RAPID RISK ASSESSMENT

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

22nd update, 29 August 2018

Main conclusions and options for response

On 23 August 2018, Public Health England (PHE) reported one case of MERS, detected in England. The patient is a resident of the Kingdom of Saudi Arabia (KSA) who had travelled from Jeddah (KSA) to Manchester (United Kingdom). The case was transferred to an isolation ward after MERS-CoV was suspected and is currently at a specialised hospital in Liverpool in a stable, ambulatory condition. According to the UK authorities, a limited number of close contacts have been identified and are being followed up. This is the fifth case of MERS-CoV reported from the UK.

The majority of the MERS-CoV infections continue to be reported from the Middle East and more specifically from the Kingdom of Saudi Arabia. Sporadic MERS-CoV infections in travellers returning to EU/EEA countries can be expected, given the regular occurrence of MERS-CoV infections in the Middle East and the substantial number of people travelling between the region and EU countries.

European public health authorities should remain vigilant, continue surveillance of acute respiratory infections and maintain preparedness for travel-related MERS cases entering the EU/EEA. Information about the risk of MERS should be shared with clinicians to maintain increased awareness for early identification, isolation and diagnosis of possible MERS. Adherence to strict infection control protocols throughout contact with possible cases is critical for preventing further spread of MERS-CoV in healthcare settings.

Previously issued advice for travellers, including pilgrims, and healthcare workers remains valid. EU residents travelling to Middle Eastern countries need to be made aware that MERS-CoV is circulating in these areas. Close contact with dromedary camels, consumption of raw/undercooked camel products, such as milk, and transmission in hospital settings are the main sources of infection.

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

The risk of widespread transmission of MERS-CoV in the community after sporadic importation into the EU/EEA remains very low. The risk of transmission of MERS-CoV in the healthcare setting after sporadic importation into the EU/EEA remains low, provided appropriate infection control measures are implemented rapidly when seeing suspected cases.

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Public health issue

This update of ECDC's risk assessment on MERS-CoV was triggered by the detection of a case imported into the EU/EEA from the Kingdom of Saudi Arabia (KSA). In this update, we reassess the risk for EU/EEA residents.

Consulted experts

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External consulted experts: Nick Phin, Public Health England and the World Health Organization (WHO). It should be noted, however, that the views expressed in this document do not necessarily represent the views of WHO.

Disease background information

Since the disease was first identified in the Kingdom of Saudi Arabia in September 2012 and as of 24 August 2018, 2 253 MERS cases, including 840 deaths, have been detected in 27 countries worldwide [1]. In Europe, eight countries (Austria, France, Germany, Greece, Italy, the Netherlands, Turkey and the United Kingdom) have reported confirmed cases, all with direct or indirect connection to the Middle East.

The clinical presentation of MERS-CoV infection ranges from asymptomatic to very severe pneumonia with acute respiratory distress syndrome, septic shock and multi-organ failure resulting in death. Healthy adults under the age of 60 years infected with MERS-CoV usually present as asymptomatic or with mild infection [2-4]. The majority of severe cases have been reported in males aged over 50 years with underlying conditions such as diabetes, renal disease and immune suppression.

The incubation period is estimated to be up to 14 days [5]. The estimated reproductive number (R_0) is mostly <1 in KSA, but is dependent on the outbreak setting and was reported to be R_0 =2.5-8 in South Korea during the early phase of the outbreak [6-8].

Three patterns of MERS-CoV transmission have been identified: sporadic community-acquired cases (usually of zoonotic origin), family clusters (usually among close contacts and those caring for a confirmed case) and clusters in healthcare settings.

Dromedary camels represent the host species of the virus and camels play an important role as the primary source of human infections [9,10]. Persons in close contact with dromedaries or consuming raw/undercooked dromedary products are considered to be at higher risk of infection [2]. In a recent study, almost 55% of primary cases report direct or indirect contact with dromedaries. According to WHO reports, between 2017 and 2018, 37/56 community-acquired cases had direct or indirect contact with dromedary camels [2,10].

In humans, MERS-CoV has been detected in respiratory tract specimens (such as sputum, nasopharyngeal swab, endotracheal aspirate), as well as in urine, faeces and blood [3]. Viral shedding has been detected for three weeks or longer [11,12]. Transmission of MERS-CoV from human to human has been described both in the community and in healthcare settings [2]. Although the precise routes of human-to-human transmission (e.g. droplet, airborne or ingestion) are still unclear, close contact is known to facilitate transmission [3].

