RAPID RISK ASSESSMENT

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

20th update, 27 August 2015

Main conclusions and options for response

The majority of the MERS cases continue to be reported from the Middle East, and specifically from Saudi Arabia. Given the substantial number of people travelling between the Middle East and EU countries, sporadic imported cases to Europe can be expected. In addition to the Hajj, large numbers of people travel to and from the Middle East throughout the year.

When compared to previous years, the increase in reported MERS cases in August was unexpected and is mainly explained by a large, ongoing, nosocomial outbreak in Riyadh linked to one healthcare facility.

The extent to which other healthcare facilities in Riyadh are affected is unknown, as is the number of asymptomatic individuals who may be infected with MERS-CoV.

The role of hospitals as amplifiers of MERS-CoV infection is now well known, making the strict and timely application of comprehensive infection prevention and control measures all the more imperative.

Sporadic, imported cases can be expected in EU/EEA Member States, and are associated with a risk of nosocomial spread. This highlights the need for awareness among healthcare workers, early detection through functioning testing algorithms, preparedness planning and stringent infection control precautions.

Advice previously issued for travellers, including pilgrims, and healthcare workers remains valid.

Source and date of request

ECDC internal decision, 24 August 2015.

Public health issue

A large nosocomial outbreak of MERS in Riyadh triggered this update of ECDC's risk assessment, in order to assess whether this event changes the risk of international spread or increases the risk to EU citizens living in or travelling to Saudi Arabia. Furthermore, the update includes assessment of the risk of infection and introduction into the EU associated with pilgrims visiting Saudi Arabia during the upcoming Hajj.

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Consulted experts

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External consulted experts: World Health Organization (WHO) was consulted however the views expressed in this document do not necessarily represent the views of WHO.

Disease background information

Since the disease was first identified in Saudi Arabia in September 2012, more than 1 500 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 and persons with underlying chronic comorbidities. 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 [1].

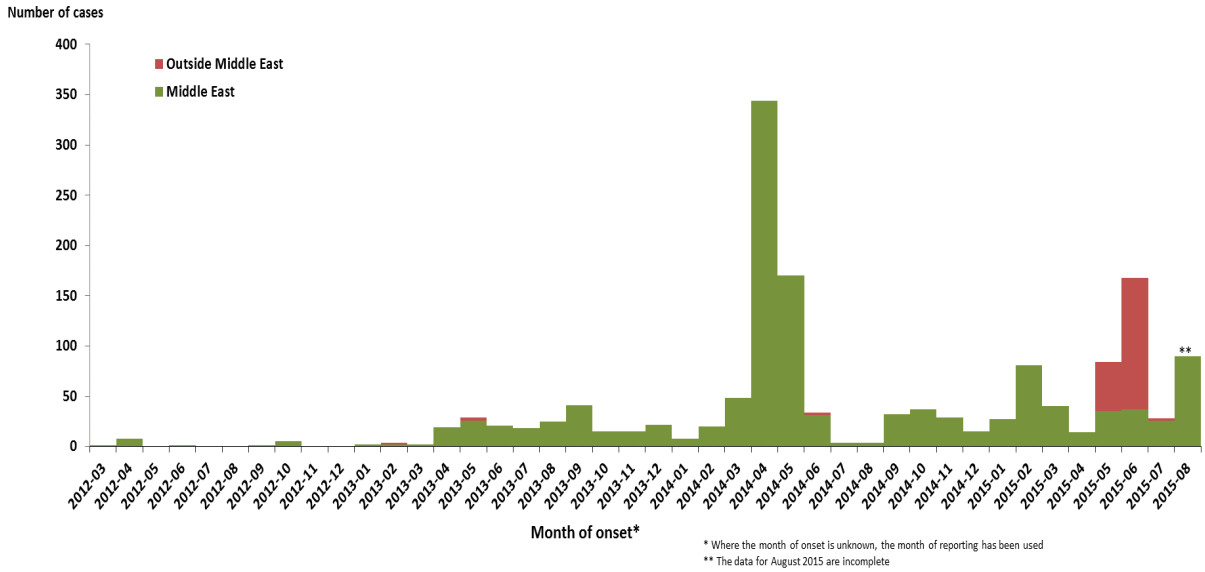
Although it is likely that zoonotic transmission is the starting point of most clusters, human-to-human transmission is the most common mode of transmission for MERS-CoV. Nosocomial transmission dominates the spread of MERS, and the majority of cases so far have been reported from hospital outbreaks in Saudi Arabia, the United Arab Emirates and South Korea. In this outbreak and since the beginning of this epidemic, it has not yet been established to what extent unrecognised mild and asymptomatic cases contribute to the sporadic cases reported in the community where exposure to camels, hospital outbreaks or other confirmed cases in the community could not be confirmed [2].

