is particularly important for travellers with pre-existing medical conditions. Travellers to the Arabian Peninsula should avoid close contact with camels, visiting farms and consuming unpasteurised camel milk, urine or raw or under-cooked meat.

This year the Hajj falls between 21 and 26 September. Hajj and Umrah travellers with pre-existing medical conditions should be advised to consult a healthcare provider to review the risk before deciding to make the pilgrimage. The Ministry of Health of Saudi Arabia advises patients with chronic diseases, and the elderly, to postpone their pilgrimage for their own safety and gives advice on how to prevent infection.

Travellers with pre-existing medical conditions should be advised to identify a trusted healthcare facility prior to travel in case of a health emergency during their stay. Travellers who require medical care should minimise contact with other sick people in the facility.

Early detection of MERS-CoV infection among travellers exposed to camels or healthcare facilities in the Middle East, especially Saudi Arabia and the United Arab Emirates, remains essential. The recent outbreak in South Korea highlights the continued risk of healthcare-associated transmission and the need for timely diagnosis and implementation of prevention and control measures.

Countries should advise travellers returning from all countries affected by MERS to seek medical attention if they develop a respiratory illness with fever and cough during the two weeks after their return and to disclose their recent travel history to their healthcare provider.

Healthcare workers in the EU should be made aware of the risk related to travellers from affected areas, the presentation of the disease, and the need to promptly investigate travellers returning from affected areas presenting with severe respiratory illness.

WHO recommends that probable and confirmed cases should be admitted to adequately ventilated single rooms or rooms with airborne transmission precautions. Healthcare workers caring for probable or confirmed cases of MERS should, in addition to eye protection (i.e. goggles or face shield), gown and gloves, use personal protective equipment that is appropriate for the exposure risk defined by a pre-assessment of the workplace and the planned interventions.

## Source and date of request

ECDC internal decision, 30 July 2015.

## Public health issue

This update was prompted in order to reassess the risk for European travellers to South Korea now that there have been no additional cases reported since 4 July 2015.

## Consulted experts

Internal experts: Denis Coulombier, Niklas Danielsson, Kaja Kaasik-Aaslav, Ettore Severi, René Snacken.

## Disease background information

Since it was first identified in Saudi Arabia in September 2012, more than 1 400 MERS cases have been detected in over 20 countries. In Europe, eight countries have reported confirmed cases, all with direct or indirect connection with the Middle East.

The clinical presentation of MERS ranges from asymptomatic to very severe pneumonia with acute respiratory distress syndrome, septic shock and multi-organ failure resulting in death. The clinical course is more severe in immunocompromised patients. There is growing evidence that the dromedary camel is a host species for the virus and that camels play an important role as a source of human infection.

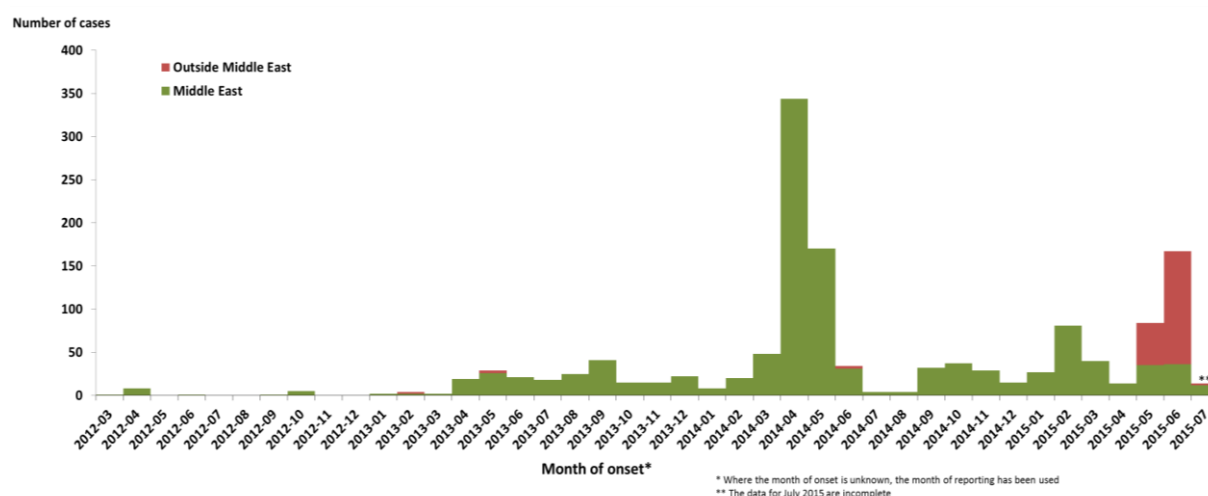
Although it is likely that zoonotic transmission is the starting point of most clusters, human-to-human transmission is the dominant mode of transmission for MERS-CoV, and almost all new cases are generated in healthcare facilities or among family members. Nosocomial transmission has been a hallmark of MERS, and the majority of cases have been reported from hospital outbreaks in Saudi Arabia, the United Arab Emirates and most recently in South Korea.