The majority of cases have been reported from healthcare-associated outbreaks in Saudi Arabia, the United Arab Emirates and South Korea. Some of the healthcare-associated outbreaks have included more than 100 cases [13-16]. Healthcare-associated cases have included patients sharing the room or the ward with a MERS patient, healthcare workers and family visitors [2]. No sustained human-to-human transmission or community outbreaks outside of close contacts have been documented for MERS.

Hospital transmission of MERS-CoV and related hospital outbreaks have been observed over the last few years in different countries [3,6,7,17]. The analysis of transmission patterns is supported by molecular epidemiological studies which are able to identify relatedness of viruses despite no obvious risk factors for transmission [18].

ECDC has previously published risk assessment guidelines for diseases transmitted on aircraft [19]. Many studies have shown that MERS-CoV, similar to other respiratory viruses, can spread in humans who are in close contact and that infection can occur over short periods of time [3,20]. With the increasing number of passengers travelling internationally by air, the potential risk of MERS-CoV being introduced and spread will increase [21,22]. During two previous MERS case investigations to manage contact tracing in the UK in 2014, no evidence of symptomatic onward transmission was found [23] and so far no transmission events have been detected on board planes or at airports.

The environmental persistence of the virus is not clear. MERS-CoV has been cultured from air, surfaces and medical equipment up to several days after contact with a positive patient [24]. Further studies are required to better understand the risk factors for animal-to-human and human-to-human transmission.

Evolution of MERS-CoV viruses in the camel population and continued transmission to humans and between humans could support adaptation mechanisms for the emergence of a more transmissible variant to humans [25].

Event background information

On 23 August 2018, Public Health England (PHE) reported one case of MERS-CoV detected in England [26].

The case, a resident of Saudi Arabia, reported onset of symptoms on 13 August 2018 and a private medical consultation on 15 August 2018 before travelling. He had no history of recent travel, or contact with sick patients in Saudi Arabia before the onset of symptoms.

On 16 August 2018, the patient travelled from Jeddah (KSA) to Manchester (UK) on Saudi Arabian Airlines flight SV123 and onward to the final destination in Leeds by private transportation. On 19 August, the case was initially admitted to an infectious disease unit in a hospital in Leeds where MERS-CoV infection was confirmed. The case was then transferred to the Royal Liverpool Hospital, an expert respiratory infectious disease centre. As of 26 August, the case was in a stable and ambulatory condition.

Close contacts (a mix of hospital and community) have been identified and followed up and passengers from the same flight have been identified and informed. Investigation is ongoing into the case's exposure possibilities prior to symptom onset.

This is the fifth MERS case reported by the UK since 2012. Two previous cases were imported from the Middle-East, while the other two were infected through contact with a confirmed index case [27,28]. Three of these five cases have died. The UK public health authorities have developed dedicated algorithms for the diagnosis and management of MERS cases as well as for the public health investigation and management of contacts [29].

The UK public health authorities have also provided advice for travellers and pilgrims to the Middle East in multiple languages.

Current PHE guidelines recommend that healthcare providers consider MERS-CoV infection in any symptomatic patient returning from an endemic country within 14 days, with no alternative explanation. Although resource-intensive, the early detection and appropriate management of this fifth case in the UK highlights the importance of maintaining appropriate protocols and procedures.

Worldwide situation

Since April 2012 and as of 24 August 2018, 2 253 cases of MERS, including 840 deaths, have been reported by health authorities worldwide (Figures 1 and 2, and Table 1). Sixteen cases have been reported from EU Member States, all related to importation from the Middle East.

Figure 1. Distribution of confirmed MERS cases by month* and probable place of infection, April 2012–24 August 2018 (n=2 253)