Event background information

Worldwide situation

Since April 2012 and as of 27 August 2015, 1511 cases of MERS, including 574 deaths, have been reported by health authorities worldwide (Figure 1 and 2, and Table 1).

Figure 1. Distribution of confirmed cases of MERS by month* and probable place of acquisition of infection, March 2012–27 August 2015 (n=1 511)



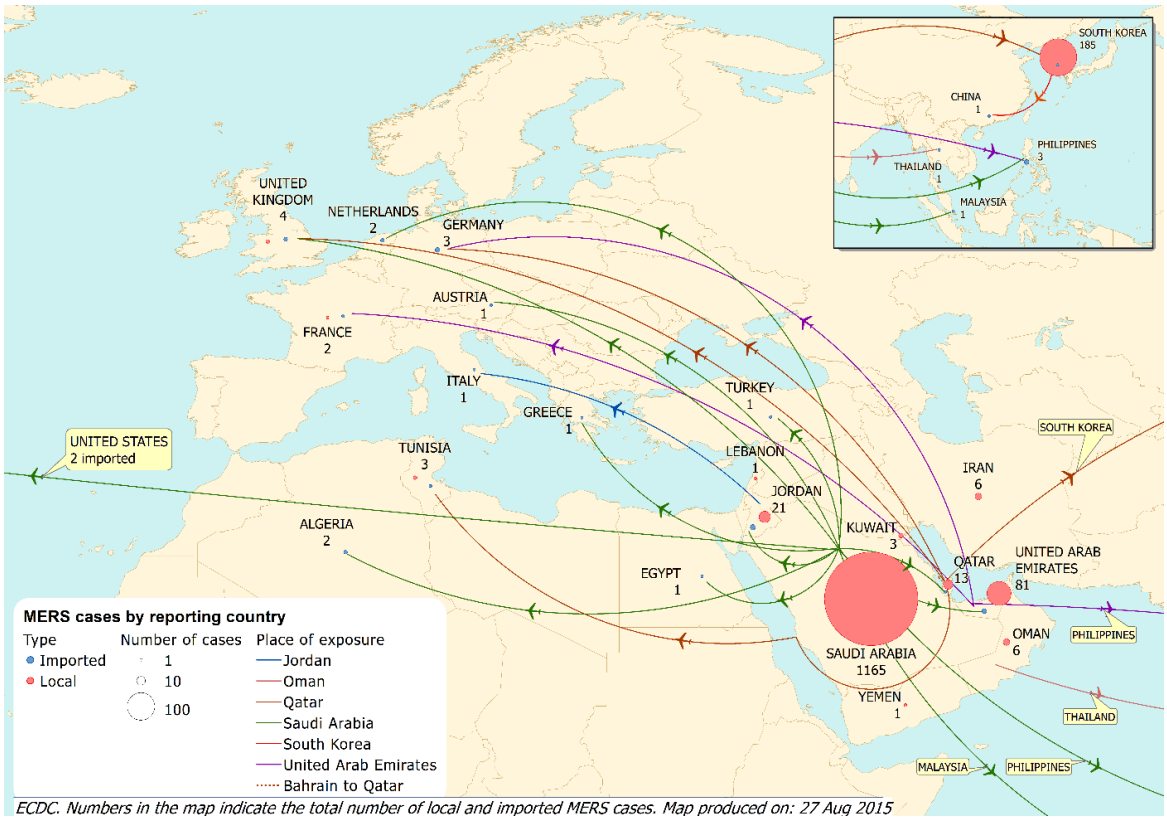
Current epidemiological situation

Since the previous update of the ECDC Rapid Risk Assessment on MERS-CoV of 31 July 2015 [3], and as of 27 August, 110 new cases and 31 deaths have been reported globally; most of them from Saudi Arabia (Table 1).

