

Will it be possible to shorten the delay between the start of an outbreak and its detection by health care systems?

An example with MERS-CoV

Maria Van Kerkhove, PhD

Head, Outbreak Investigation Task Force, Center for Global Health, Institut Pasteur, Paris
Seminaire Maladies Infectieuses Emergente

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Emerging and re-emerging infectious of zoonotic origin

Human health, animal health and the state of ecosystems are inextricably linked with 75% of emerging and re-emerging infectious diseases known to be of zoonotic origin*



MERS-COV



Avian influenza

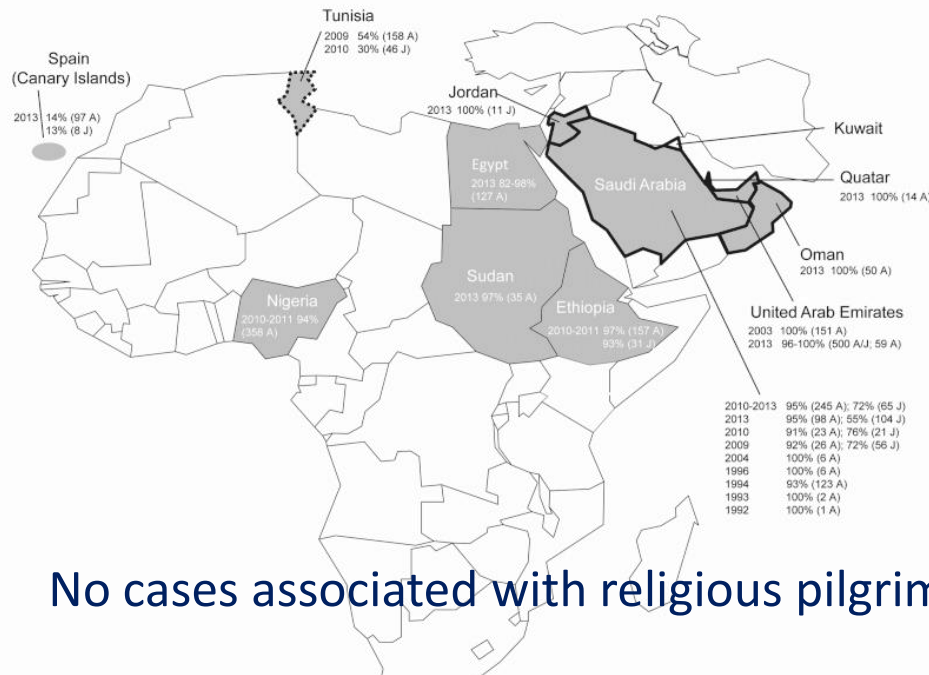


Ebola

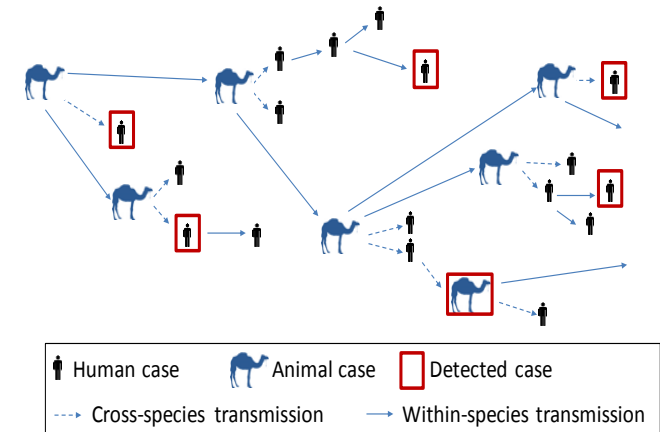
*Jones et al (2008) Nature

Epidemiology of MERS-CoV

- Pattern of the epidemic:** repeated sporadic introductions into the human population from direct or indirect contact with dromedary camels (and possibly other not-yet identified animals), resulting in limited human-to-human transmission, notably in healthcare settings



