MERS Coronavirus, the third year
and
Assessing risk: creating CRAT from IRAT

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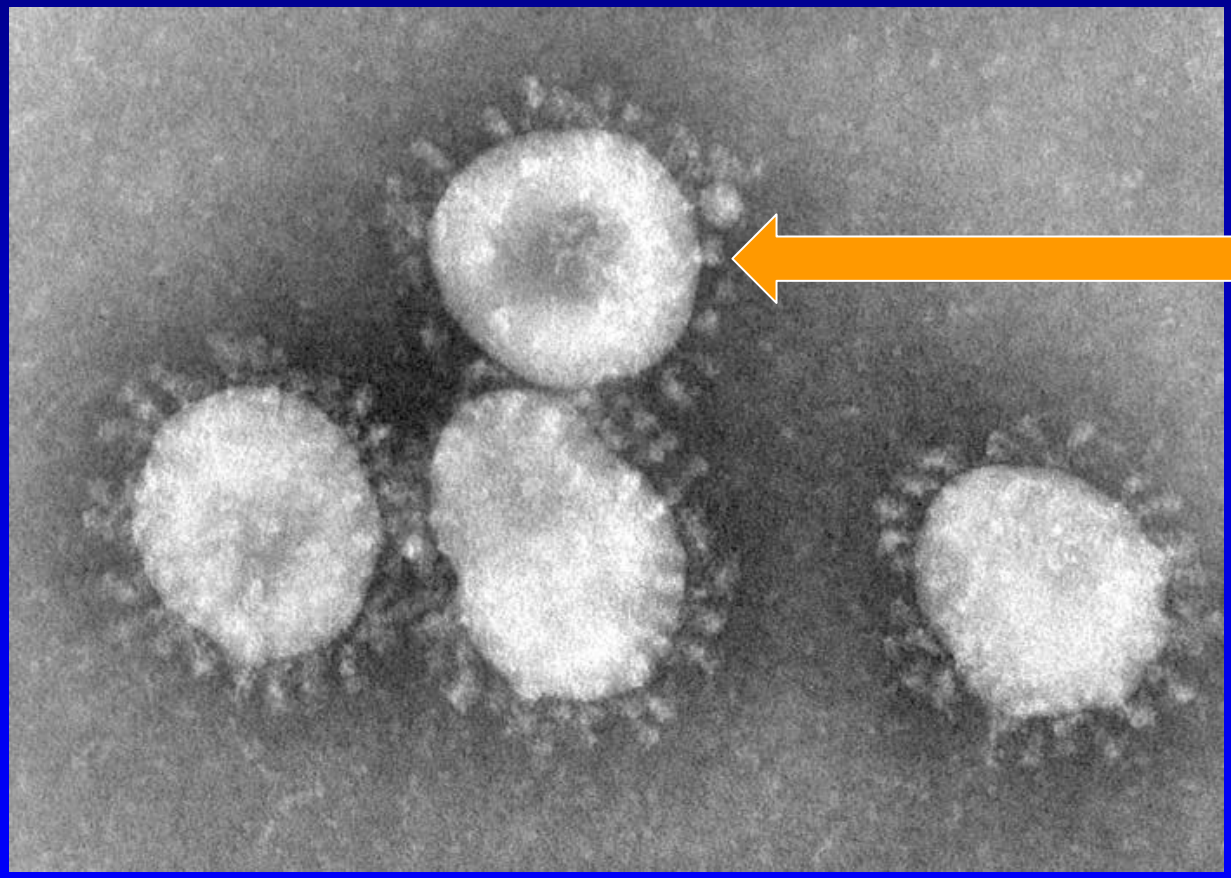
Coronaviruses- EM



Petal-shaped spikes

Size:120-160 nm diameter

Coronaviruses (CoVs)

- First identified in the 1960s
- Found in many animals including bats
- Six human CoVs had been identified:
  - Most mild- worldwide, seasonal, children: “common cold”
    229E, NL-63, OC-43, HKU1
  - Severe:
    SARS CoV
    MERS CoV


SARS CLINIC ENTRANCE


THE SHIITE FACTOR • HOT SUMMER MOVIES
Newsweek
SARS
ou Need to Know
Age of Epidemics


MAY 5, 2003
TIME
THE TRUTH ABOUT
SARS
WHY
the virus
spreads
China's
COVER-U
How
SCARED
should
you be?