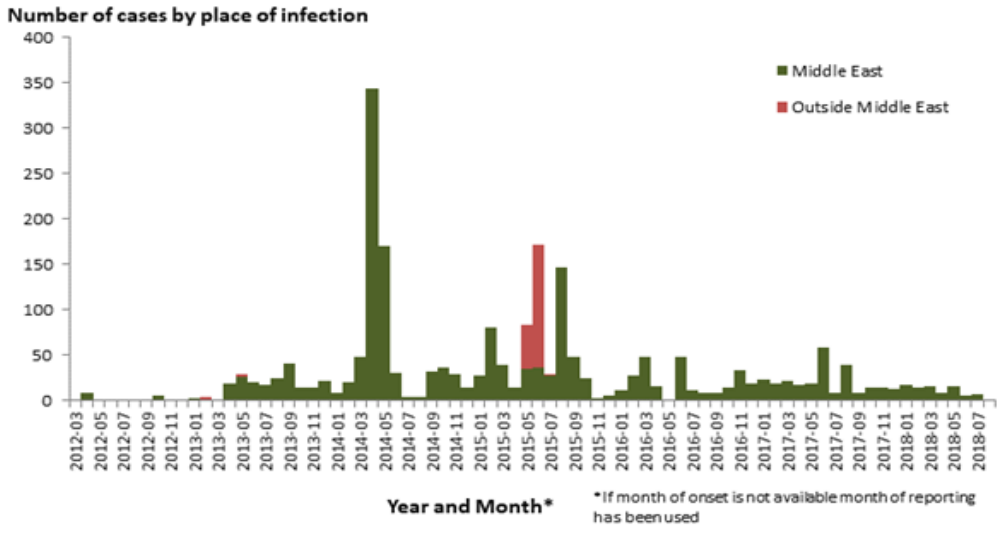
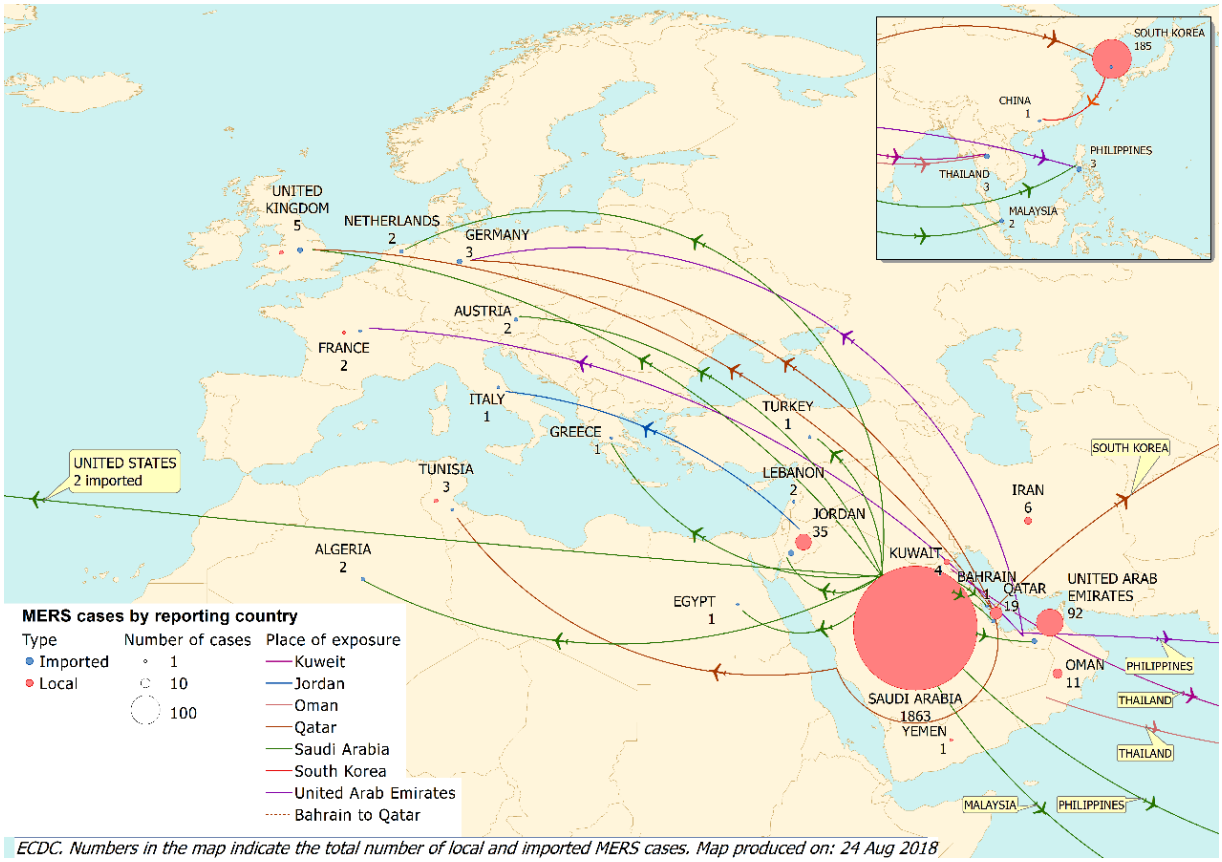


