

OREGON PUBLIC HEALTH DIVISION • OREGON HEALTH AUTHORITY

MIDDLE EAST RESPIRATORY SYNDROME (MERS)

The first imported cases of Middle East Respiratory Syndrome (MERS) in the United States were reported in early May. Although no spread was documented in this country, cases in the Middle East have increased markedly since March (Figure 1).<sup>1</sup> In this *CD Summary*, we outline what's known (and not) about MERS and its causative coronavirus (CoV), and describe the role of clinicians in recognizing persons who might be affected, making a timely diagnosis, and limiting the likelihood of further spread.

THE PATHOGEN

MERS is caused by an RNA virus of the family *Coronaviridae*. It was first identified as a cause of human infection in 2012 in a resident of Saudi Arabia. It is closely related to strains circulating in bats, but the striking frequency of seropositivity among camels in the affected region (90%–100% in some tested cohorts) suggests that these humped companions may constitute the main reservoir of the virus.<sup>2,3</sup>

MERS-CoV infection typically presents with fever, severe pneumonia or acute respiratory distress syndrome, and 62% of reported lab-confirmed cases have been hospitalized. Though

**Going Paperless and Free CME!**  
Only a few print issues left. The *CD Summary* is going paperless this summer. Please subscribe for e-mail delivery, and encourage colleagues who either don't subscribe or only get the print edition to do the same.  
Some licensed providers will be able to get free CME credits for reading the *CD Summary* and passing a test. Details will follow.  
Visit: <http://healthoregon.org/cdsummary>

the mortality rate among reported symptomatic patients has been 25%–30%, some patients have presented with mild illness, and, based on laboratory testing of contacts, as many as one in five of those infected may be asymptomatic.

EPIDEMIOLOGY

The median age of reported cases has been 49 (range, 1–94) years, and 65% of those with confirmed MERS have been male. The infection seems to strike disproportionately those with underlying chronic conditions such as renal insufficiency and diabetes, although since many cases have occurred in the course of healthcare-associated outbreaks, this might be a red herring.\* Ninety-six percent of cases reported to date have been among residents of countries on or near the Arabian Penin-

Figure 2. Countries on or near the Arabian Peninsula with confirmed MERS.<sup>1</sup>



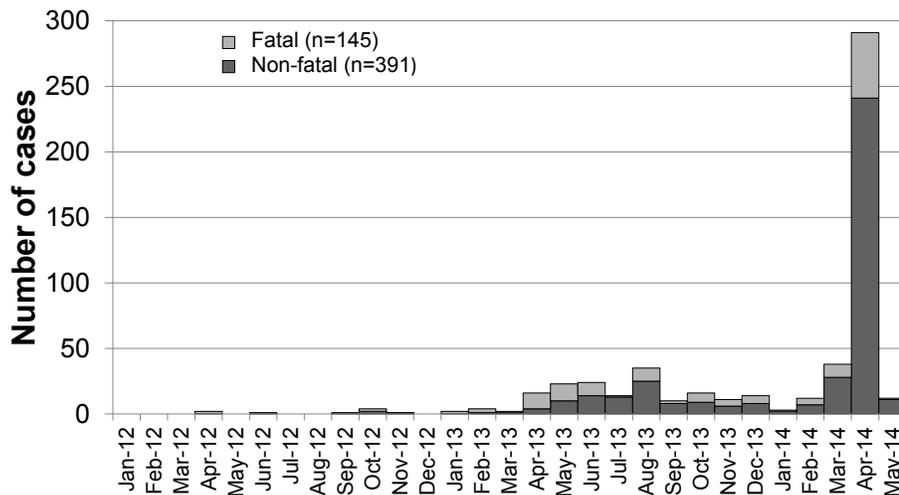
sula (Figure 2: Box, verso).<sup>1</sup> As this issue goes to press, confirmed cases have been reported in 11 countries further afield, but all such cases have been linked to recent travel to the Arabian Peninsula, or have occurred in close contacts of confirmed cases who had recently been there.

The incubation period looks to be 5–14 days, although it is possible that symptoms might appear more quickly. The communicable period is not well defined, but, based on currently available evidence, it does not appear that transmission occurs while patients are asymptomatic.

We are still learning about modes of transmission. Exposure to camels may pose a risk, but we don't know what proportion of cases have had such exposure. Person-to-person transmission has certainly occurred among close contacts. Based on a World Health Organization review of 128 lab-confirmed MERS cases in Jeddah, Saudi Arabia (onsets February 17–April 26, 2014), about 1% of screened household contacts showed serologic evidence of infection, and a third of those infected were "primary cases" — i.e., they had no known connection to another case. This suggests either occult person-to-person transmission, or spread by some other route. In any event, there has been no sustained community transmission.

Spread of MERS-CoV in the health-care setting is another matter. The WHO review of cases in Jeddah concluded that >60% had been acquired in the hospital setting.

Figure 1. Confirmed cases of MERS coronavirus infection reported by the World Health Organization as of May 12, 2014, by month of illness onset — worldwide, 2012–2014.<sup>1</sup>



\* At least there's something a little fishy about it....



If you need this material in an alternate format, call us at 971-673-1111.

THE CD SUMMARY WILL SOON ONLY be delivered by e-mail, so zap your request to [cd.summary@state.or.us](mailto:cd.summary@state.or.us). Please include your full name and mailing address (not just your e-mail address), so that we can purge you from our print mailing list, thereby saving trees, taxpayer dollars, postal worker injuries, etc. .