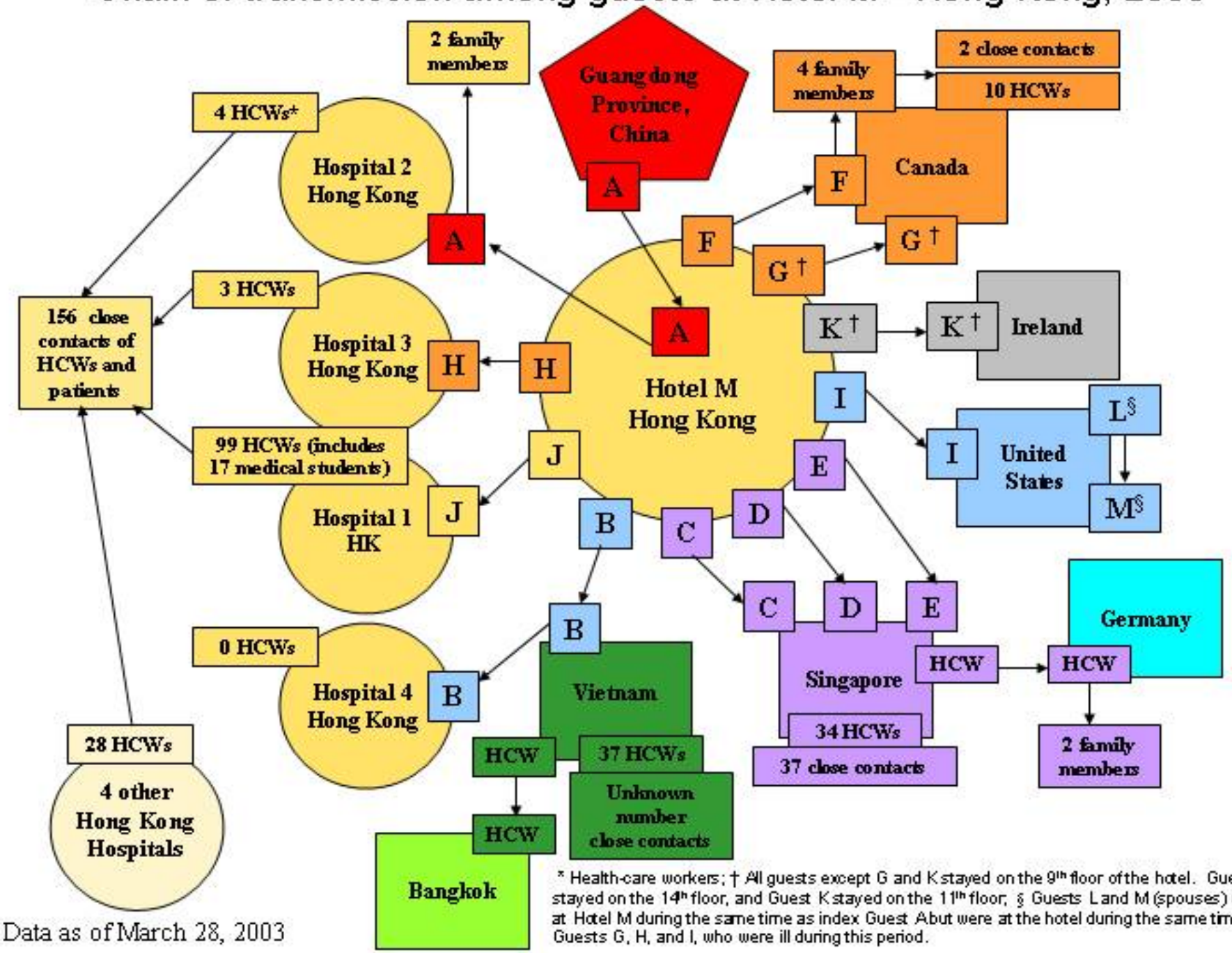

DEPARTMENT OF HEALTH & HUMAN SERVICES-USA

CDC

SARS Epidemic

- Occurred 2002-2003
- 8,098 probable cases, 774 deaths
- Estimated economic losses >$30B
- Role of superspreaders/superspreading events
- Experts felt that transmissibility increased associated with changes in S protein
- Control strategies:
  - Surveillance to identify cases
  - Isolation of ill
  - Quarantine of exposed
  - Good infection control