Table 1. Confirmed MERS cases and deaths, by country of reporting, March 2012–27 August 2015

Reporting country	Cases	Deaths
Middle East	1 298	527
Saudi Arabia	1 165	498
United Arab Emirates	81	11
Jordan	21	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
Total	**1 511**	**574**

Figure 2. Distribution of confirmed MERS cases by place of probable infection, as of 27 August 2015 (n=1 511)



ECDC. Numbers in the map indicate the total number of local and imported MERS cases. Map produced on: 27 Aug 2015

Outbreak in Riyadh

Between 2012 and August 2015, hospital outbreaks have been described in Saudi Arabia, Jordan and South Korea [4-7]. Some of these outbreaks included more than one hundred cases [6,7].

Since the beginning of 2015, Saudi Arabia has reported 337 cases (Figures 3 and 4), 105 of which have been reported since the risk assessment of 31 July [3]: 101 cases are from Riyadh province, two in Najran, one in Alzulfi and one in Abha province.

As with previous outbreaks in Saudi Arabia and the recent outbreak in South Korea, the majority (at least 53), of the currently cases reported in Riyadh are linked to a single hospital, the King Abdul Aziz Medical Centre - National Guard hospital. Among the cases reported in Riyadh, nine are healthcare workers. In addition, one of the two cases reported in Najran is a healthcare worker. Likely secondary cases in two small community clusters related to the National Guard hospital in Riyadh have also been reported [8].

Figure 3. Distribution of MERS cases by reporting city, Saudi Arabia, 1 January – 26 August 2015