Sustained transmission in animals, not sustained in humans



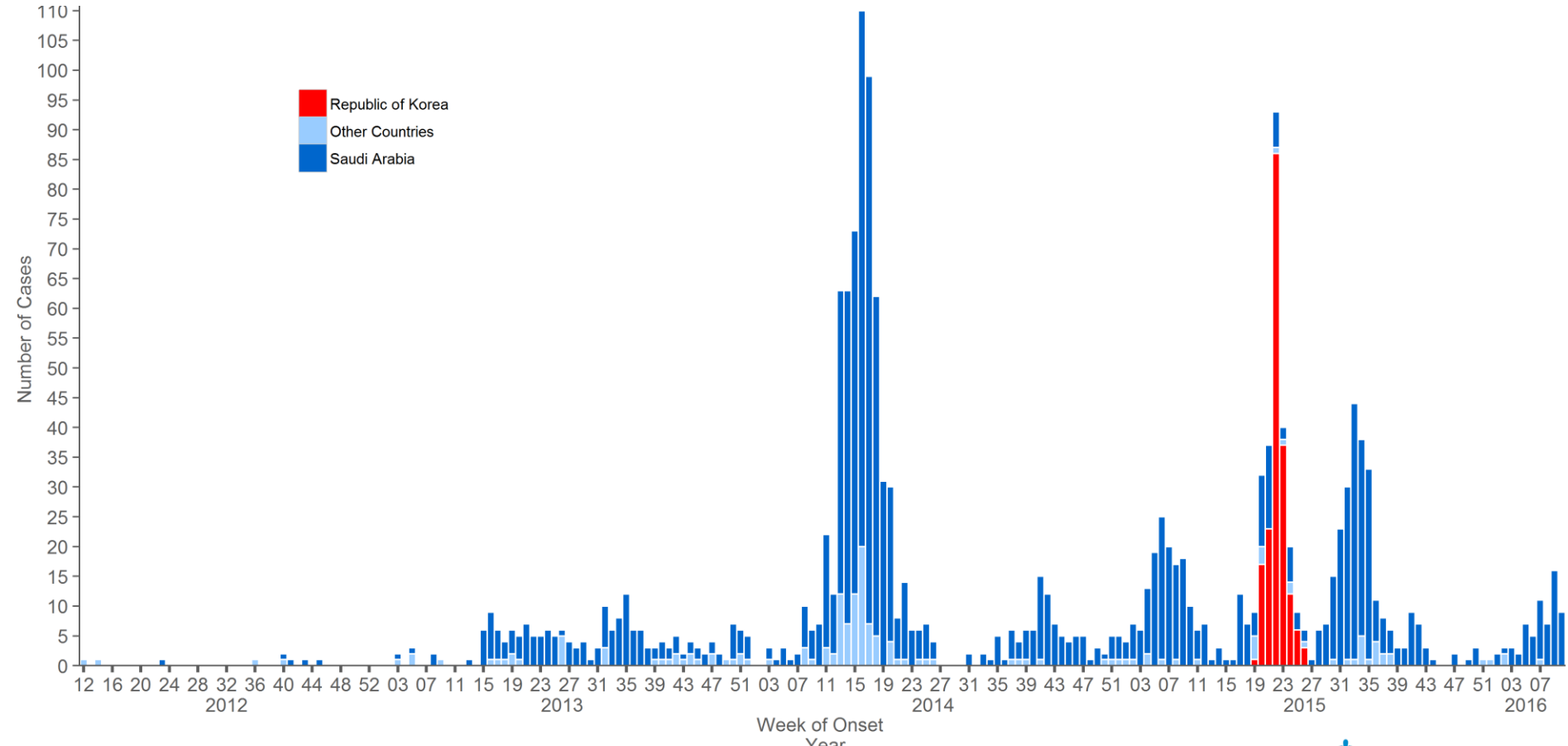
- No cases associated with religious pilgrimages
- There is no evidence of sustained human-to-human transmission
- Failures in infection control and prevention in healthcare settings has resulted in large numbers of secondary cases