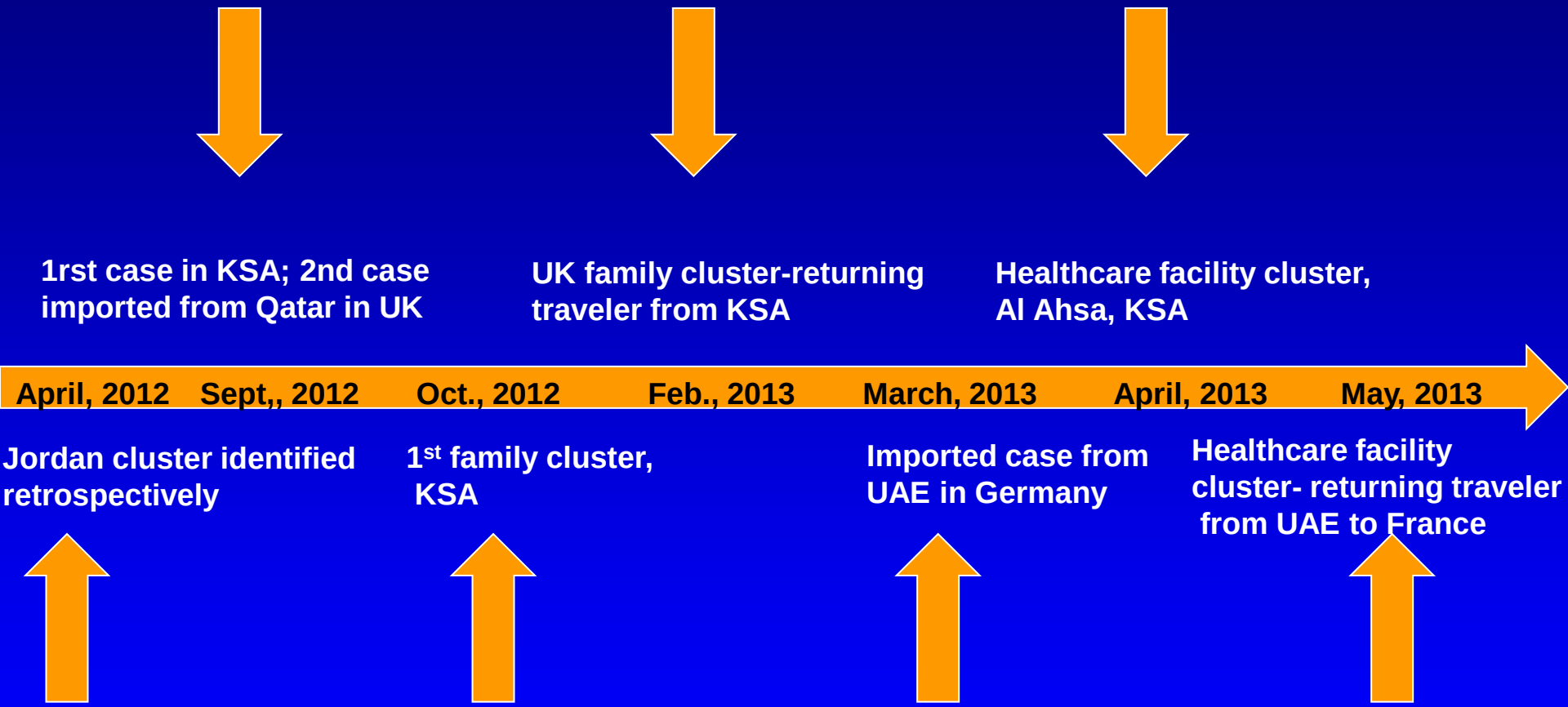
Chain of transmission among guests at Hotel M—Hong Kong, 2003



* Health-care workers; † All guests except G and K stayed on the 9th floor of the hotel. Guest G stayed on the 14th floor, and Guest K stayed on the 11th floor; § Guests L and M (spouses) were not at Hotel M during the same time as index Guest A but were at the hotel during the same times as Guests G, H, and I, who were ill during this period.