Table 1. Confirmed MERS cases and deaths, by country of reporting, April 2012–24 August 2018

Region	Country	Number of cases	Number of deaths
Middle East	Kingdom of Saudi Arabia	1863	750
	United Arab Emirates	92	13
	Qatar	19	5
	Jordan	35	14
	Oman	11	3
	Kuwait	4	2
	Egypt	1	0
	Yemen	1	1
	Lebanon	2	0
	Bahrain	1	0
	Iran	6	2
Europe	Turkey	1	1
	UK	5	3
	Germany	3	2
	France	2	1
	Italy	1	0
	Greece	1	1
	Netherlands	2	0
	Austria	2	1
Africa	Tunisia	3	1
	Algeria	2	1
Asia	Malaysia	2	1
	Philippines	3	0
	South Korea	185	38
	China	1	0
	Thailand	3	0
Americas	United States of America	2	0
Global		**2253**	**840**

Figure 2. Distribution of confirmed MERS cases by place of probable infection, as of 24 August 2018 (n=2 253)



ECDC. Numbers in the map indicate the total number of local and imported MERS cases. Map produced on: 24 Aug 2018

Travel patterns to and from the Middle East

The volume of travel to and from the Middle East is high throughout the year. An analysis of global travel figures showed that 6.9 million commercial air travellers departed from KSA, Jordan, Qatar and the United Arab Emirates between June and November 2012 [30]. According to the International Air Transport Association (IATA), in 2016, there were 12.5 million estimated travellers from the EU to the Middle East. Of these, almost 900 000 travelled to Saudi Arabia, 360 000 to Jordan, 490 000 to Qatar, and four million to the United Arab Emirates.

ECDC threat assessment for the EU

Due to its ability to cause large and rapid healthcare-associated outbreaks with high case fatality, MERS-CoV infections continue to pose a threat to public health in the Middle East for as long as the virus circulates in camel populations causing spill-over cases and events.

The majority of MERS cases continue to be reported from the Middle East, and more specifically from KSA. A substantial number of people travel between the Middle East and EU countries and sporadic imported cases can be expected in EU/EEA Member States due to the endemicity of the virus in the primary host, dromedary camels and continuous sporadic spill-over to exposed people in the Arabian Peninsula. However, the most recently reported MERS case in Europe, prior to the current UK case, was in Germany in March 2015.

The current MERS patient travelled by plane to the UK through two busy airports while symptomatic. Contact tracing activities have been initiated by UK and KSA authorities to identify other passengers on board the same flight as the patient, but are limited to those individuals sitting closest to the passenger, as recommended for other respiratory viruses [19,21]. Close contacts are being identified, given information and asked to call a dedicated number in the event of symptom onset. So far, since the identification of the virus in 2012, no MERS-CoV transmission has been reported between passengers on a flight, which contrasts with the transmission events documented for Severe Acute Respiratory Syndrome (SARS) in 2003. Contact tracing for contacts during airport transits will also be limited to possible close contacts.

The patient sought healthcare support soon after arrival in the UK and the MERS-CoV infection was rapidly detected after admission to the hospital which triggered an immediate transfer to an isolation ward. These measures minimised the risk of transmission to close contacts and the spread of the virus within the hospital setting (e.g. to healthcare workers, patients, visitors or outpatients.)

Personal protective measures lower the risk of MERS-CoV infection transmission for people in close contact with the case (e.g. healthcare workers.)

A large number of pilgrims will be returning from the Hajj 2018 to EU Member States during the coming days. Although European and KSA recommendations for pilgrims advocate avoiding contact with camels or consuming unprepared camel products (such as milk) [31], this is popular among travellers to the region and the importation of further cases is possible. Saudi officials prohibit camels or camel products in the areas of Mecca visited by pilgrims.

ECDC has published a rapid risk assessment on public health risks related to communicable diseases during the Hajj 2018 [31].

The risk of widespread transmission of MERS-CoV in the community after sporadic importation into the EU/EEA remains low, due to the low reproduction number of the virus which is supported by the lack of documented community outbreaks. The risk of transmission of MERS-CoV in healthcare settings after sporadic importation into the EU/EEA remains low, provided appropriate infection control measures are implemented rapidly for suspected cases.