MERS-CoV

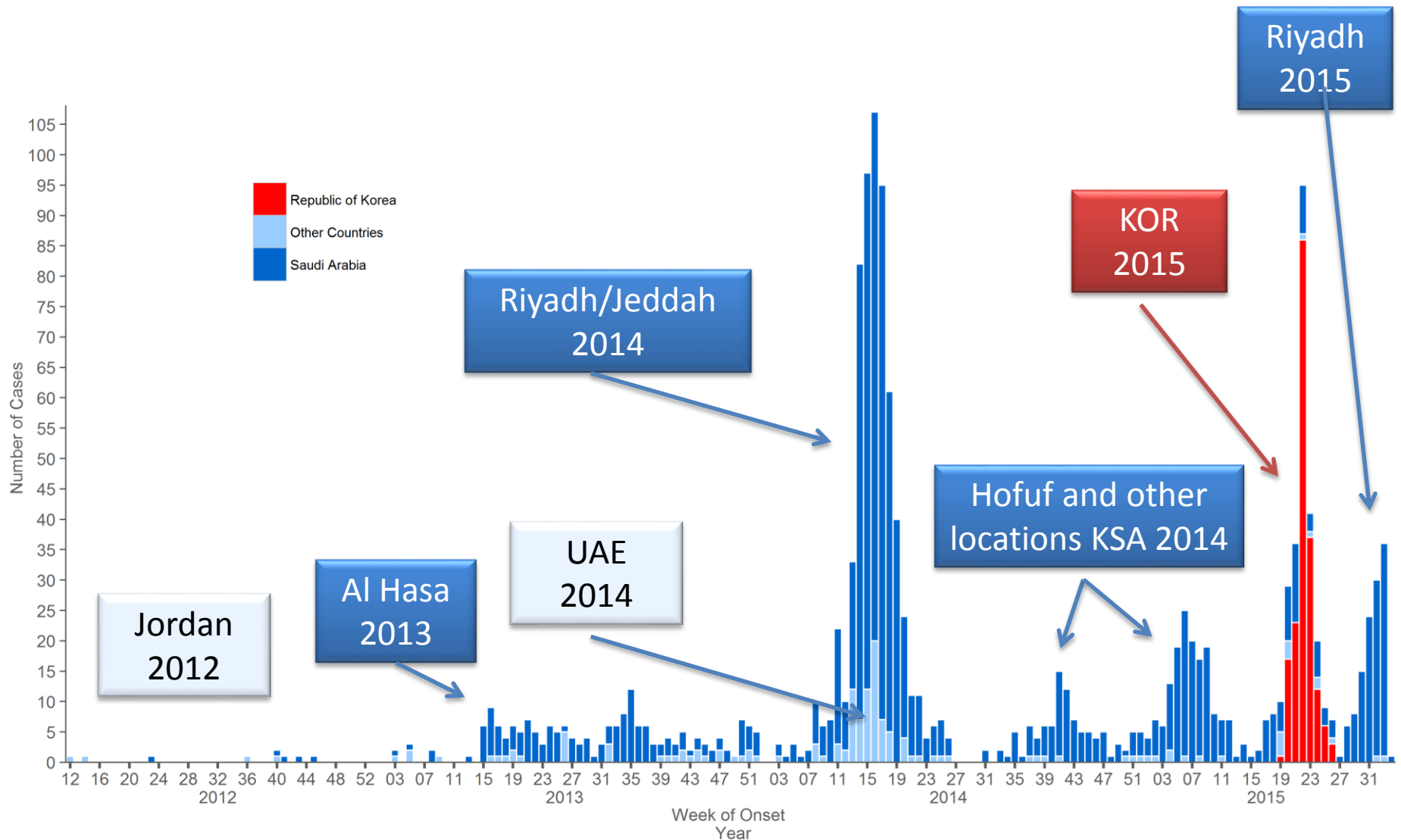
>1694 cases reported from 26 countries, >603 deaths



World Health Organization



Peaks in activity are dominated by nosocomial outbreaks



Primary infection – an opportunity?

Probable source of infection of confirmed MERS-CoV-2015 (based on date of onset)