Data as of March 28, 2003

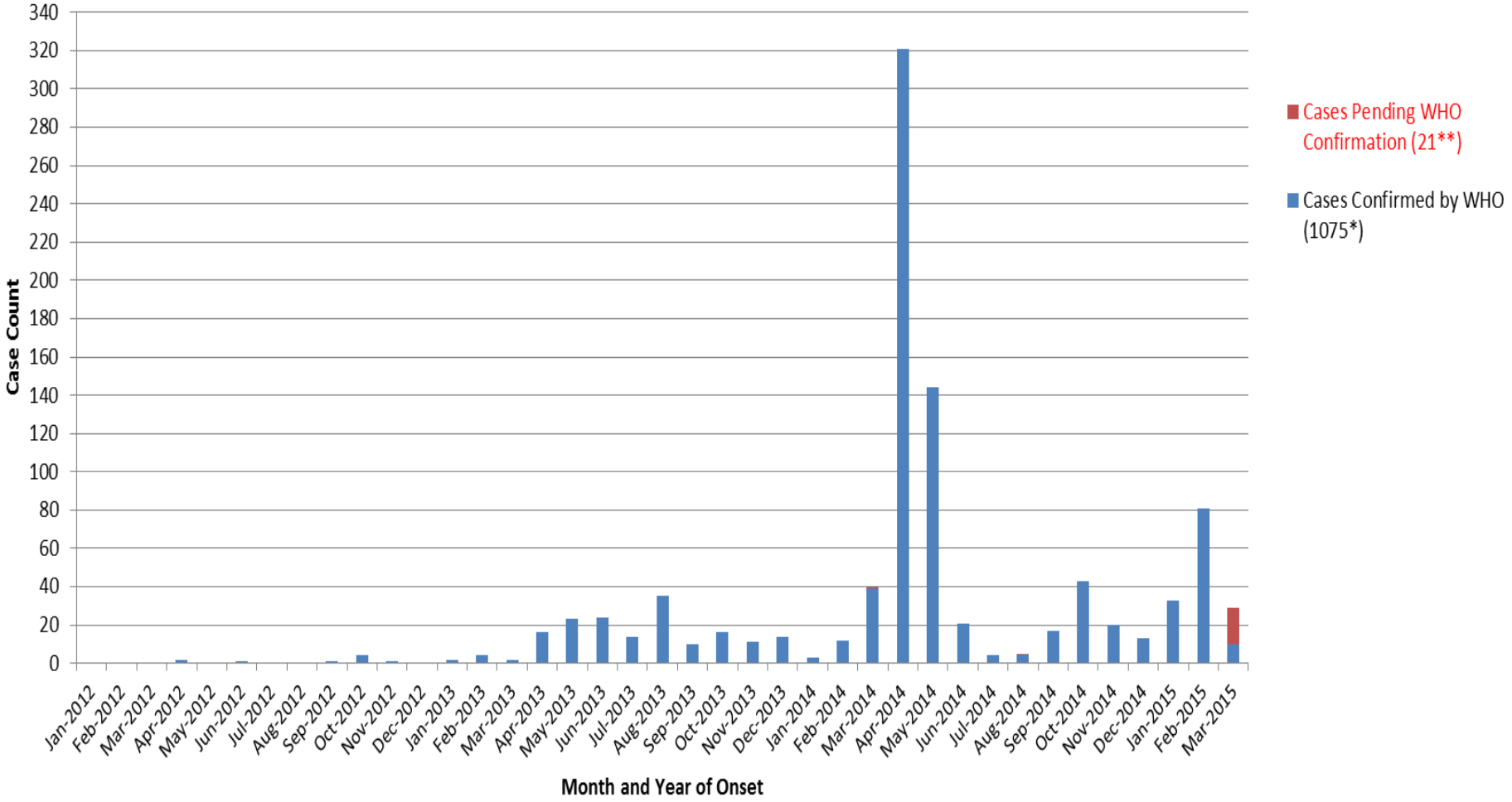
Emergence of a Novel Virus



MERS CoV- current situation, March 25, 2015

- Since 2012, 1075 cases confirmed by WHO with 404 (38%) deaths (21 cases and 20 deaths pending)
- Gender: 687 M (66%), 354 F [34 Unknown]
- Median age 50 (0, 99)
- Most with underlying conditions
- 189 (18%) cases health care workers (12 deaths)