## Event background information

### Worldwide situation

Since April 2012 and as of 30 July 2015, 1 401 cases of MERS, including 543 deaths, have been reported by health authorities worldwide (Figure 1 and Table 1).

**Figure 1. Distribution of confirmed cases of MERS by month\* and probable place of acquisition of infection, March 2012–30 July 2015 (n=1 401)**



## Current epidemiological situation

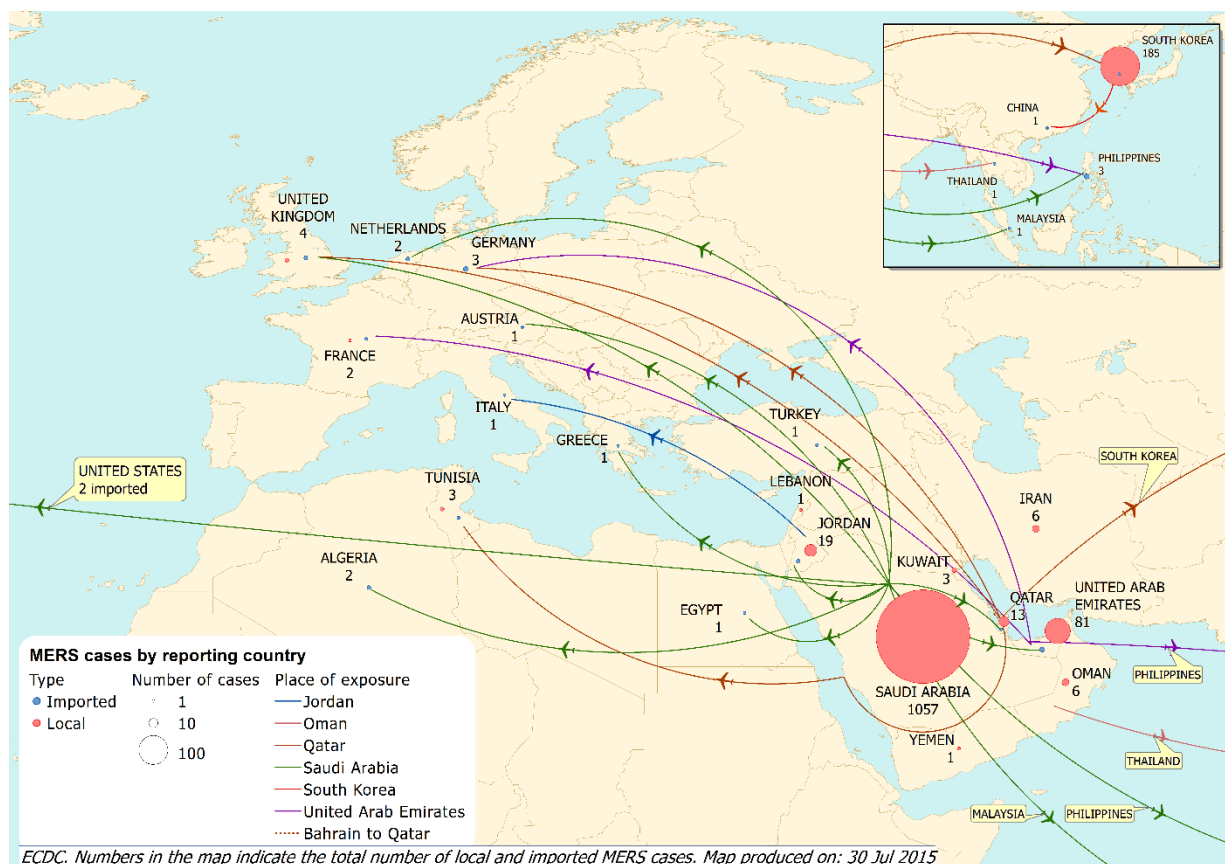
Since the previous update of the ECDC Rapid Risk Assessment on MERS-CoV of 30 June 2015 [1], 22 new cases and 12 deaths have been reported globally from: South Korea (4 cases and 4 deaths), Saudi Arabia (17 cases and 8 deaths) and the Philippines (1 case and 0 deaths).