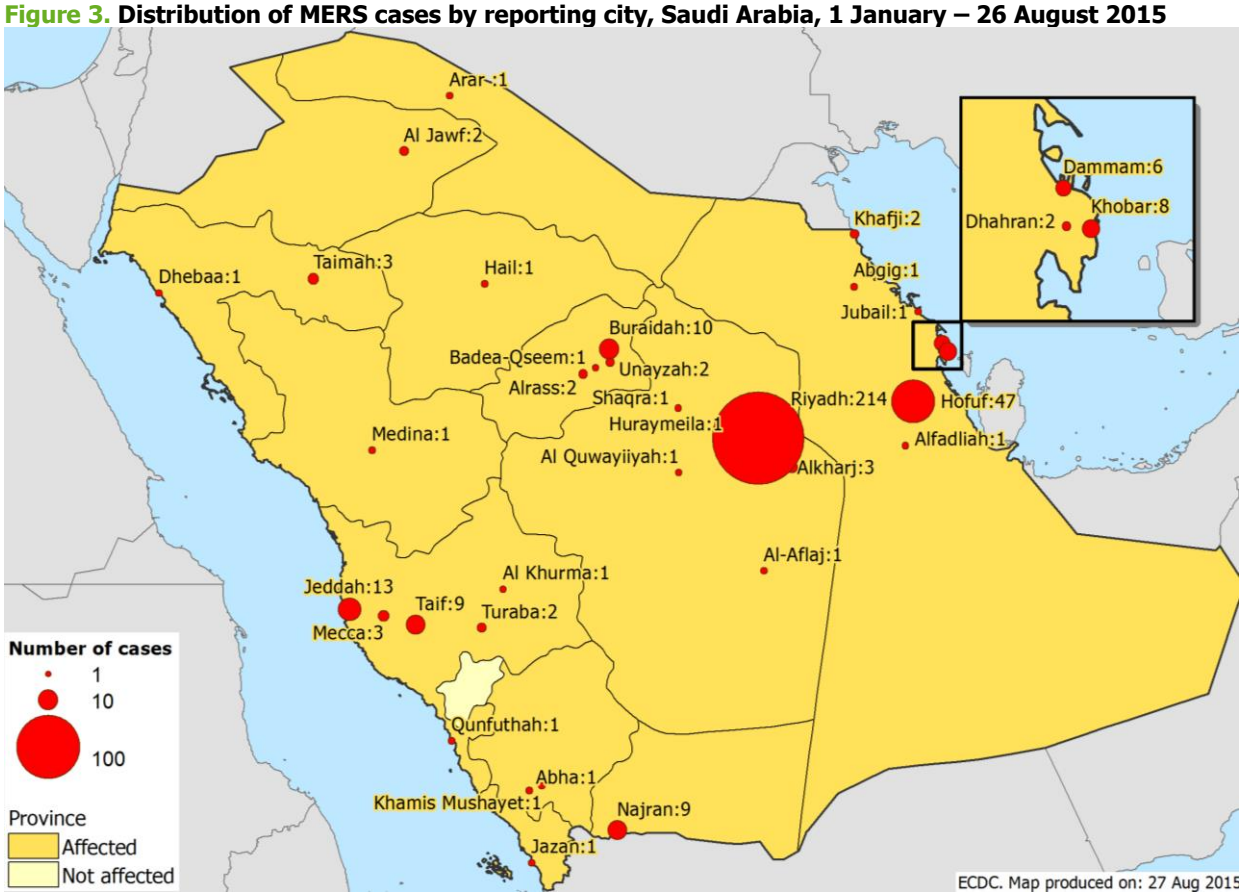
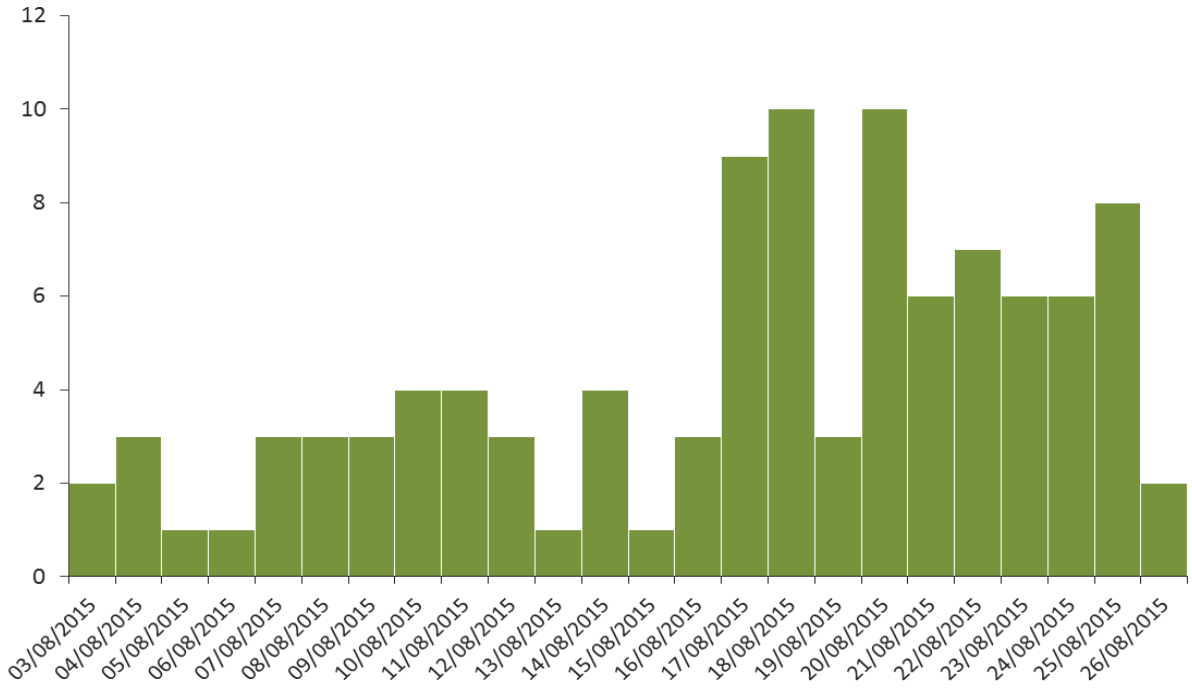


Figure 4. Number of cases (n=103) reported by Saudi Arabia in Riyadh, August 2015, by date of reporting