- Since August 1, 2014 221confirmed cases (21 pending)
  - KSA, Qatar (4), Oman (3), UAE (1)
- Recent exportations
  - Austria, Turkey, Jordan, Philippines, Germany

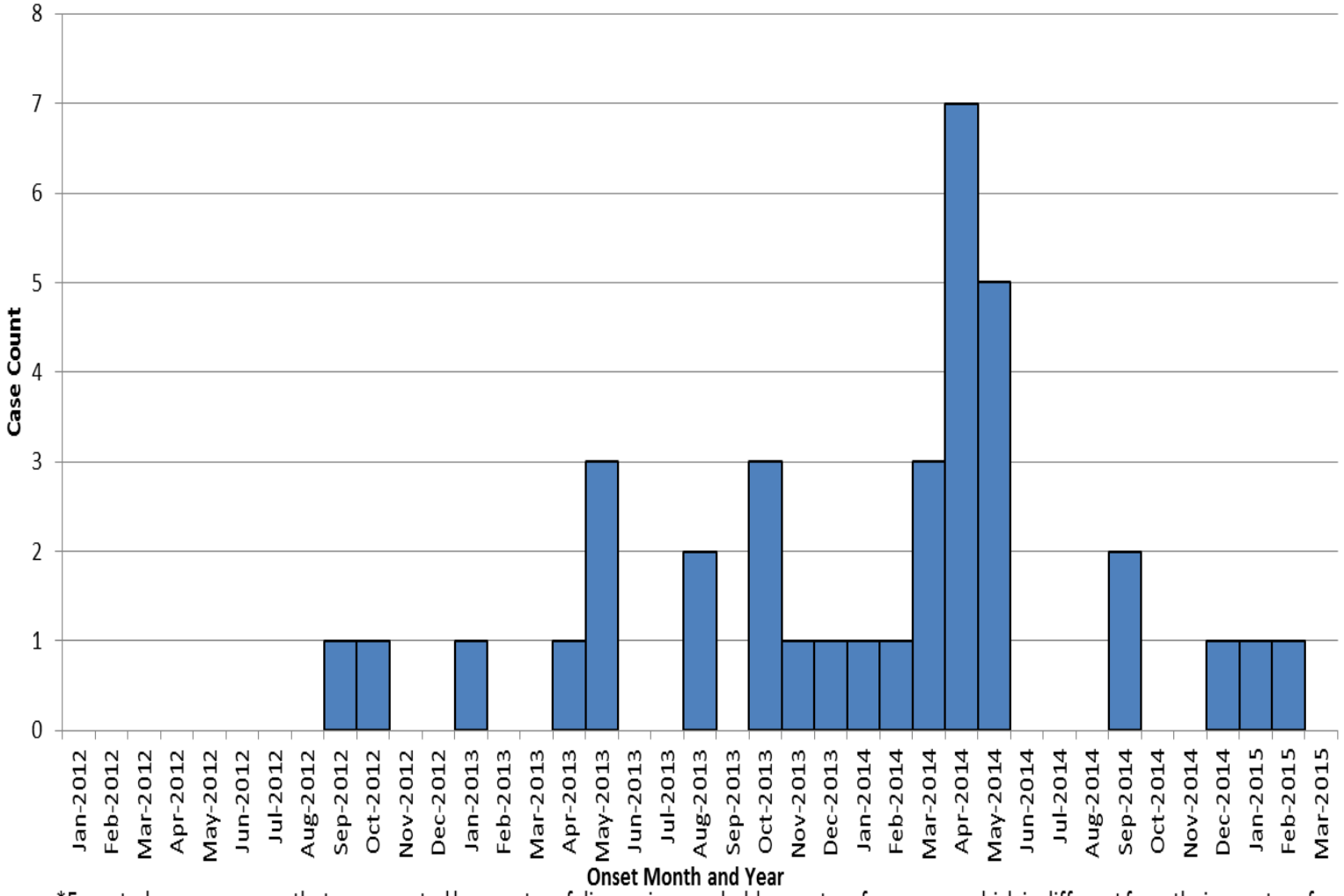
Middle East Respiratory Syndrome Coronavirus (MERS-CoV) Reported Cases (including cases not confirmed by WHO), 2012--2014 (Total=1096*)