Options for response

Travellers and pilgrims

EU residents travelling to the Middle East need to be made aware that MERS-CoV is circulating in these areas, and that close contact with dromedary camels or consumption of raw/undercooked camel products such as milk, as well as transmission in hospital settings are the main sources of infection. This applies in particular, but not exclusively, to KSA. EU travellers should be reminded of the importance of good hand and respiratory hygiene and adherence to good food-safety practices, and advised to avoid contact with sick people. This is particularly important for elderly travellers with pre-existing medical conditions (e.g. diabetes, chronic lung disease, chronic renal disease, immunodeficiency, etc.). Travellers to the Middle East should avoid close contact with camels, visiting camel farms and consuming raw/undercooked camel milk products or raw/under-cooked meat [31].

Pilgrims with pre-existing medical conditions, who are planning to travel to the Middle East should be advised to consult a healthcare provider to review the risk before deciding to make the pilgrimage. The Ministry of Health of the Kingdom of Saudi Arabia has advised that those with severe medical conditions such as terminal cancers,

advanced cardiac, respiratory, liver, or kidney diseases, and senility are exempt from the religious duties of pilgrimage [32].The Ministry also offers advice on how to prevent infection [32,33].

Travellers with pre-existing medical conditions should also be advised to identify a trusted healthcare facility prior to travel in the event of a health emergency during their stay. Travellers who require medical care should minimise contact with other sick people when visiting healthcare facilities [34].

Notably, no cases of MERS-CoV infection have been reported among returning Hajj pilgrims since the identification of the virus, despite intense surveillance in many countries, either in previous years or during 2018. WHO does not recommend travel restrictions in relation to MERS-CoV infections, but rather recommends raising awareness among travellers to and from affected countries [13]. The US Centers for Disease Control and Prevention (CDC) and the National Travel Health Network have also issued health and travel advice for travellers to the Middle East and pilgrims participating in the Hajj and Umrah [35,36].

Returning travellers and advice for healthcare workers

Sporadic cases of MERS-CoV infection in returning travellers can be expected in the EU/EEA countries. Countries should advise travellers returning from all areas affected by MERS-CoV to seek medical attention if they develop a respiratory illness with fever and cough or diarrhoea during the two-week period after their return, and to disclose their recent travel history to their healthcare provider. Travellers returning from the Middle East who experience respiratory symptoms should be asked to report visits to healthcare facilities, direct or indirect contact with camels or the consumption of raw/undercooked camel products during their travel.

Early detection of MERS-CoV infection among travellers from the Middle East, especially from countries with a high incidence of MERS cases, remains essential to preventing local outbreaks. The healthcare associated outbreaks highlight the continued risk of healthcare-associated transmission and the need for timely diagnosis and implementation of infection prevention and control measures.

Healthcare workers in the EU should be made aware of the risk associated with 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. The Ministry of Health of the Kingdom of Saudi Arabia has also published guidelines for healthcare professionals [33].

The successful prevention of amplification of MERS-CoV infections associated with healthcare depends on the full implementation of infection prevention and control programmes [24]. Before a specific case is suspected or confirmed, it is essential to routinely apply measures to prevent the spread of acute respiratory infections (ARI) when caring for symptomatic patients in order to reduce the spread of any ARI in healthcare settings. Additional precautions should be applied when caring for patients with probable or confirmed MERS-CoV infection to further reduce the risk of transmission [37].

Public health authorities in the EU need to maintain a high level of vigilance and preparedness for potential MERS cases among returning travellers. Every confirmed case of MERS should be notified promptly through the Early Warning Response System (EWRS) and the International Health Regulations (IHR) mechanism.