## CONTAGION

An infection's basic reproduction number  $R_0$ † is the average number of additional cases each sick person is expected to generate in a completely susceptible population if no steps are taken to mitigate transmission. Highly contagious diseases like measles have  $R_0$ s in the 12–18 range,<sup>4</sup> while that for SARS was around 3.<sup>5</sup> An  $R_0 < 1.0$  indicates that the outbreak will not be able to sustain itself. The  $R_0$  for MERS appears to be perhaps 0.5–1, suggesting minimal potential for pandemicity.<sup>6</sup> However, the MERS  $R_0$  can be estimated with little precision at this point.

## MERS RECOGNITION AND TESTING

While we hope that the MERS outbreak will soon peter out, the ~30% case-fatality rate among recognized cases is concerning. There are definite advantages to recognizing, confirming, and caring for cases of this illness in a timely fashion, as well as containing its spread. Consider the possibility of MERS and contact your local health department to arrange testing for patients meeting specified criteria (Box).<sup>1</sup>

All testing in Oregon must go through the Oregon State Public Health Laboratory. Testing is by reverse transcriptase polymerase chain reaction (RT-PCR). Lower respiratory specimens (e.g., pleural fluid, a bronchoalveolar lavage sample, sputum, or tracheal aspirate) are preferred. It's also possible in some circumstances to test nasopharyngeal swabs, oropharyngeal swabs, and serum. In any case, prior authorization from public health is needed to arrange testing. For complete information on specimen collection and shipment, visit

### Consider MERS and Seek Testing for Patients with:<sup>1</sup>

- **Category A:** Fever ( $\geq 38^\circ\text{C}$ ,  $100.4^\circ\text{F}$ ) and pneumonia or acute respiratory distress syndrome (based on clinical or radiological evidence) AND
- a history of travel from countries on or near the Arabian Peninsula\* within 14 days before symptom onset; OR
- close contact (e.g., providing care in a healthcare or family setting, similar close physical contact, visiting, or sharing living space) with a symptomatic traveler who developed fever and acute respiratory illness (not necessarily pneumonia) within 14 days after traveling from countries on or near the Arabian Peninsula\*; OR
- a member of a cluster of patients with severe acute respiratory illness (e.g., fever and pneumonia requiring hospitalization) of unknown etiology in which MERS-CoV is being evaluated, in consultation with state and local health departments.

OR

- **Category B:** Close contact as described above with a confirmed or probable case of MERS while the case was ill, AND
- fever ( $> 100^\circ\text{F}$ ) or symptoms of respiratory illness within 14 days following the close contact. (This is a lower threshold than category A.)

\* Bahrain, Iraq, Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Palestinian territories, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen

<http://public.health.oregon.gov/Laboratory-Services/SubmittingSamples/Pages/mers-cov.aspx>.

## INFECTION CONTROL

CDC and WHO recommend contact, droplet, and airborne precautions when evaluating and caring for patients with suspected or confirmed MERS. Guidance on infection control measures in the healthcare setting is available at [www.cdc.gov/coronavirus/mers/infection-prevention-control.html](http://www.cdc.gov/coronavirus/mers/infection-prevention-control.html).

Infection control guidance for care in the home setting is also available:

[www.cdc.gov/coronavirus/mers/hcp/home-care.html](http://www.cdc.gov/coronavirus/mers/hcp/home-care.html).

## FOR MORE INFORMATION

- Oregon Public Health Division (includes [MERS Fact Sheets](#) in English, Arabic, Farsi and Somali)
- CDC: [www.cdc.gov/coronavirus/MERS/index.html](http://www.cdc.gov/coronavirus/MERS/index.html)
- WHO: [www.who.int/csr/don/archive/disease/coronavirus\\_infections/en](http://www.who.int/csr/don/archive/disease/coronavirus_infections/en)

## REFERENCES

1. Bialek SR, Allen D, Alvarado-Ramy F, et al. First confirmed cases of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) infection in the United States: updated information on the epidemiology of MERS-CoV infection, and guidance for the public, clinicians, and public health Authorities — May 2014. *MMWR* 2014;63:431–6. Available at [www.cdc.gov/mmwr/preview/mmwrhtml/mm6319a4.htm?s](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6319a4.htm?s)
2. Meyer B, Muller MA, Corman VM, et al. Antibodies against MERS coronavirus in dromedary camels, United Arab Emirates, 2003 and 2013. *Emerg Infect Dis* 2014;20:552–9. Available at: [http://wwwnc.cdc.gov/eid/article/20/4/13-1746\\_article.htm](http://wwwnc.cdc.gov/eid/article/20/4/13-1746_article.htm)
3. Reusken CB, Haagmans BL, Muller MA, et al. Middle East respiratory syndrome coronavirus neutralising serum antibodies in dromedary camels: a comparative serological study. *Lancet Infect Dis* 2013;13:859–66.
4. Fine PEM, Mulholland K. Community immunity. In: Plotkin S, Orenstein WA, Offitt PA, eds. *Vaccines*. 6th ed. Philadelphia: Elsevier Saunders; 2012. pp. 1395–412.
5. Wallinga J and Teunis P. Different epidemic curves for Severe Acute Respiratory Syndrome reveal similar impacts of control measures. *Am J Epidemiol*. 2004;160:509–16.
6. Memish ZA, Al-Tawfiq J, Drosten C, et al. Middle East Respiratory Syndrome Coronavirus, MERS-CoV. Conclusions from the 2 Scientific Advisory Board Meeting of the WHO Collaborating Center for Mass Gathering Medicine, Riyadh. *Int J Infect Dis* 2014:[in press].

† "R naught"