*The 130 cases identified drom KSA MoH's restrospective reviews are included in the total case counts but are not depicted in the epi-curve due to unknown case onset dates; **Cases pending WHO confirmation that are reported by a country's MOH and not include cases newly identified from Saudi Arabia's ongoing retrospective review of MERS data. Data as of March 25, 2015

Countries	Cases (Deaths) confirmed by WHO	Cases (Deaths) pending WHO confirmation
Saudi Arabia	**951[1](372)[2]**	21(20)
United Arab Emirates (UAE)	68(8)	
Qatar	13(5)	
Jordan	9(5)	
Oman	8(5)	
Iran	5(1)	
United Kingdom (UK)	3(2)	
Tunisia	3(1)	
Kuwait	3(1)	
France	2(1)	
Algeria	2(1)	
Netherlands	2(0)	
Malaysia	1(1)	
Italy	1(0)	
Yemen	1(1)	
Turkey[3]	1(0)	
Lebanon	1(0)	
Germany	1(0)	
Total	**1075(404)**	**21(20)**

Middle East Respiratory Syndrome Coronavirus (MERS-CoV) 2012--2014, Cases Exported* from Arabian Peninsula (Total = 36)



Cases have been exported to 19 countries: Algeria, Austria, Egypt, France, Germany, Greece, Italy, Jordan, Kuwait, Malaysia, Netherlands, Philippines, Oman, Qatar, Tunisia, UAE, UK, USA, & Turkey

*Exported cases are cases that are reported by country of diagnosis or probable country of exposure, which is different from their country of residence. Data as of March 11, 2015

First cases in the United States
April – May 2014

- Case #1 Indiana: US citizen, healthcare worker, worked in Saudi Arabia
  - Mild symptoms before departure
  - Traveled by plane and bus to Indiana
  - Contact investigations included HCW in hospital, household members, and those on airplanes and bus – most contacted. No secondary cases.

- Case # 2- Florida: HCW who worked in Saudi Arabia
  - Traveled by four flights to reach Florida
  - Became symptomatic on the flights to Florida
  - Contact investigations included HCW in hospital, household members, and those on airplanes- most contacted. No secondary cases.