The majority of cases have occurred in the Middle East, most of them in Saudi Arabia and the United Arab Emirates (Table 1). However, South Korea is the country with the highest number of new cases reported since the start of the outbreak there in early May 2015.

**Table 1. Confirmed MERS cases and deaths, by country of reporting, March 2012–30 July 2015**

Reporting country	Cases	Deaths
Middle East	1 188	496
Saudi Arabia	1 057	467
United Arab Emirates	81	11
Jordan	19	6
Qatar	13	5
Oman	6	3
Iran	6	2
Kuwait	3	1
Egypt	1	0
Yemen	1	1
Lebanon	1	0
Europe	15	8
United Kingdom	4	3
Germany	3	2
France	2	1
Netherlands	2	0
Greece	1	1
Turkey	1	1
Austria	1	0
Italy	1	0
Asia	191	37
China	1	0
Malaysia	1	1
Philippines	3	0
South Korea	185	36
Thailand	1	0
Rest of the world	7	2
Algeria	2	1
Tunisia	3	1
United States of America	2	0
<b>Total</b>	<b>1 401</b>	<b>543</b>

**Figure 2. Distribution of confirmed MERS cases by probable place of acquisition of infection, as of 30 July 2015 (n=1 401)**



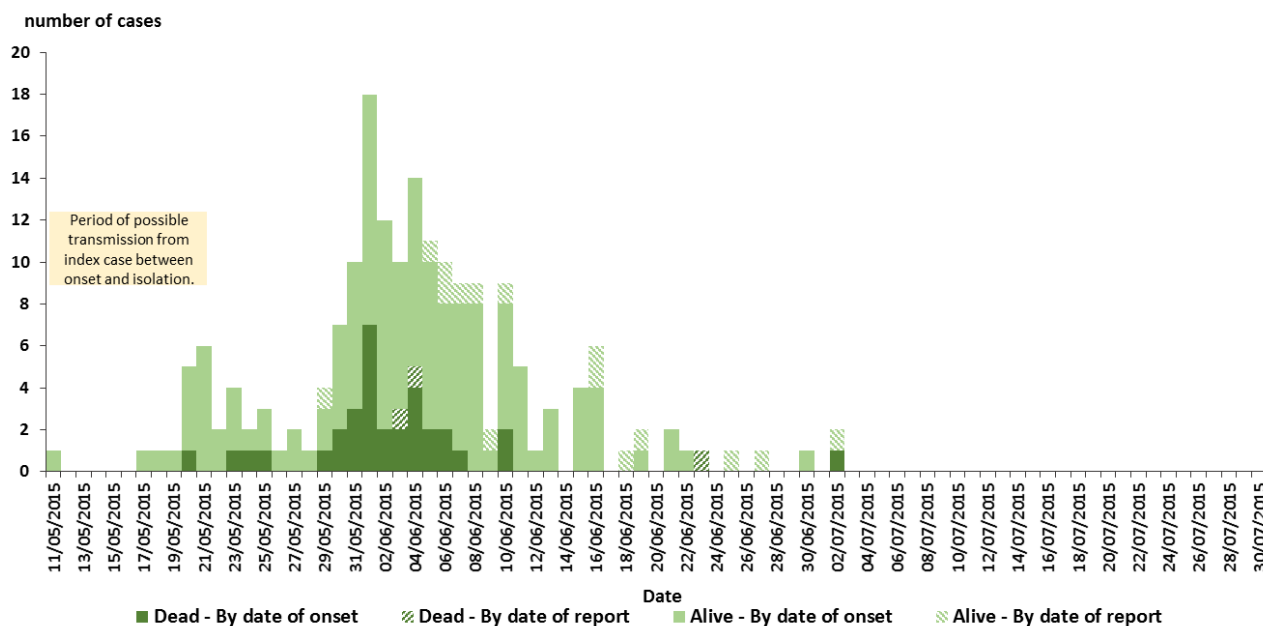
## South Korea

On 20 May 2015, the Korea Centres for Disease Control and Prevention notified WHO of the first laboratory-confirmed case of MERS in a 68-year-old man with recent travel history to the Middle East [2].

As of 30 July 2015, the South Korean Ministry of Health and Welfare have reported 186 cases since the index case was reported there (including a South Korean case reported by China). Of these, 138 patients have been discharged, 36 patients have died and 12 are still receiving medical treatment. Eleven of the 12 cases under treatment have twice tested negatively for MERS-CoV. Among the 36 deaths, 33 (92%) were categorised as high-risk, either because of old age or because of pre-existing chronic conditions, including cancer, diabetes, heart, lung and kidney diseases or immunodeficiency disorders [3].

