MERS-CoV and Influenza A(H7N9)

European public health response

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A word on ECDC mandate

Identify, assess & communicate current & emerging health threats to human health from communicable diseases

ECDC Founding Regulation (851/2004)

Technical and scientific advice

EU level surveillance

Early warning and risk assessment

Strengthen preparedness capacity

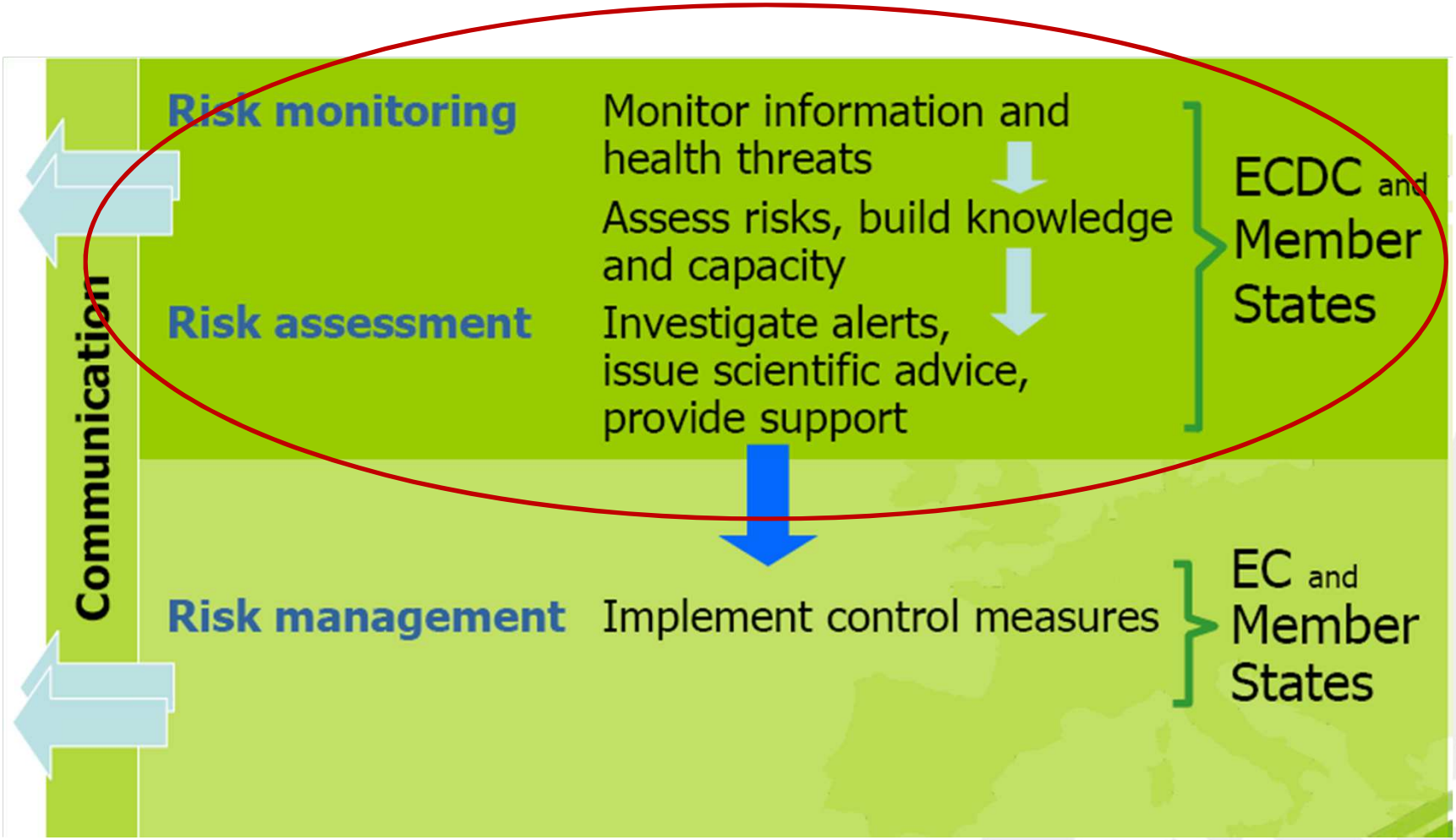
Communication

www.ecdc.europa.eu

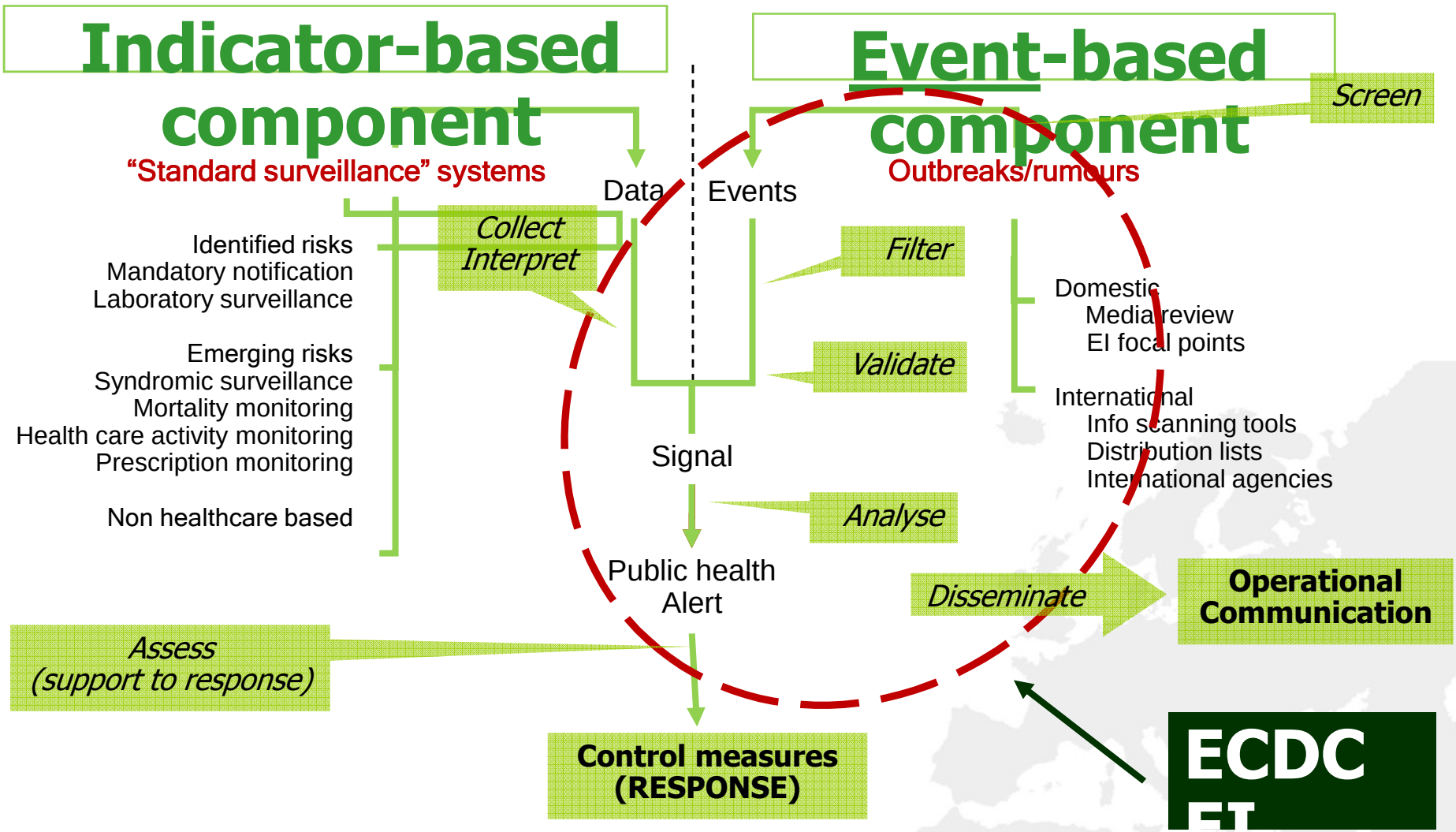
All actions aim to **HEALTH SECURITY** at EU level in close cooperation with EU Member States