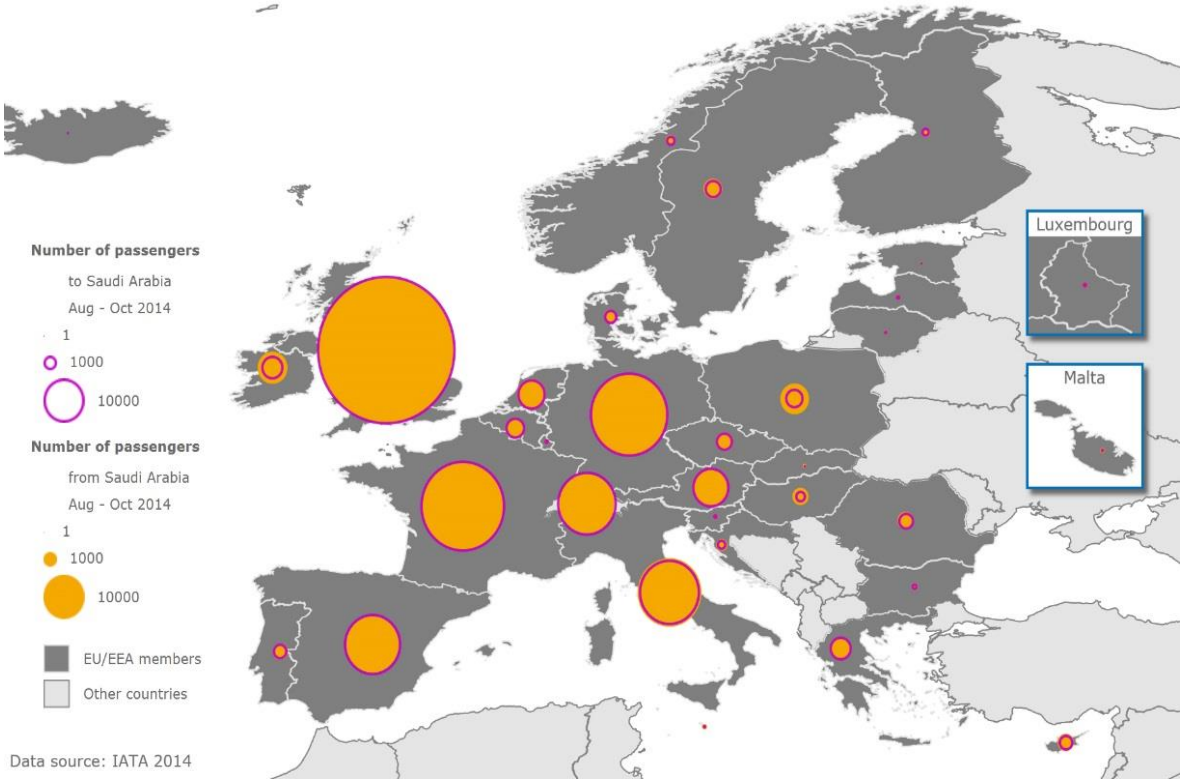


Travel patterns and Hajj

Throughout the year there is a large amount of global travel to and from the Middle East. An analysis of the global travel volume indicated that between June and November 2012 there were 6.9 million commercial air travellers departing from Saudi Arabia, Jordan, Qatar, and United Arab Emirates [10]. To date, a total of 5.7 million pilgrims have visited Saudi Arabia during the current Umrah season 1436 (since 23 November 2014) [9].

Between August and September 2014, over 280 000 passengers travelled with commercial air carriers from the EU/EEA to Saudi Arabia and over 270 000 passengers travelled from Saudi Arabia to EU/EEA countries (Figure 5). The United Kingdom, France and Germany are the countries with the highest numbers of passengers travelling to and from Saudi Arabia.