Transmission, treatment and vaccines

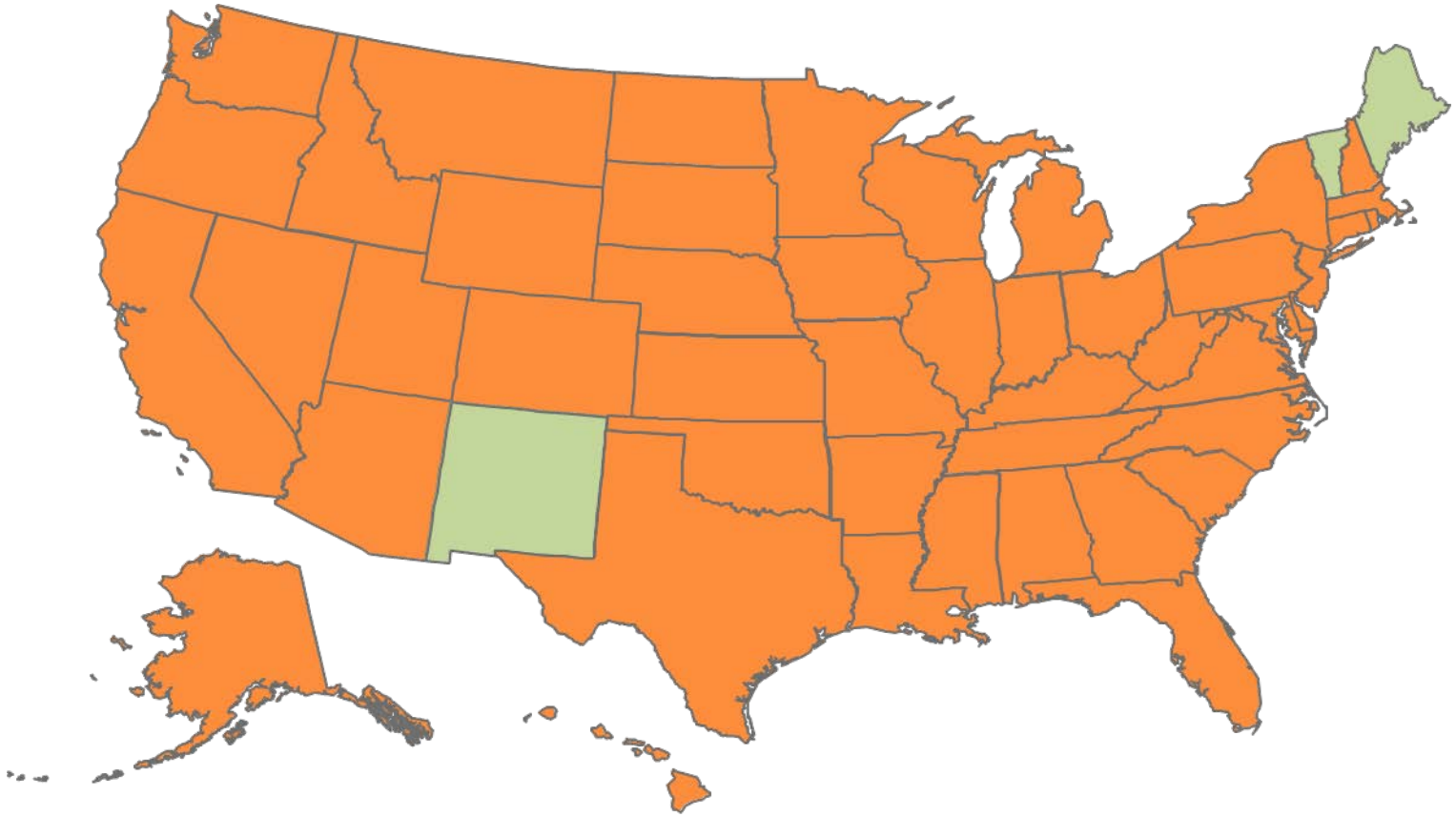
- Transmission: Likely respiratory
  - Evidence of human to human transmission but not sustained
  - Healthcare associated outbreaks
  - Animal sources:
    - Bats: PCR testing
    - Camels: Serology, PCR, some epidemiology
    - But most cases have not had contact with camels
- Treatment
  - None clearly established
  - Experimental treatments being evaluated
- Vaccines
  - None available
  - Several being tested

Domestic Activities

- Epidemiology and laboratory
  - Case definition and guidance, and epidemiology toolkit, widely disseminated
  - Investigating persons with travel link, severe respiratory illness
    - 549 samples/45 states
  - PCR diagnostics developed and distributed
  - Serology developed
- Infection control guidance
- Travelers health recommendations

CDC MERS-CoV rRT-PCR Assay

Domestic Kit Deployment



Approved for MERS-CoV testing (47)

Kits will be sent later (3)

Kits also in: NYC, Dallas , Houston, Washington DC, Los Angeles County, Jacksonville, Miami

Middle East Respiratory Syndrome (MERS)

MERS
FAQs
Healthcare Providers
Interim Guidance
Case Definitions
Infection Prevention and Control
Preparedness
Interim Home Care and Isolation Guidance
Interim Guidance for Preventing MERS-CoV from Spreading in Homes and Communities
Health Departments
Laboratories
Guidance for Travel
Related Materials

Related Links
Coronavirus
SARS

Information for Healthcare Providers

Interim Guidance For Health Professionals
CDC interim guidance for evaluating patients, reporting patients under investigation (PUIs), testing specimens, and conducting investigations.