Health security at EU level

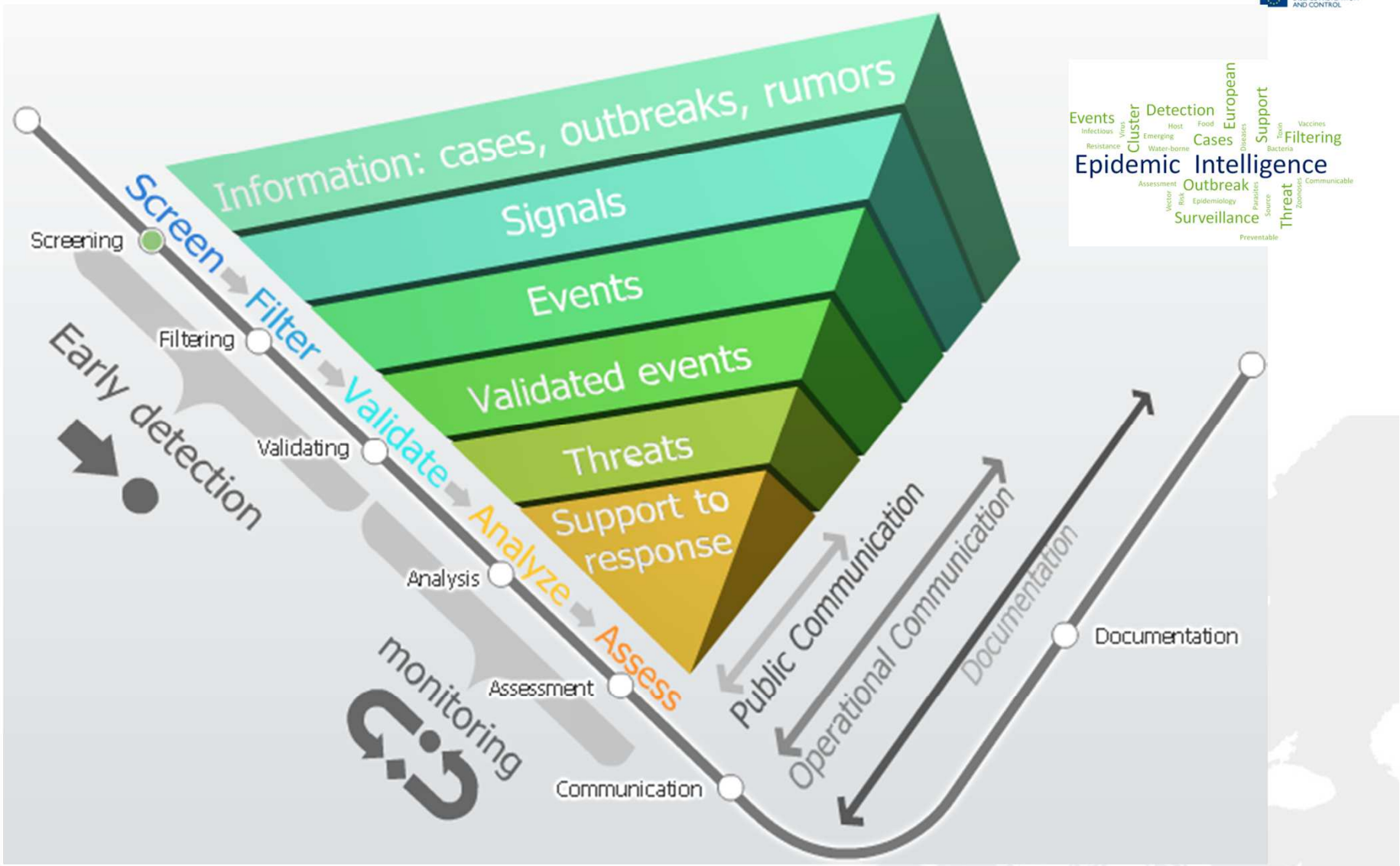
ECDC role in EU health security: risk detection/monitoring and assessment



The Epidemic Intelligence Framework



The process of Epidemic Intelligence:



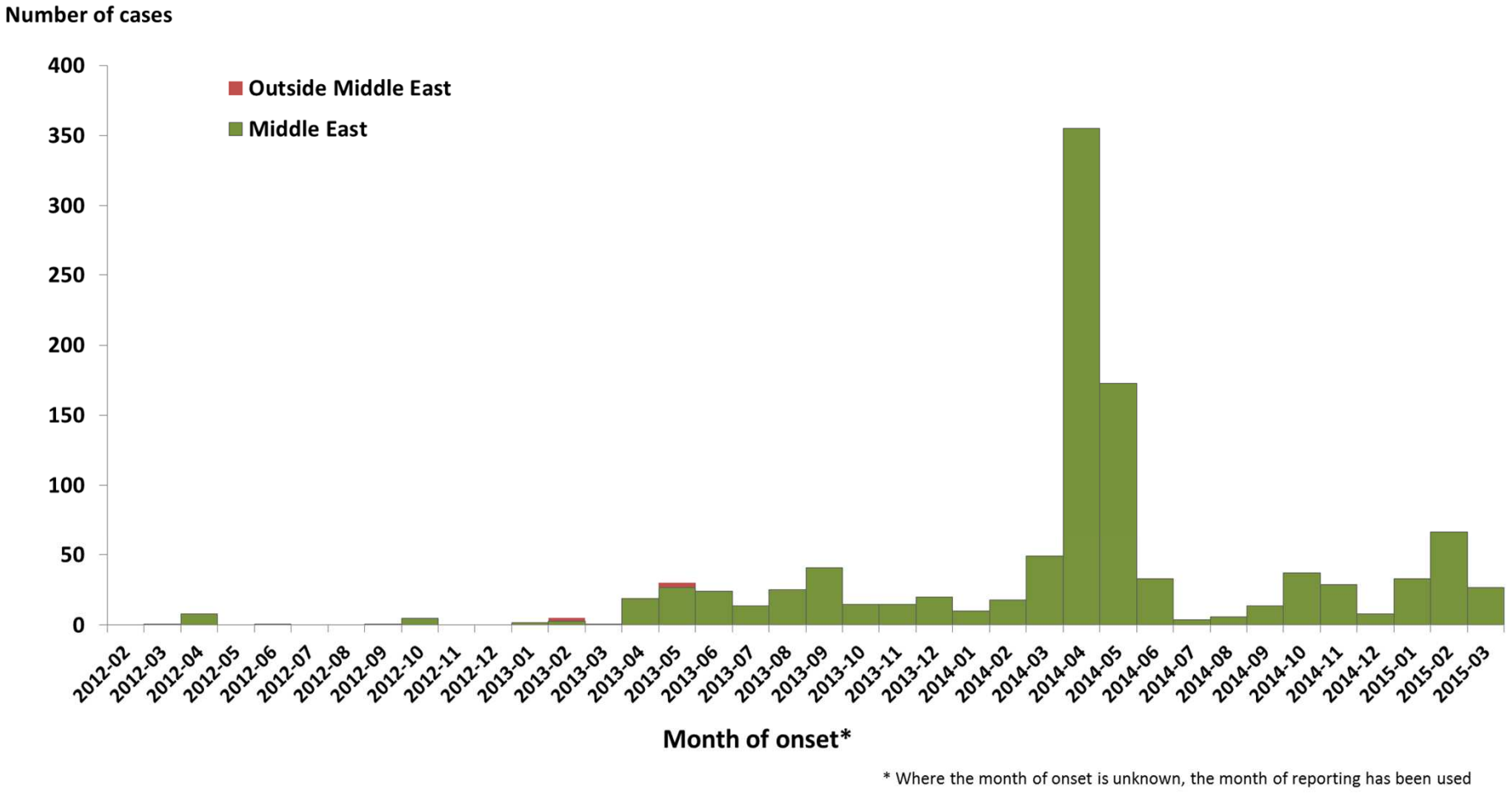
Epidemic Intelligence (EI) at ECDC: **what does it mean 24/7/365**