References

1. European Centre for Disease Prevention and Control. Communicable Disease Threat Report Week 32, 5-11 August 2018.
2. World Health Organization. WHO MERS Global Summary and Assessment of Risk. 2018. Available from: http://www.who.int/csr/disease/coronavirus_infections/risk-assessment-august-2018.pdf?ua=1.
3. Hui DS, Azhar EI, Kim YJ, Memish ZA, Oh MD, Zumla A. Middle East respiratory syndrome coronavirus: risk factors and determinants of primary, household, and nosocomial transmission. Lancet Infect Dis. 2018 Aug;18(8):e217-e27.
4. European Centre for Disease Prevention and Control. Factsheet for health professionals, MERS-CoV 2014. Available from: http://www.ecdc.europa.eu/en/healthtopics/coronavirus-infections/mers-factsheet/Pages/default.aspx.
5. Assiri A, McGeer A, Perl TM, Price CS, Al Rabeeah AA, Cummings DA, et al. Hospital outbreak of Middle East respiratory syndrome coronavirus. N Engl J Med. 2013 Aug 1;369(5):407-16.
6. Chen X, Chughtai AA, Dyda A, MacIntyre CR. Comparative epidemiology of Middle East respiratory syndrome coronavirus (MERS-CoV) in Saudi Arabia and South Korea. Emerg Microbes Infect. 2017 Jun 7;6(6):e51.
7. Park JW, Lee KJ, Lee KH, Lee SH, Cho JR, Mo JW, et al. Hospital Outbreaks of Middle East Respiratory Syndrome, Daejeon, South Korea, 2015. Emerg Infect Dis. 2017 Jun;23(6):898-905.
8. Park JE, Jung S, Kim A, Park JE. MERS transmission and risk factors: a systematic review. BMC Public Health. 2018 May 2;18(1):574.
9. Gossner C, Danielson N, Gervelmeyer A, Berthe F, Faye B, Kaasik Aaslav K, et al. Human-Dromedary Camel Interactions and the Risk of Acquiring Zoonotic Middle East Respiratory Syndrome Coronavirus Infection. Zoonoses Public Health. 2016 Feb;63(1):1-9.
10. Conzade R, Grant R, Malik MR, Elkholy A, Elhakim M, Samhouri D, et al. Reported Direct and Indirect Contact with Dromedary Camels among Laboratory-Confirmed MERS-CoV Cases. Viruses. 2018 Aug 13;10(8).
11. Oh MD, Park WB, Choe PG, Choi SJ, Kim JI, Chae J, et al. Viral Load Kinetics of MERS Coronavirus Infection. N Engl J Med. 2016 Sep 29;375(13):1303-5.
12. Corman VM, Albarrak AM, Omrani AS, Albarrak MM, Farah ME, Almasri M, et al. Viral Shedding and Antibody Response in 37 Patients With Middle East Respiratory Syndrome Coronavirus Infection. Clin Infect Dis. 2016 Feb 15;62(4):477-83.
13. Cowling BJ, Park M, Fang VJ, Wu P, Leung GM, Wu JT. Preliminary epidemiological assessment of MERS-CoV outbreak in South Korea, May to June 2015. Euro Surveill. 2015;20(25).
14. Oboho IK, Tomczyk SM, Al-Asmari AM, Banjar AA, Al-Mugti H, Aloraini MS, et al. 2014 MERS-CoV outbreak in Jeddah--a link to healthcare facilities. N Engl J Med. 2015 Feb 26;372(9):846-54.
15. WHO Regioinal Office for the Eastern Mediterranean. WHO mission on Middle East respiratory syndrome coronavirus (MERS-CoV) in Saudi Arabia 2015 [cited 13 October 2015]. Available from: http://www.emro.who.int/surveillance-forecasting-response/surveillance-news/who-mission-on-middle-east-respiratory-syndrome-coronavirus-merscov-in-saudi-arabia.html.
16. Oh MD, Park WB, Park SW, Choe PG, Bang JH, Song KH, et al. Middle East respiratory syndrome: what we learned from the 2015 outbreak in the Republic of Korea. Korean J Intern Med. 2018 Mar;33(2):233-46.
17. Kim KH, Tandi TE, Choi JW, Moon JM, Kim MS. Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak in South Korea, 2015: epidemiology, characteristics and public health implications. J Hosp Infect. 2017 Feb;95(2):207-13.
18. Assiri AM, Midgley CM, Abedi GR, Bin Saeed A, Almasri MM, Lu X, et al. Epidemiology of a Novel Recombinant Middle East Respiratory Syndrome Coronavirus in Humans in Saudi Arabia. J Infect Dis. 2016 Sep 1;214(5):712-21.
19. European Centre for Disease Prevention and Control. Risk assessment guidelines for diseases transmitted on aircraft. Part II: Operational guidelines for assisting in the evaluation of risk for transmission by disease 2010. Second edition. Stockholm: ECDC; 2010. Available from: https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/1012_GUI_RAGIDA_2.pdf
20. Browne A, Ahmad SS, Beck CR, Nguyen-Van-Tam JS. The roles of transportation and transportation hubs in the propagation of influenza and coronaviruses: a systematic review. J Travel Med. 2016 Jan;23(1).