The last case from South Korea was reported on 4 July 2015 and no transmission has been reported since then in South Korea. However, under current definitions, the outbreak can only be considered to have ended when no new cases have been detected for a period of 28 days (two times the maximum 14-day incubation period) after the last case being treated has tested negative twice (with a minimum of 24 hours between the two tests) or the case has died.

**Figure 3. Distribution of confirmed cases of MERS by date of onset or reporting, South Korea and China, 11 May–30 July 2015 (n=186)**



The index case in the South Korea outbreak had onset of symptoms on 11 May and was diagnosed and isolated on 20 May 2015. During the 10-day period from onset of illness until isolation (Figure 3, yellow box), the index case visited several healthcare facilities.

The local health authorities had detected transmission in 15 healthcare facilities. On 17 July 2015, the Samsung Medical Centre was the last of the initial 15 facilities to be released from strict control measures.

## China

On 30 May 2015, WHO notified a case of MERS in China with probable transmission in South Korea. The case is the 44-year-old son of the third MERS case in South Korea and the younger brother of the fourth MERS case. He visited his father at a time when he was hospitalised in the same room as the index case in South Korea. Later, he travelled from Seoul to Guangdong in China where he was hospitalised, and MERS-CoV infection was confirmed on 29 May [4]. No further cases of MERS linked to this patient have been identified to date. According to media sources, the patient was discharged from hospital on 26 June 2015.

## The Philippines

On 6 July 2015, the Philippines Department of Health reported that a non-national male, who developed symptoms of MERS on 30 June 2015, had a laboratory-confirmed positive result for MERS-CoV on 4 July 2015. The case was discharged on 10 July 2015 following two negative tests 48 hours apart.

## Saudi Arabia

Since the beginning of 2015 and as of 30 July, Saudi Arabia has reported 231 infections with MERS-CoV (Figure 4). Of these, 17 cases and 8 deaths have been reported since 30 June 2015.