- Detect/monitor PH threats
- Assess risks/investigate PH threats

- Collect information
- Daily analysis/validation of potential threats (roundtable)
- Storage of relevant info (TTT)
- Operational communication
- Support to outbreak response

Middle East Respiratory Syndrome – coronavirus (MERS-CoV)

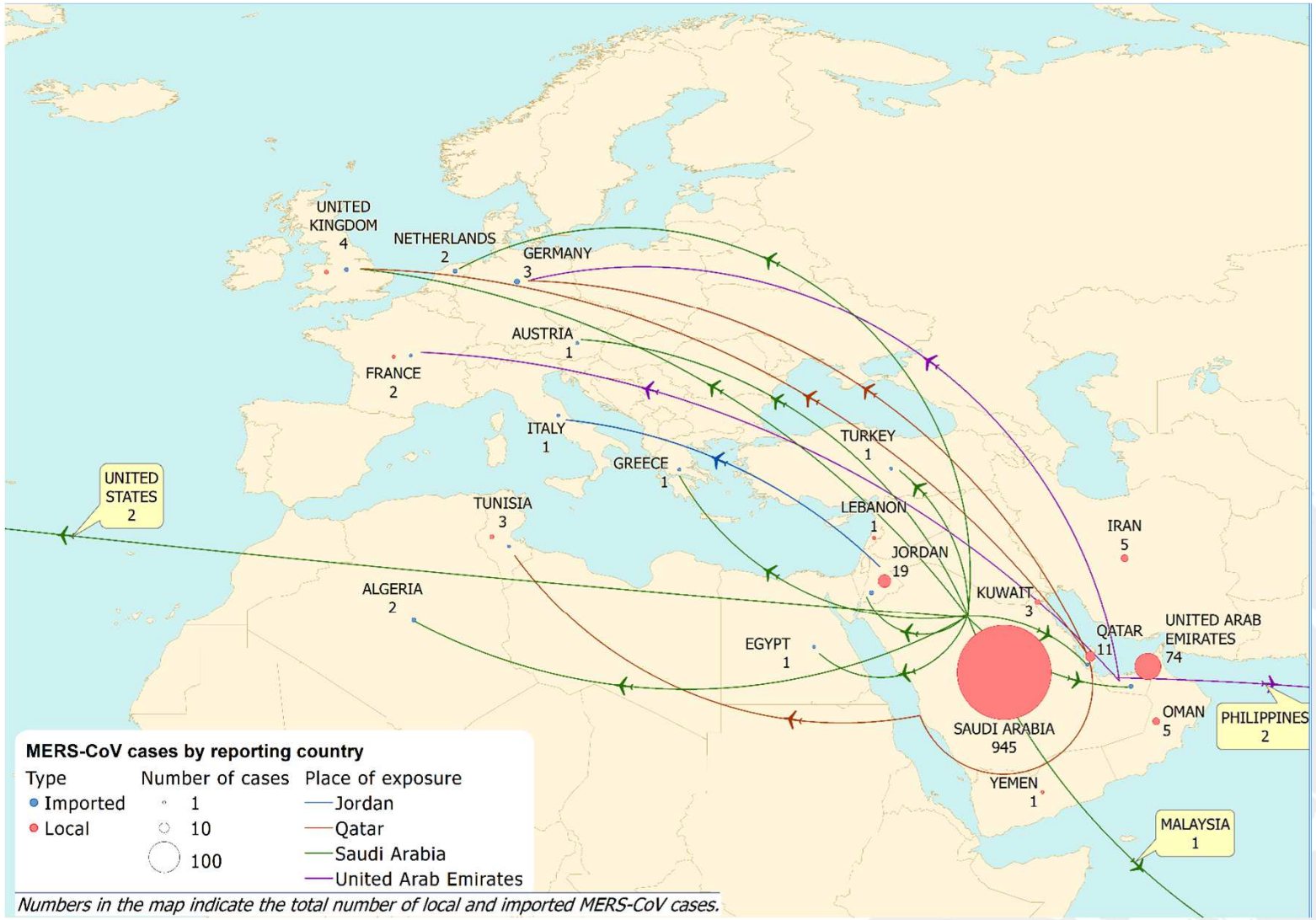
Distribution of confirmed cases of MERS-CoV by first available date and place of probable infection, March 2012 – 10 March 2015 (n=1090)