Figure 5. Number of travellers on commercial air carriers (excluding unscheduled charters), by EU/EEA country, to and from Saudi Arabia, August–October 2014

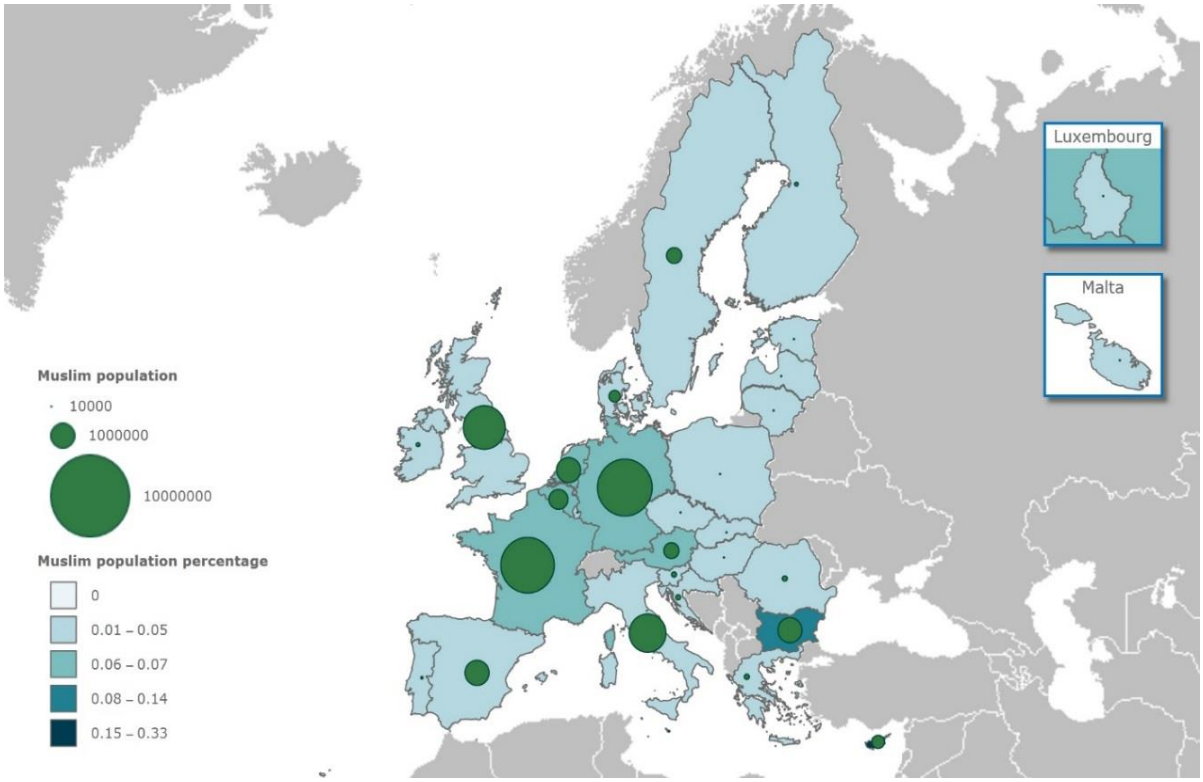


Source: BioDiaspora

In 2015, the Hajj will be performed between 21 and 26 September.