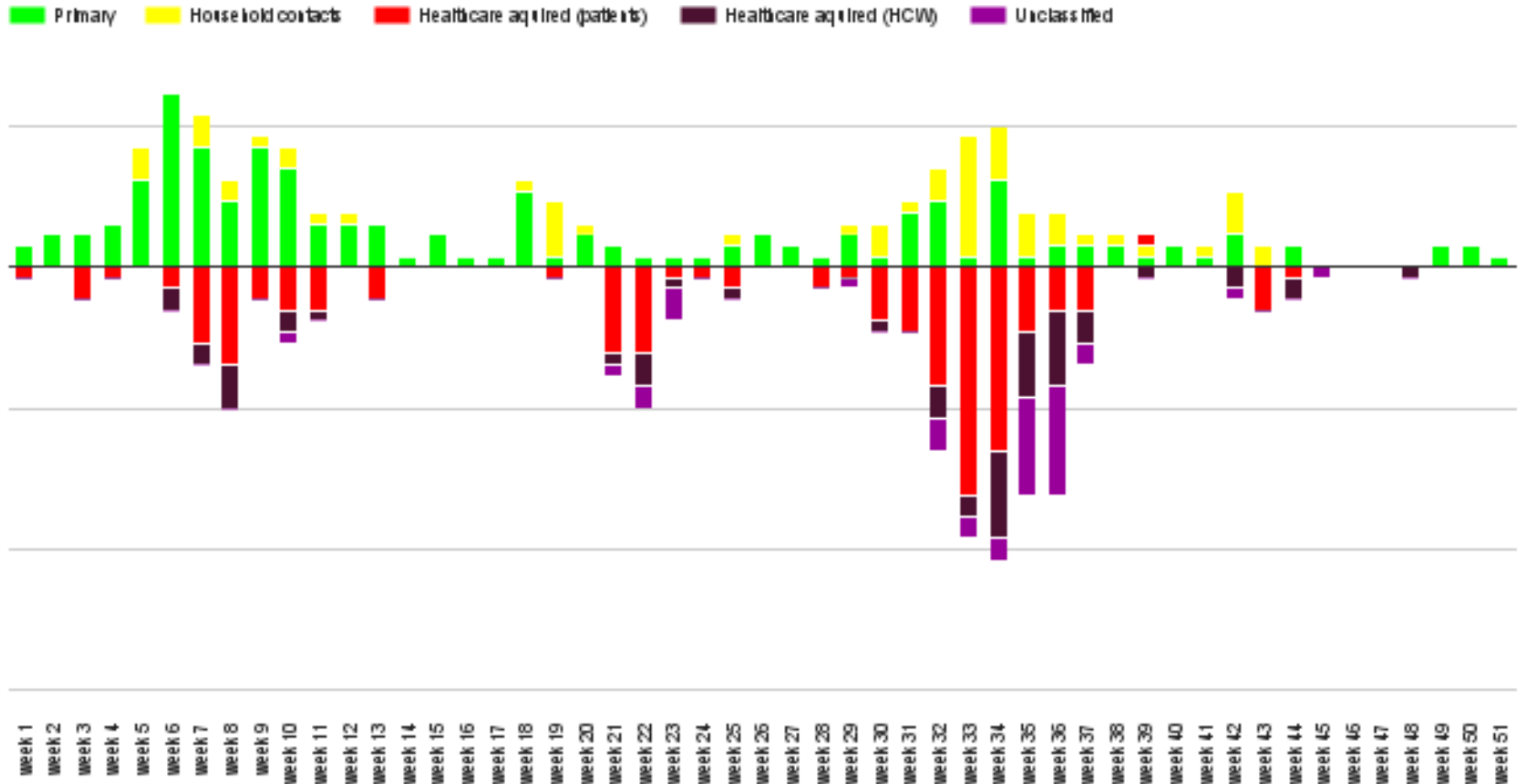
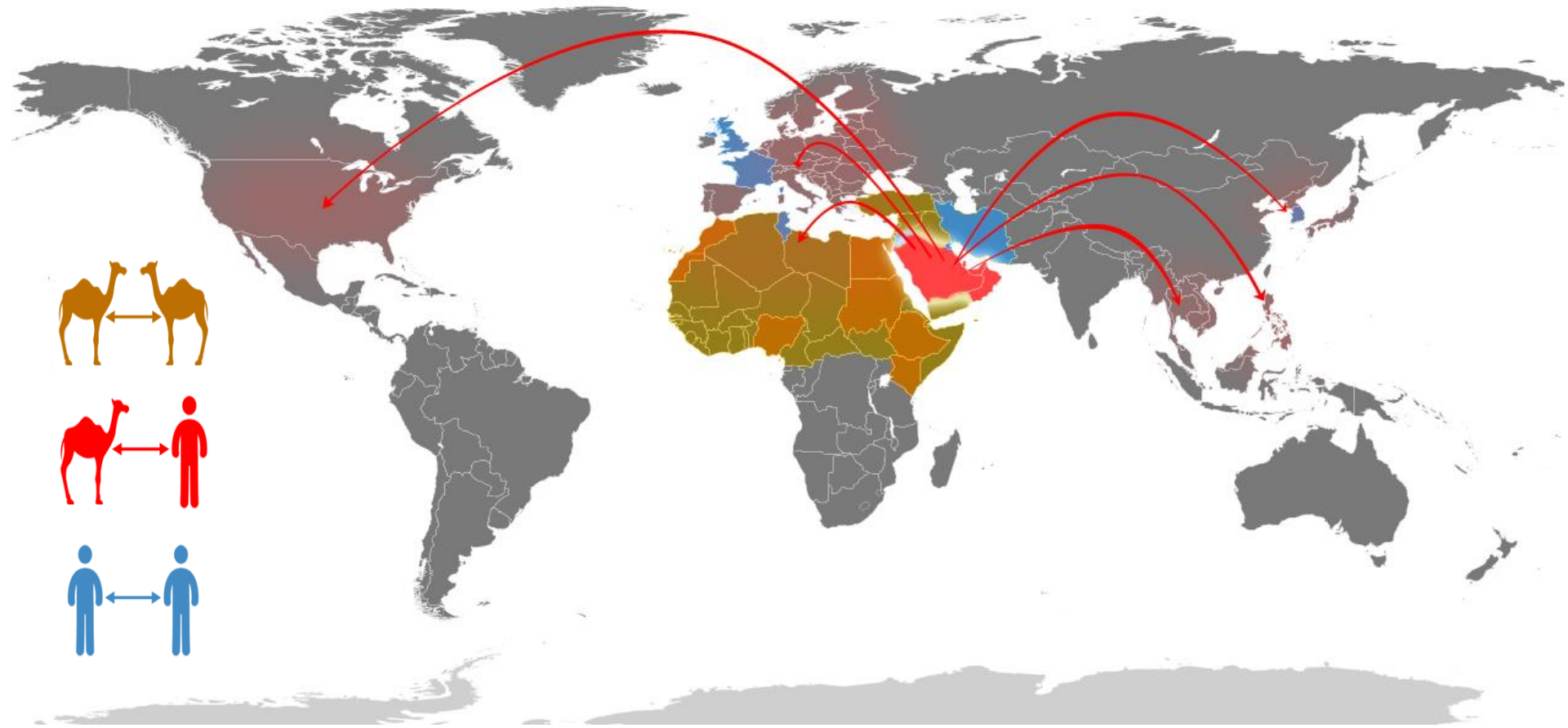