* Where the month of onset is unknown, the month of reporting has been used

** Data for March 2015 is incomplete

Distribution of confirmed cases of MERS-CoV by place of probable infection and place of reporting, March 2012 – 10 March 2015 (n=1090)



Volume of passengers originating from Saudi Arabia and United Arab Emirates by final destination in the EU/EEA countries, April–May

Distribution of confirmed MERS cases by gender and age group (n=655), March 2012–20 August 2014

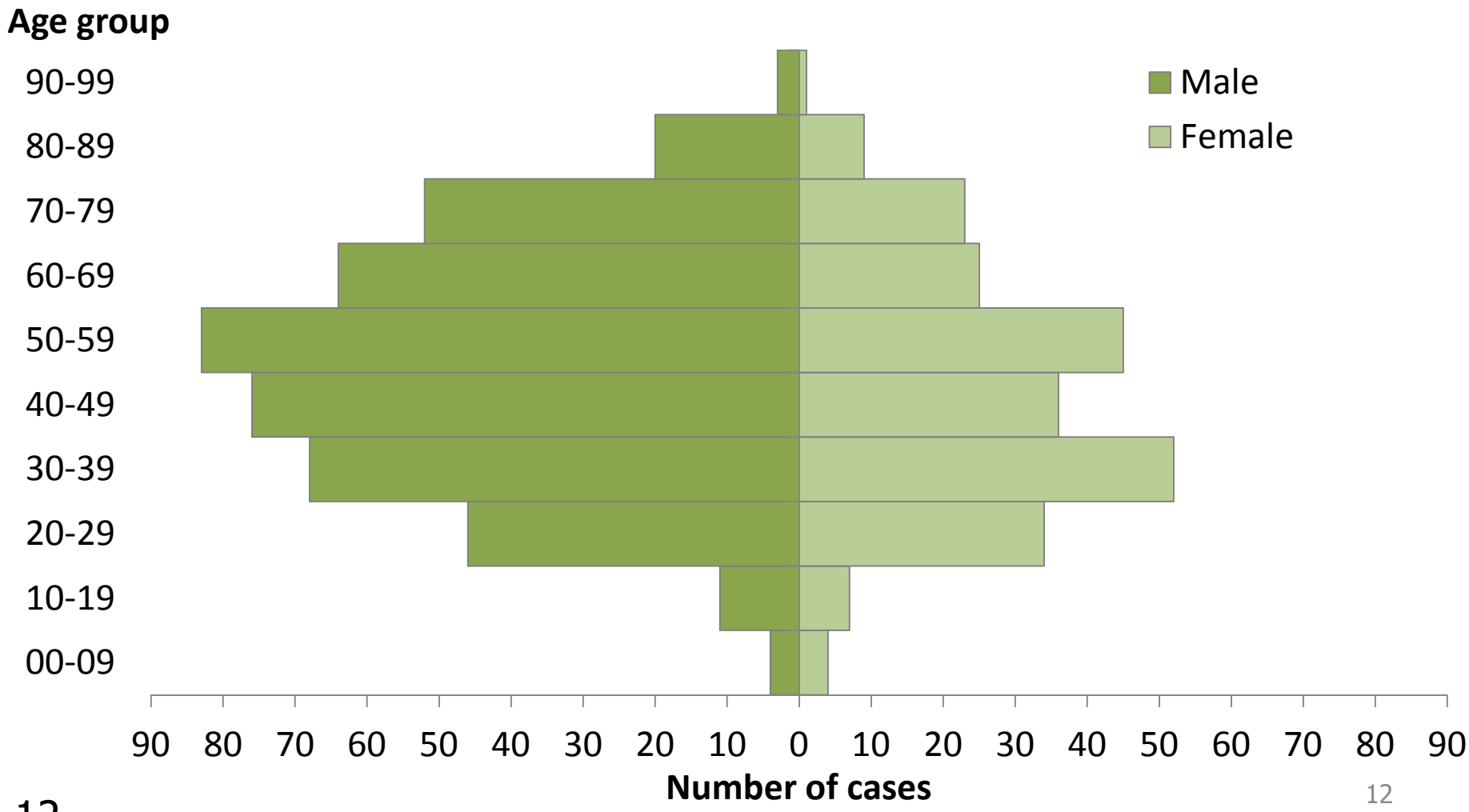


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Table 1. Characteristics of Confirmed and Probable MERS-CoV Patients by Outcome and By Epidemiologic Link

Variable	Confirmed and Probable Cases n=161	Outcome†			Case-Type	
		Fatal n=61	Recovered or Asymptomatic n=55	Unknown Outcome n=45	Index or Sporadic n=51	Secondary n=95
Demographic Data						
Median Age (years)	50.0 (157)‡	58.0	34.0 (51)‡¥	51.0	59.0	43.0 (91)‡∏
Age Range (years)	1-94 (157)‡	2-94	1-76 (51)‡	14-85	2-83	1-94 (91)‡
>50 Years Old (%)	49.7% (157)‡	72.1%	21.6% (51)‡¥	51.1%	70.6%	37.4% (91)‡∏
Male (%)	64.5% (155)‡	80.0% (60)‡	60.0% (50)‡¥	48.9%	72.6%	60.0% (90)‡
Reported Underlying Conditions						
≥ 1 underlying condition (%)	75.8% (120)‡	86.8% (53)‡	42.4% (33)‡¥	91.2% (34)‡	80.9% (47)‡	67.2% (61)‡
Any immunocompromised**(%)	5.0% (120)‡	7.6% (53)‡	3.0% (33)‡	2.9% (34)‡	6.4% (47)‡	4.9% (61)‡
Chronic Renal Failure**(%)	13.3% (120)‡	20.8% (53)‡	6.1% (33)‡	8.8% (34)‡	4.3% (47)‡	23.0% (61)‡∏
Diabetes**(%)	10.0% (120)‡	11.3% (53)‡	9.1% (33)‡	8.8% (34)‡	23.4% (47)‡	1.6% (61)‡∏
Heart Disease**(%)	7.5% (120)‡	3.8% (53)‡	3.0% (33)‡	17.7% (34)‡	14.9% (47)‡	3.3% (61)‡∏
Severity and Outcome Measures						
Severe Disease$^{\alpha}$ (%)	63.4%	100%	23.6% ¥	62.2%	90.2%	49.5% ∏