Case Definitions
CDC case definitions for PUI, close contact, probable case, confirmed case, and clusters of SARI.

Preparedness
Checklists and resources to help healthcare providers and facilities better prepare for the possibility of MERS patients.

Infection Prevention and Control
Interim recommendations for managing hospitalized patients with known or suspected MERS-CoV infection.

Interim Home Care and Isolation Guidance
CDC interim guidance to prevent MERS-CoV from spreading in homes and communities if there is ever a case in the U.S.

Important Links

- Guidelines for Clinical Specimens
- Data Collection

Email page link
Print page

Contact Us:

Centers for Disease Control and Prevention
1600 Clifton Rd
Atlanta, GA 30333

800-CDC-INFO
(800-232-4636)
TTY: (888) 232-6348
Contact CDC-INFO

Middle East Respiratory Syndrome (MERS)

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SARS

Guidance for Travel

Travel to Arabian Peninsula
CDC does not recommend that anyone change travel plans because of MERS. Travelers to the Arabian Peninsula can take precautions.

Hajj and Umrah 2013
The annual Hajj pilgrimage to Mecca, Saudi Arabia, is among the largest mass gatherings in the world. Pilgrims can take steps to protect themselves from respiratory illnesses.

Guidance for Airline Crew
Airline crew are asked to report ill travelers in and near the Arabian Peninsula.

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Print page

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Summary- MERS coronavirus

- Cases have occurred in multiple locations over 3 years
- Clear evidence for person-to-person spread (not sustained)
- Camels a likely source but unknown what proportion of cases have had camel exposure and what exposures associated with illness.
- No clear treatment or vaccine available
- Healthcare worker illness and illnesses in returning travelers concerning and reminiscent of SARS

Creating CRAT from IRAT

- 2012- 2013 collaborative effort
  - ASPR
  - BARDA
  - CDC
- IRAT
  - Virus, population, ecology
  - Impact, risk of emergence

Creating CRAT from IRAT

- Reviewed all risk elements
- Eliminated some elements
- Modified elements for coronaviruses
- Ranked and weighted elements
- Developed scoring criteria
- Reviewed with internal experts
- Created raw and adjusted (weighted) scores

IRAT risk elements and how they might apply to MERS-CoV

Risk Element	Most Important	Very Important	Important	Not at all Relevant/Assessable with Available Data
Human infections		x		
Antigenic Relationship			x	
Global Distribution		x		
Infection in Animals		x		
Genomic Variation			x	
Population Immunity				x
Receptor Binding				x
Antiviral Treatment Options		x		
Disease Severity	x			
Transmission in Animals Models				x

1) Human Infections [10%] - The element of human infection is defined as the occurrence of human infections, the frequency of these human infections and the extent of human-to-human transmission of these viruses.

MERS-CoV Sporadic, isolated human cases. Potential for nosocomial transmission. Limited person-to-person spread through close contact. (Moderate Risk).

Multiple Emerging Novel Influenza A Viruses

H9N2 — *1998-2014*

1997, 2003-2014 — H5N1

2003 — H7N7

2009-14 — pH1N1

2011-14 — H3N2v

H7N9 — *2013-14*

H5N6

H6N1

H10N8

H7N3 — *2012*

Problems with Creating CRAT

- Not enough coronaviruses!
- Not enough data to use to grade elements
- Not enough experts to grade
- In the end- We concluded that MERS was like SARS- especially before transmissibility of SARS increased in later phases
- Unfortunately CRAT did not add much to our overall assessment of risk
- May need other ways to do risk assessment for non-influenza risks

Acknowledgments

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