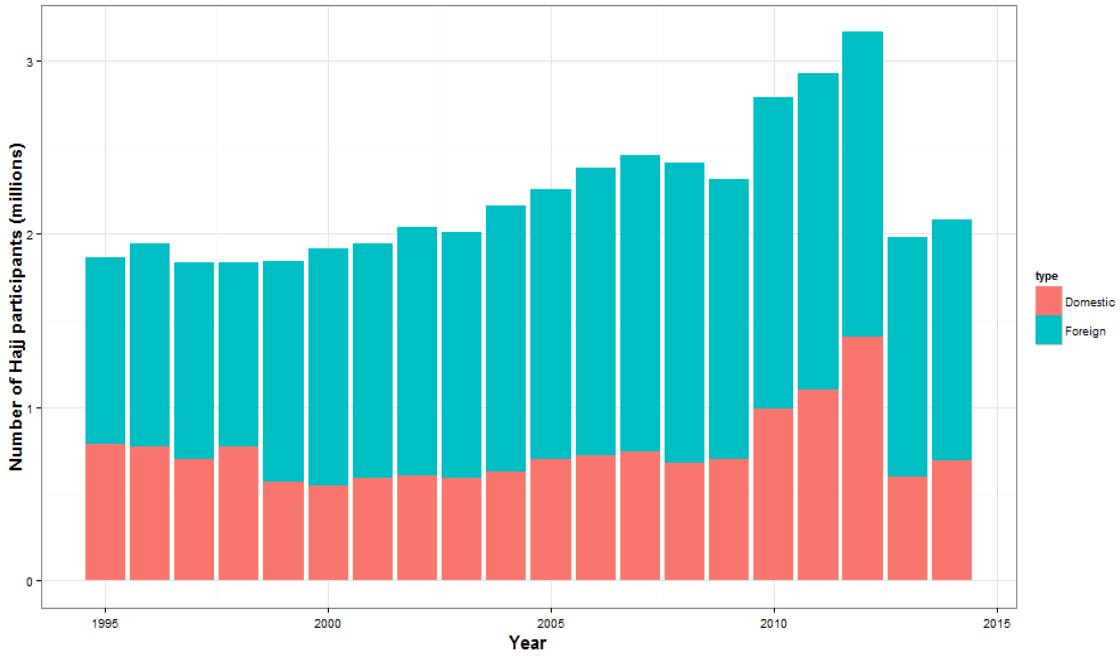
Saudi Arabia regulates participation in Hajj by approving visas for 1 000 pilgrims per million Muslim residents from each country. The Muslim population in EU countries was estimated to be 20 million in 2010 (Figure 6).

Figure 6. Estimation of Muslim population in the EU in 2010 [11, 12]



In 2011 and 2012, around three million people participated in the Hajj each year, while in 2013 and 2014 the numbers decreased to approximately two million (Figure 7).

Figure 7. Number of Hajj participants by year of Hajj, 1995–2014 [13]



Of the 1 389 053 foreign participants in last year's Hajj, 1 315 850 pilgrims came by air (95%), 59 204 by land (4%) and 13 999 by sea (1%) [14].

ECDC threat assessment for the EU

The majority of the MERS cases continue to be reported from the Middle East, and more specifically from Saudi Arabia. Due to the substantial number of people travelling between the Middle East and EU countries, and the continued circulation of the virus in camel populations causing nosocomial and family clusters in the Middle East, imported, sporadic cases to Europe continue to be expected.

When compared to previous years, the increase in reported MERS cases in August was unexpected and is mainly explained by a large, ongoing, nosocomial outbreak in Riyadh linked to one healthcare facility. As of 27 August 2014, there had been no decline in the weekly number of cases, indicating that the outbreak is continuing. The health authorities in Saudi Arabia have established strict control measures in the affected hospitals to contain the outbreak. The extent to which other healthcare facilities in Riyadh are affected and are linked to the outbreak hospital is currently unclear. A high-level WHO mission to Saudi Arabia is currently assessing the situation. Previous WHO missions have concluded that sub-optimal implementation of infection prevention and control procedures have contributed to outbreaks in the Middle East and South Korea.

Affected groups include patients hospitalised for other reasons, healthcare workers and patients visiting the emergency department. The role of hospitals as amplifiers of MERS-CoV infection is now well known, making the strict and timely application of comprehensive infection prevention and control measures all the more imperative. Such measures include effective triage of patients with respiratory infections for the timely detection and isolation of MERS-CoV cases, hand hygiene and the use of personal protective equipment.

The number of asymptomatic individuals (if any), who tested positive during contact follow-up in Riyadh in the current outbreak is unknown [15, 16]. The current guidance and case definition implemented by Saudi Arabia does not require systematic testing, or notification of asymptomatic laboratory-confirmed individuals [15]. However, the WHO case definitions require reporting of the latter as confirmed cases to WHO [17]. During the large 2014 nosocomial outbreak in Jeddah, up to 25% of the detected cases were asymptomatic prior to testing positive, although it is unclear how many developed symptoms later on [6].