Non-Severe Disease$^{\beta}$ (%)	29.8%	0	65.5% ¥	26.7%	7.8%	46.3% ∏
Unknown Severity (%)	6.8%	0	10.9% ¥	11.1%	2.0%	4.2%
% Pneumonia	44.1%	63.9%	43.6% ¥	17.8%	54.9%	45.3%
% ARDS	12.4%	27.9%	3.6% ¥	2.2%	29.4%	5.3%∏
Required Hospitalization (%)	70.8%	86.9%	52.7% ¥	71.1%	94.1%	59.0%∏
Required ICU (%)	51.6%	70.5%	23.6% ¥	60.0%	76.5%	40.0% ∏
Treated with ECMO (%)	3.7%	8.2%	0	2.2%	5.9%	3.2%
Animal Exposure						
Contact with Animals (%)	14.3% (49)‡	20.0% (15)‡	14.3% (21)‡	7.7% (13)‡	17.9% (28)‡	9.5% (21)‡
Contact with Camels$^{\Omega}$ (%)	71.4% (7)‡	100% (3)‡	33.3% (3)‡	100% (1)‡	80.0% (5)‡	50.0% (2)‡
Contact with Sheep$^{\Omega}$ (%)	28.6% (7)‡	33.3% (3)‡	0 (3)‡	100% (1)‡	40% (5)‡	0 (2)‡

Notes: †Outcome is reported as of 22 October 2013; for 45 cases, outcome is unknown as either because they are still in hospital or their outcome (recovery or death) has not yet been reported; 4 fatal cases cannot be matched to our line list and are not included in the fatal cases in this table; ‡The denominator equals the total n in each category unless otherwise noted in parentheses;** denominator is total cases reporting on ≥1 underlying condition; α Severe cases are those who were admitted to an ICU, reported ECMO support, mechanical ventilation, or the use of vasopressors, were reported by the member state as "critical", "severe" or who died; β Including asymptomatic cases; ΩExposure to camels and sheep = direct contact to camels or sheep within the 10 days before symptom onset and only calculated for cases reporting contact with animals; Statistically significant differences ($p<0.05$) using Wilcoxon rank-sum test or Fisher's Exact test, as appropriate, between fatal and recovered patients are noted with a ¥ and between index/sporadic vs. secondary cases are noted with a ∏.