21. Leitmeyer K. European risk assessment guidance for infectious diseases transmitted on aircraft--the RAGIDA project. Eurosurveillance: bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin. 2011 Apr 21;16(16).

22. Gardner LM, Chughtai AA, MacIntyre CR. Risk of global spread of Middle East respiratory syndrome coronavirus (MERS-CoV) via the air transport network. J Travel Med. 2016 Jun;23(6).

23. Parry-Ford F, Boddington N, Pebody R, Phin N, Incident Management T. Public health response to two incidents of confirmed MERS-CoV cases travelling on flights through London Heathrow Airport in 2014 - lessons learnt. Eurosurveillance: bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin. 2015;20(18).

24. Al-Tawfiq JA, Auwaerter PG. Healthcare-associated infections: the hallmark of Middle East respiratory syndrome coronavirus with review of the literature. J Hosp Infect. 2018 Jun 1.

25. Dudas G, Carvalho LM, Rambaut A, Bedford T. MERS-CoV spillover at the camel-human interface. 2018 Jan 16;7.

26. Public Health England. MERS-CoV case in England In: Public Health England press office. August 2018. [cited 29 August 2018] Available from: https://www.gov.uk/government/news/mers-cov-case-in-england

27. Pebody RG, Chand MA, Thomas HL, Green HK, Boddington NL, Carvalho C, et al. The United Kingdom public health response to an imported laboratory confirmed case of a novel coronavirus in September 2012. Euro Surveill. 2012;17(40):20292.

28. Health Protection Agency UK Novel Coronavirus Investigation team. Evidence of person-to-person transmission within a family cluster of novel coronavirus infections, United Kingdom, February 2013. Euro surveillance: bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin. 2013 Mar 14;18(11):20427.

29. Public Health England. Middle East respiratory syndrome coronavirus (MERS-CoV): clinical management and guidance 2016. Available from: https://www.gov.uk/government/collections/middle-east-respiratory-syndrome-coronavirus-mers-cov-clinical-management-and-guidance.

30. Khan K, Sears J, Hu VW, Brownstein JS, Hay S, Kossowsky D, et al. Potential for the international spread of Middle East respiratory syndrome in association with mass gatherings in Saudi Arabia. PLoS Curr. 2013;5.

31. European Centre for Disease Prevention and Control. Rapid risk assessment: Public health risks related to communicable diseases during the 2018 Hajj, Saudi Arabia, 19–24 August 2018. Available from: https://ecdc.europa.eu/en/publications-data/rapid-risk-assessment-public-health-risks-related-communicable-diseases-during-0

32. Ministry of Health Kingdom of Saudi Arabia. Health Requirements and Recommendations for Travelers to Saudi Arabia for Hajj and Umrah - 2018/1439H 2018 [cited 2018]. Available from: https://www.moh.gov.sa/en/hajj/pages/healthregulations.aspx.

33. Ministry of Health Kingdom of Saudi Arabia. Middle East Respiratory Syndrome Coronavirus; Guidelines for healthcare professionals 2018. Available from: https://www.moh.gov.sa/CCC/StaffRegulations/Corona/Documents/MERS-CoV%20Guidelines%20for%20Healthcare%20Professionals%20-%20April%202018%20-%20v5.pdf.

34. European Commission. Health Security Committee/Early Warning and Response System. Statement on MERS-CoV infection advice with regard to travelling 2015 [31/07/2015]. Available from: http://ec.europa.eu/health/preparedness_response/docs/mers_20150709_traveladvice_en.pdf.

35. Centers for Disease Control and Prevention U. Hajj and Umrah in Saudi Arabia - Travellers' Health [cited 25 August 2015]. Available from: http://wwwnc.cdc.gov/travel/notices/alert/hajj-umrah-saudi-arabia-2015.

36. National Travel Health Network and Centre NaTHNaC. Protecting the health of British travellers 2015 [cited 25 August 2015]. Available from: http://www.nathnac.org/pro/factsheets/Hajj_Umrah.htm.

37. World Health Organization. Infection prevention and control during health care for probable or confirmed cases of Middle East respiratory syndrome coronavirus (MERS-CoV) infection. Interim guidance. Updated 4 June 2015 Geneva: WHO; 2015 [cited 15 October 2015]. Available from: http://apps.who.int/iris/bitstream/10665/174652/1/WHO_MERS_IPC_15.1_eng.pdf?ua=1.