**Figure 4. Distribution of MERS cases by reporting city, Saudi Arabia, 1 January–30 July 2015**



## Conclusion

MERS-CoV infections in people with travel history to the Middle East have been diagnosed in the past in the EU and elsewhere. Although the recent MERS cluster in South Korea is the largest observed outside of the Middle East, there is no evidence of sustained community transmission of the virus. The transmission pattern in the Korean hospitals has been similar to that observed in hospitals in the Middle East.

The public health measures taken in South Korea have been effective in interrupting the chains of transmission and controlling the outbreak.

MERS-CoV transmission continues in the Middle East, with the highest number of cases reported from Saudi Arabia and the United Arab Emirates. The current transmission of MERS-CoV is consistent with the pattern that has been observed since 2013: sporadic primary zoonotic cases leading to nosocomial clusters of variable size. The fact that the Korean index case had no history of exposure to camels or healthcare settings in the Middle East raises the possibility that there are unrecognised chains of human-to-human transmission in the Middle East. Müller, et al. have suggested that undetected low-level infection in people who are exposed to the animal reservoir could serve as source of infection for people without exposure to animals [5].

## ECDC threat assessment for the EU

The MERS outbreak continues to pose a low risk to the EU with regards to the importation of MERS cases. Although sustained community transmission has not been observed, transmission to close contacts of imported cases, including to healthcare workers, and other patients and visitors in hospitals has been reported, most recently in South Korea and in France, the United Kingdom and Iran.

Although the outbreak in South Korea has not been declared over yet, the risk for EU visitors to South Korea can be currently considered as negligible. The risk for visitors to Saudi Arabia remains low, most likely related to exposure either to live camels and camel products or to healthcare facilities.

## Options for response

### Travellers

WHO does not recommend travel restrictions with regards to MERS-CoV, but rather to raise awareness among travellers to and from affected countries [6]. EU citizens travelling to Middle Eastern countries, in particular Saudi Arabia and the United Arab Emirates, need to be made aware that MERS-CoV is circulating in these areas. They should be reminded of the importance of good hand and food hygiene, and advised to avoid contact with sick people. This is particularly important for travellers with pre-existing medical conditions. Travellers to the Arabian Peninsula should avoid close contact with camels, visiting farms and consuming unpasteurised camel milk, urine and raw or under-cooked meat.

This year the Hajj falls between 21 and 26 September. Hajj and Umrah travellers with pre-existing medical conditions should be advised to consult a healthcare provider to review the risk before deciding to make the pilgrimage. The Ministry of Health of Saudi Arabia advises patients with chronic diseases, and the elderly, to postpone their pilgrimage for their own safety and gives advice on how to prevent infection [7].

Travellers with pre-existing medical conditions should be advised to identify a trusted healthcare facility prior to travel in case of a health emergency during their stay. Travellers who require medical care should minimise contact with other sick people in the facility [8].

### Returning travellers

Early detection of MERS-CoV infection among travellers exposed to camels or healthcare facilities in the Middle East, especially Saudi Arabia and the United Arab Emirates, remains essential. The recent outbreak in South Korea also highlights the continued risk of healthcare-associated transmission and the need for timely diagnosis and implementation of prevention and control measures.

Countries should advise travellers returning from all countries affected by MERS to seek medical attention if they develop a respiratory illness with fever and cough during the two weeks after their return and to disclose their recent travel history to their healthcare provider.

Healthcare workers in the EU should be made aware of the risk related to travellers from affected areas, the presentation of the disease, and the need to promptly investigate travellers returning from affected areas presenting with severe respiratory illness.