WHO MERS-CoV study group PLoS Nov 2013

Modelling

- R0 <0 or ~1 (Breban et al., Cauchemez et al.)
- Estimated number of symptomatic cases
  - 940 (62% remain undetected)

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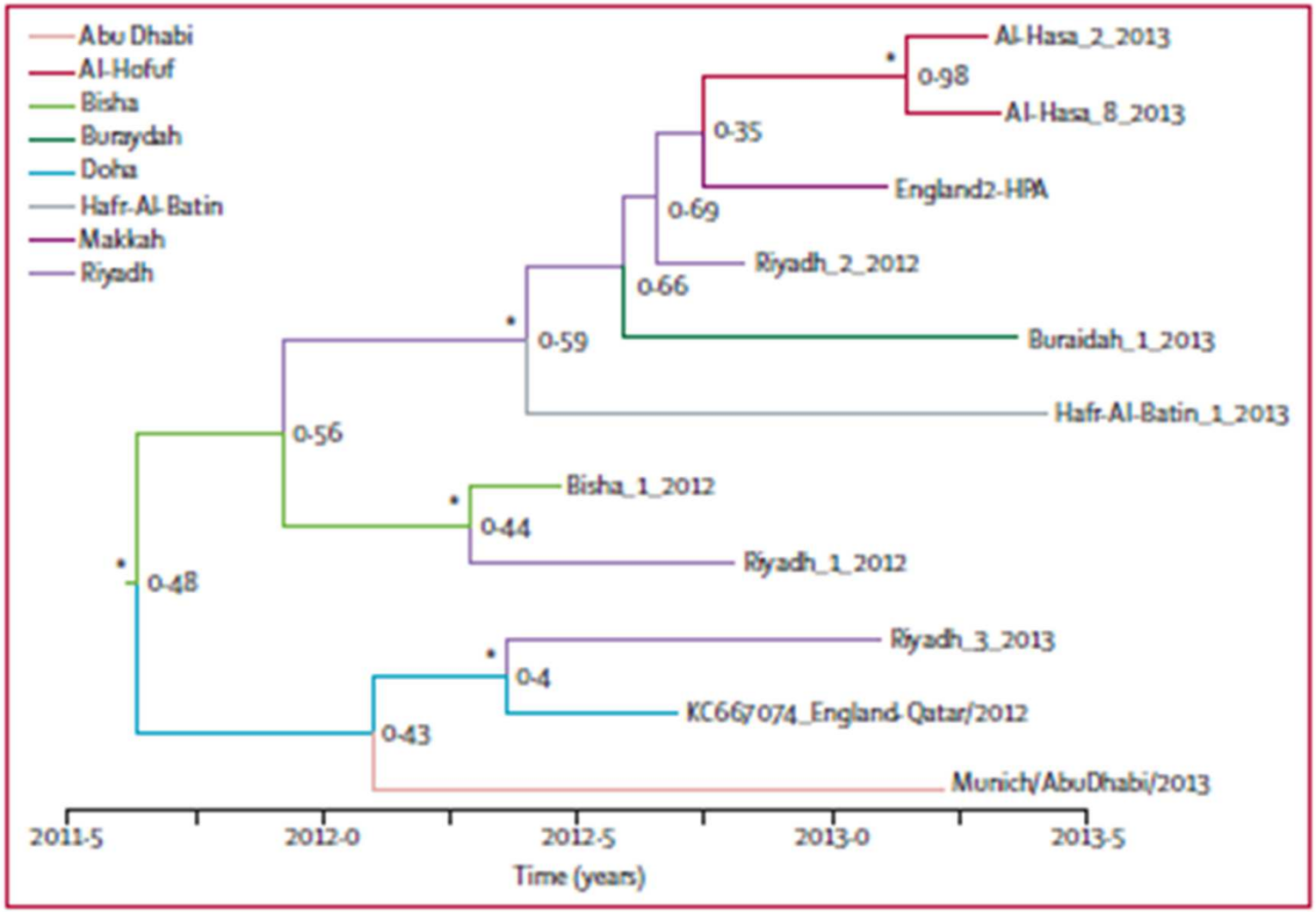
Genetic analysis suggest emergence in May 2011 (Cotton et al.)