The pattern of this hospital outbreak is similar to other hospital outbreaks related to MERS-CoV in the past in terms of severity, affected age-group and fatalities. Though previous nosocomial outbreaks in Saudi Arabia have not yet been fully documented, probable factors contributing to the extent of the outbreak might be a large, overcrowded emergency department; low awareness and late case identification; poor compliance with hygiene and protection precautions and imprudent case management, with infected healthcare workers serving to spread the disease. The recent large nosocomial outbreak of MERS-CoV in South Korea has illustrated the potential for such nosocomial outbreaks in other parts of the world, following single imported cases.

In addition to epidemiological studies assessing the detailed risk factors for primary cases, rapid documentation of the nosocomial clusters in a publicly available format is still urgently needed to guide global public health preparedness and response. Furthermore, the possible role of asymptomatic MERS cases in transmitting the virus needs to be carefully assessed.

According to WHO, analysis of sequences from currently circulating viruses does not show any substantial changes that would contribute to a higher transmissibility or pathogenicity [18].

Mass gathering events such as the Hajj provide a basis for communicable diseases to spread easily among humans. In 2014, Lessler et al. made a scenario analysis with predicted number of MERS-CoV cases during and on return from the Hajj [19]. They concluded that only small numbers of people would become infected during the event, some of whom would become sick upon return to their country of residence. A specific surveillance system is in place during the Hajj to monitor various relevant diseases, including MERS-CoV [20]. Despite intensive surveillance in Saudi Arabia and in countries to which pilgrims returned after the Hajj in 2013, no cases of MERS were detected among the estimated two million pilgrims. In 2014, several cases detected outside of Saudi Arabia were in pilgrims returning from the minor Umrah pilgrimage, but not from the Hajj. Given the current large number of cases, many of which are linked to the current hospital outbreak in Riyadh, as well as the constant detection of sporadic cases across the country in recent months, it is possible to identify cases among pilgrims or in the healthcare facilities providing services to the pilgrims. Sporadic, imported cases can be expected in EU/EEA Member States and are associated with a risk of nosocomial spread. This highlights the need for awareness among healthcare workers, early detection through functioning testing algorithms, preparedness planning and stringent infection control precautions.

The risk of widespread transmission of MERS-CoV in the community after sporadic importation into the EU/EEA remains low.

Options for response

Travellers and pilgrims to Hajj

The EU Health Security Committee has issued a statement with traveller advice regarding MERS-CoV (Annex 1) [21].

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 currently circulating in these areas, with a large hospital outbreak in Riyadh. 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 Middle East should avoid close contact with camels, visiting camel farms and consuming unpasteurised camel milk products or raw/under-cooked meat.

Pilgrims with pre-existing medical conditions planning to perform Hajj or Umrah this year 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 has advised the elderly, pregnant women and children and patients with chronic immunodeficiency or metabolic diseases to postpone their pilgrimage for their own safety. The Ministry also offers advice on how to prevent infection [22].

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 [23].

WHO does not recommend travel restrictions in relation to MERS-CoV, but rather recommends raising awareness among travellers to and from affected countries [24]. A risk assessment is available from Public Health England [25], as well as health and travel advice for travellers to the Middle-East and pilgrims participating in the Hajj and Umrah by CDC and the National Travel Health Network [26, 27].

Returning travellers and advice for healthcare workers

The Health Security Committee has issued a statement with advice for returning travellers and healthcare workers regarding MERS-CoV (Annex 2) [28].

Early detection of MERS-CoV infection among travellers from the Middle East, especially Saudi Arabia and the United Arab Emirates, remains essential. The recent outbreaks in South Korea and in Riyadh also highlight the continued risk of healthcare-associated transmission and the need for timely diagnosis and implementation of infection prevention and control measures.

Countries should advise travellers returning from all countries affected by MERS-CoV to seek medical attention if they develop a respiratory illness with fever and cough or diarrhoea 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. In addition to eye protection (i.e. goggles or face shield), gown and gloves, healthcare workers caring for probable or confirmed cases of MERS should use personal protective equipment (PPE) 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 using filters with a specification of FFP2 or FFP3 [29]. 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.

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Annex I. MERS-CoV infection advice with regard to travelling [21]

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.

* 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 Ministry of Health 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 healthcare workers caring for patients with MERS-CoV infection [28]

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). 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.

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

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 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.

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

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

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.