WHO recommends that probable and confirmed cases should be admitted to adequately ventilated single rooms or rooms with airborne transmission precautions. Healthcare workers caring for probable or confirmed cases of MERS should, in addition to eye protection (i.e. goggles or face shield), gown and gloves, use personal protective equipment that is appropriate for the exposure risk defined by a pre-assessment of the workplace and the planned interventions: if airborne exposure cannot be ruled out PPE should include respiratory protection by use of filters with a specification of FFP2 or FFP3 [9]; if only droplet exposure is expected and respirators are not available a surgical or medical procedure mask with the additional classification IIR (splash resistance to blood and bodily fluids) can be considered.



## References

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## Annex I. MERS-CoV infection advice with regard to travelling

### Statement of the Health Security Committee (HSC)\* based on scientific input by the European Centre for Disease Prevention and Control

4 August 2015

The Middle East respiratory syndrome (MERS) is an emerging infectious disease that was first reported in September 2012 in Saudi Arabia. The disease is caused by the MERS coronavirus (MERS-CoV) that primarily infects the respiratory system but can affect many organ systems in severe cases. Since 2012, more than 1 400 cases of MERS have been reported from 26 countries. The majority of cases have been reported from the Middle East region where Saudi Arabia alone has notified more than 1 000 cases. Seven European countries have reported confirmed cases, all with direct or indirect connection with the Middle East.

The largest outbreak outside of the Middle East has been in South Korea where a person who returned from travels in the Arabian Peninsula gave rise to several hospital-centred clusters with altogether close to 200 cases. The outbreak in South Korea has been propagated mainly through nosocomial transmission and transmission to family caregivers. The imported index case was diagnosed on 20 May 2015 and the epidemic curve peaked during the first week of June. No transmission has been reported in South Korea since 4 July.

There is growing evidence that the dromedary camel is a host species for MERS-CoV and that zoonotic introductions from camels play an important role for the epidemiology in the Middle East. However, zoonotic infections are likely to be rare events and almost all human cases, whether in the Middle East or elsewhere, are the result of transmission from an ill person to a close contact, most of which have occurred in healthcare settings. It is not yet fully understood how the virus spreads but contamination through respiratory droplets plays an important role as well as aerosol-generating medical procedures.

The following statement is a summary of the technical guidance for consideration by National Contact Points in Member States, and should be reviewed according to how the MERS epidemic evolves.

Based on currently available information, the risk for travellers to countries affected by MERS to acquire MERS-CoV infection is considered low.

#### South Korea

As no transmission has occurred in South Korea since 4 July, the risk to travellers or the risk of imported cases to the EU are considered as negligible.

#### Arabian Peninsula

The risk of transmission in Saudi Arabia is related to the high number of nosocomial clusters identified, the persistent transmission in healthcare settings for more than two years, the suspicion of infections occurring through unrecognised chains of transmissions in the community and the risk related to exposure to camels and camel products. In this context, the risk for travellers to the Arabian Peninsula and in particular to Saudi Arabia is considered low and related to contacts with healthcare facilities or to exposures to live camels and camel products.

In line with the most recent WHO advice countries should not impose travel or trade restrictions in relation to MERS-CoV. However, EU citizens travelling to countries with ongoing MERS-CoV transmission should be made aware that MERS-CoV is circulating in these areas and should be reminded of the importance of good hand and food hygiene, and to avoid contact with sick people.

Travellers to the Arabian Peninsula should avoid close contact with camels, visiting farms and consuming unpasteurised camel milk, urine or improperly cooked meat.

People with pre-existing medical conditions are more likely to develop severe disease if exposed to MERS-CoV. Those at higher risk of severe MERS-CoV infection, and therefore for whom awareness of the risks is particularly important, include:

- elderly people
- people with chronic diseases, including: heart diseases, kidney diseases, respiratory diseases, nervous system disorders and diabetes
- people with immunodeficiency conditions, congenital and acquired
- pregnant women.

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\* The statement is based on Article 11 'Coordination of response' of Decision 1082/2013/EU on serious cross border health threats and can be adapted to the needs and circumstances of Member States.