Figure provided by Dr Abdullah Assiri, KSA Ministry of Health

Transmission of MERS



Human Surveillance for MERS

- **Significant variation in surveillance for MERS-CoV within and outside of the Middle East**
 - Testing uneven between countries
 - Testing uneven over the course of the year
 - Noncompliance with surveillance recommendations from WHO
 - **Notable increases in efforts to monitor for MERS during Hajj**
 - To date, not a single case associated with Hajj (or Umrah)*
 - Worry is visits to health care facilities or camel contact

Animal Surveillance for MERS

- **Improving, but not ideal**
- **MERS is reportable virus according to OIE (May 2015)**
- **Surveillance is reactive rather than proactive**

**Waldrom and Doherty 2015; Kumar et al 2015; Barasheed et al 2015; Aberle et al 2015; Annan et al 2015; Barasheed et al 2014; Benkouiten et al 2014; Gautret et al 2014; Memish et al 2014*

Each human/camel case presents an opportunity

- **Improvements in case investigations are urgently needed**
 - *All human cases of MERS-CoV need to be thoroughly investigated*
 - Including
 - Immediate notification of health sector to animal sector if human case reports direct or indirect camel exposure
 - Joint animal and human investigations for all community acquired cases
 - Monitoring and testing of all contacts regardless of symptoms
 - Tracing and testing of animals
 - Reporting of follow up for both animal and human investigations



If PCR positive camel identified, animal sector should inform human sector

- Reporting of PCR positive camels to OIE (Doha Declaration)
- **Knowledge learned leads to improvements in prospective studies and can minimize missed cases seeking health care**

How can we limit camel-to-human transmission?

- Active surveillance in animals and humans – surveillance must be improved
- Intensive and joint animal/human investigations for every case (needs public trust)
- Clear guidance for at risk populations to limit entering human population
- Coordinated, multi-site, inter-sectorial human/camel research is needed to better understand transmission patterns



Will it be possible to shorten the delay between the start of an outbreak and its detection by health care systems?

- **Yes - absolutely**
- **Need better surveillance in animals and humans**
- **Need better case investigations through:**
 - Improvements in field training
 - More cooperation between the animal and human sectors
 - More cooperation within and between countries
- **Improvements in health care response – earlier suspicion and isolation**
- **We to limit introduction into the human population with better mitigation measures**