Hajj and Umrah travellers with pre-existing medical conditions should be advised to consult a healthcare provider to review the risk before deciding to make the pilgrimage. The [MoH of Saudi Arabia](#) advises patients with chronic diseases and the elderly to postpone their pilgrimage

Travellers with pre-existing medical conditions should be advised to identify a trusted healthcare facility prior to travel in case of a health emergency during their stay. Travellers who require medical care should minimise contact with other sick people in the facility.

Countries should advise returning travellers from all countries affected by MERS to seek medical attention if they develop a respiratory illness with fever and cough during the two weeks after their return and to disclose their recent travel history to the healthcare provider.

The Health Security Committee will re-evaluate the evidence and situation on a regular basis and revise this statement accordingly.

## Annex II. Advice to Health Care Workers caring for patients with MERS-CoV infection

### Statement of the Health Security Committee (HSC)\* based on scientific input by the European Centre for Disease Prevention and Control

4 August 2015

Since it was first identified in Saudi Arabia in September 2012, more than 1 000 cases of Middle East respiratory syndrome coronavirus (MERS-CoV) infection have been detected in over 20 countries. In Europe, seven countries have reported confirmed cases, all with direct or indirect connection with the Middle East. The clinical presentation of MERS coronavirus infection ranges from asymptomatic to very severe pneumonia with acute respiratory distress syndrome, septic shock and multi-organ failure resulting in death. The clinical course is more severe in immunocompromised patients. There is growing evidence that the dromedary camel is a host species for the virus and that camels play an important role as a source of human infection. Although it is likely that zoonotic transmission is the starting point of most clusters, human-to-human transmission is the dominant mode of transmission for MERS-CoV, and almost all new cases are generated in healthcare facilities or among family members. Nosocomial transmission has been a hallmark of MERS-CoV infection, and the majority of cases have been reported from hospital outbreaks in Saudi Arabia, the United Arab Emirates (UAE) and most recently in South Korea. It is expected that small numbers of cases will continue to present to healthcare services in the EU as a result of: (a) medical transfers of MERS-CoV infected patients into the EU for specialist care; (b) patients who acquired MERS-CoV while visiting the affected area and develop the infection in the EU; and (c) patients who are exposed to and infected with MERS-CoV through contacts with confirmed cases in the EU (secondary transmission in the EU).

#### Advice on infection control

This is a summary of the recommended technical measures for reducing the risk of transmission of MERS-CoV in healthcare settings and laboratories in the EU for consideration by national contact points. It draws on, and adapts to the EU situation, interim advice produced by WHO (Infection prevention and control during health care for probable or confirmed cases of Middle East respiratory syndrome coronavirus (MERS-CoV) infection. Interim guidance, 4 June 2015. Available from:

[http://apps.who.int/iris/bitstream/10665/174652/1/WHO\\_MERS\\_IPC\\_15.1\\_eng.pdf?ua=1A](http://apps.who.int/iris/bitstream/10665/174652/1/WHO_MERS_IPC_15.1_eng.pdf?ua=1A)). The highest risk of healthcare-associated transmission is in the absence of standard precautions, when basic infection prevention and control measures for respiratory infections are not in place, and before MERS-CoV infection has been confirmed. The summary of the advice follows:

Standard precautions (hand hygiene and use of personal protective equipment (PPE) to avoid direct contact with patients' blood, non-intact skin, body fluids and secretions, including respiratory secretions) should be applied for all patients.

Early detection of MERS-CoV infection among travellers exposed to camels or healthcare facilities in the Middle East remains essential. The outbreak in South Korea highlighted the continued risk of healthcare-associated transmission and the need for timely diagnosis and implementation of prevention and control measures, although the public health measures taken have now been effective in interrupting the chains of transmission and controlling the outbreak in South Korea.

Travellers returning from the Middle East should be made aware that if they develop respiratory symptoms or diarrhoea, either during travel or up to 14 days after their return, they should seek medical attention and report their travel history.

A patient presenting with severe acute respiratory disease in the EU and having in the last 14 days been in contact with MERS patients, healthcare services or camels in the Middle East should be investigated for MERS-CoV infection. The patient should be separated from other patients in waiting areas and in-patient settings and wear a disposable surgical or medical procedure mask.

Cases of MERS-CoV infection requiring admission should be admitted directly to negative-pressure single rooms, if available. If this is not possible, then a single room with en-suite facilities should be used. Positive pressure rooms should not be used.

Healthcare personnel providing care for cases of MERS-CoV infection should:

- use personal protective equipment that is appropriate for the exposure risk defined by a pre-assessment of the workplace and the planned interventions: if airborne exposure cannot be ruled out PPE should include

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\* The statement is based on Article 11 'Coordination of response' of Decision 1082/2013/EU on serious cross border health threats and can be adapted to the needs and circumstances of Member States.

respiratory protection by use of filters with a specification of FFP2 or FFP3; if only droplet exposure is expected and respirators are not available a surgical or medical procedure mask with the additional classification IIR (splash resistance to blood and body fluids) can be considered

- use eye protection (i.e. goggles or face shield)
- use gown and gloves
- self-monitor for symptoms.

The WHO interim guidance on Infection prevention and control during healthcare for probable or confirmed cases of Middle East respiratory syndrome coronavirus (MERS-CoV) infection (4 June 2015) should be consulted for more detailed guidance on other aspects of infection control. Available from:

[http://apps.who.int/iris/bitstream/10665/174652/1/WHO\\_MERS\\_IPC\\_15.1\\_eng.pdf?ua=1A](http://apps.who.int/iris/bitstream/10665/174652/1/WHO_MERS_IPC_15.1_eng.pdf?ua=1A).

A record of all staff providing care for confirmed MERS-CoV cases must be maintained. Staff providing care to confirmed MERS-CoV cases and staff who have been exposed to cases before implementation of infection control measures, should be vigilant for any respiratory symptoms in the 14 days following the last exposure to a confirmed case, and should seek testing and thereafter self-isolate if they become unwell.

Aerosol-generating procedures including all airway management procedures, such as tracheal intubation, broncho-alveolar lavage, other diagnostic airway procedures and manual ventilation, require particular protection measures. The number of persons in the room should be limited to a minimum during such procedures and all persons present should wear:

- a well-fitted FFP3 respirator
- tight-fitting eye protection
- gloves
- long-sleeved impermeable protective gowns.

All specimens collected for laboratory investigation should be regarded as potentially infectious, and healthcare workers who collect or transport clinical specimens should adhere rigorously to Standard Precautions to minimise the possibility of exposure to pathogens. The WHO *Aide-memoire on Standard Precautions in Health Care* is available from: [http://www.who.int/csr/resources/publications/EPR\\_AM2\\_E7.pdf](http://www.who.int/csr/resources/publications/EPR_AM2_E7.pdf)

Laboratories should adhere to guidance in these two documents:

The European Committee for Standardisation: *CWA15793 Laboratory Biorisk Management, 2011*, available from: <http://www.cen.eu/CEN/sectors/technicalcommitteesworkshops/workshops/Pages/ws31.aspx>

and

The World Health Organization: *Laboratory testing for Middle East Respiratory Syndrome Coronavirus. Interim guidance* of June 2015, available from: [http://www.who.int/iris/bitstream/10665/176982/http://apps.who.int/iris/bitstream/10665/176982/1/WHO\\_MERS\\_LAB\\_15.1\\_eng.pdf?ua=1](http://www.who.int/iris/bitstream/10665/176982/http://apps.who.int/iris/bitstream/10665/176982/1/WHO_MERS_LAB_15.1_eng.pdf?ua=1)

The duration of infectivity for MERS-CoV patients remain unknown. Critically ill patients can shed MERS-CoV for long periods and viral detection tests should assist in the decision on when to discontinue additional precautions for hospitalised patients.

The Health Security Committee will re-evaluate the evidence and situation on a regular basis and revise this statement accordingly.