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Case detection and surveillance

Case definition (WHO update 3 July 2013)

"A person with laboratory confirmation of MERS-CoV infection"

Case investigation protocol

Hospitalised acute respiratory infection AND

- Part of cluster
- Possibly exposed health care worker
- Travel to Middle- East
- Unusual or unexpected clinical course

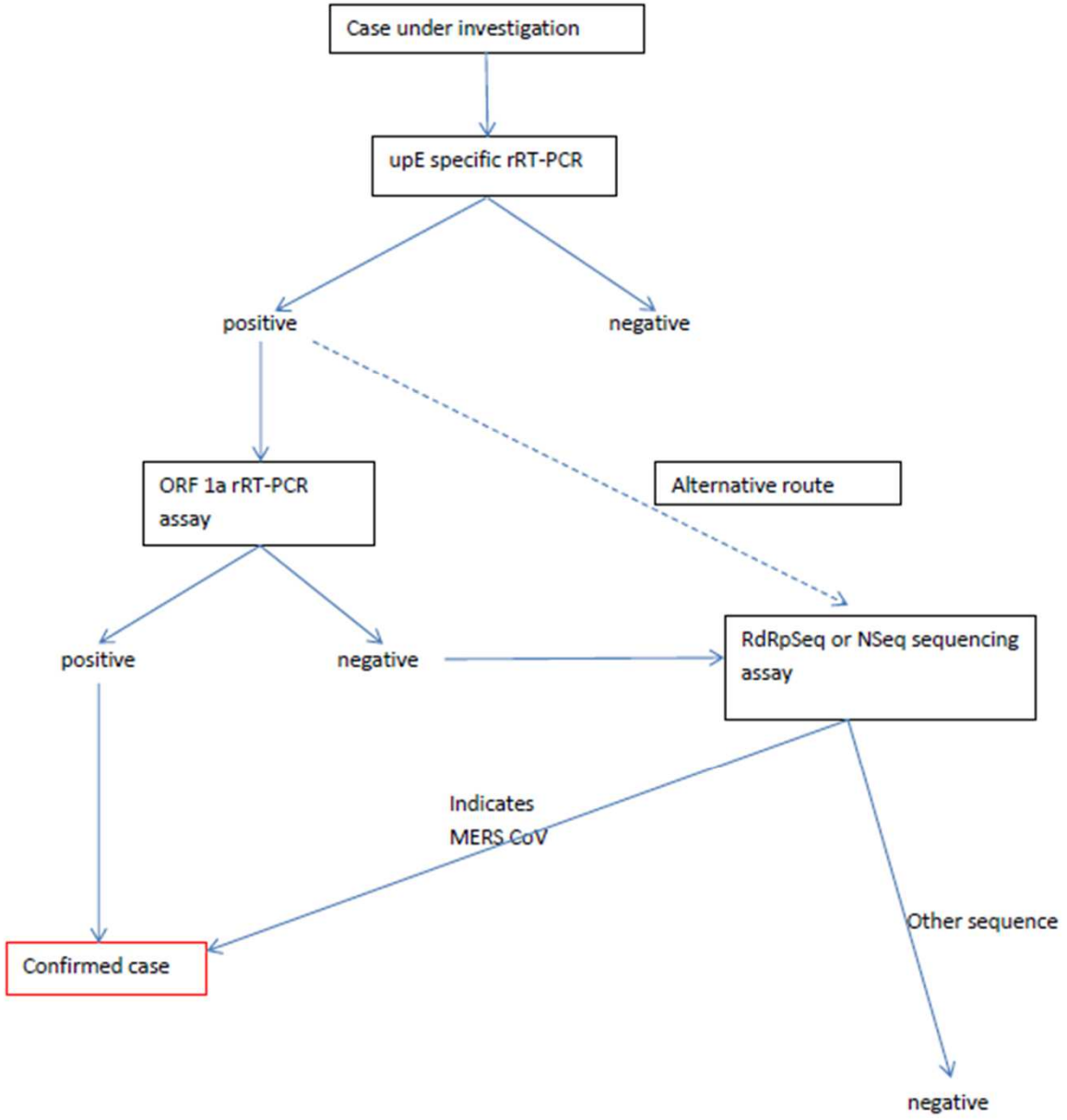
Surveillance

MoH Kingdom of Saudi Arabia

WHO IHR and HQ updates (incl. Twitter!)

EU EWRS and ECDC epidemic intelligence

Testing algorithm



Probable case definition

- A person with a febrile acute respiratory illness with evidence of pulmonary parenchymal disease
  AND
  Testing for MERS-CoV is unavailable or negative on a single inadequate specimen[1]
  AND
  The patient has a direct epidemiologic-link with a confirmed MERS-CoV case[2].

- A person with a febrile acute respiratory illness with evidence of pulmonary parenchymal disease
  AND
  An inconclusive MERS-CoV laboratory test
  AND
  A resident of or traveler to Middle Eastern countries where MERS-CoV virus is believed to be circulating in the 14 days before onset of illness.

- A person with an acute febrile respiratory illness of any severity
  AND
  An inconclusive MERS-CoV laboratory test
  AND
  A direct epidemiologic link with a confirmed MERS-CoV case[2].

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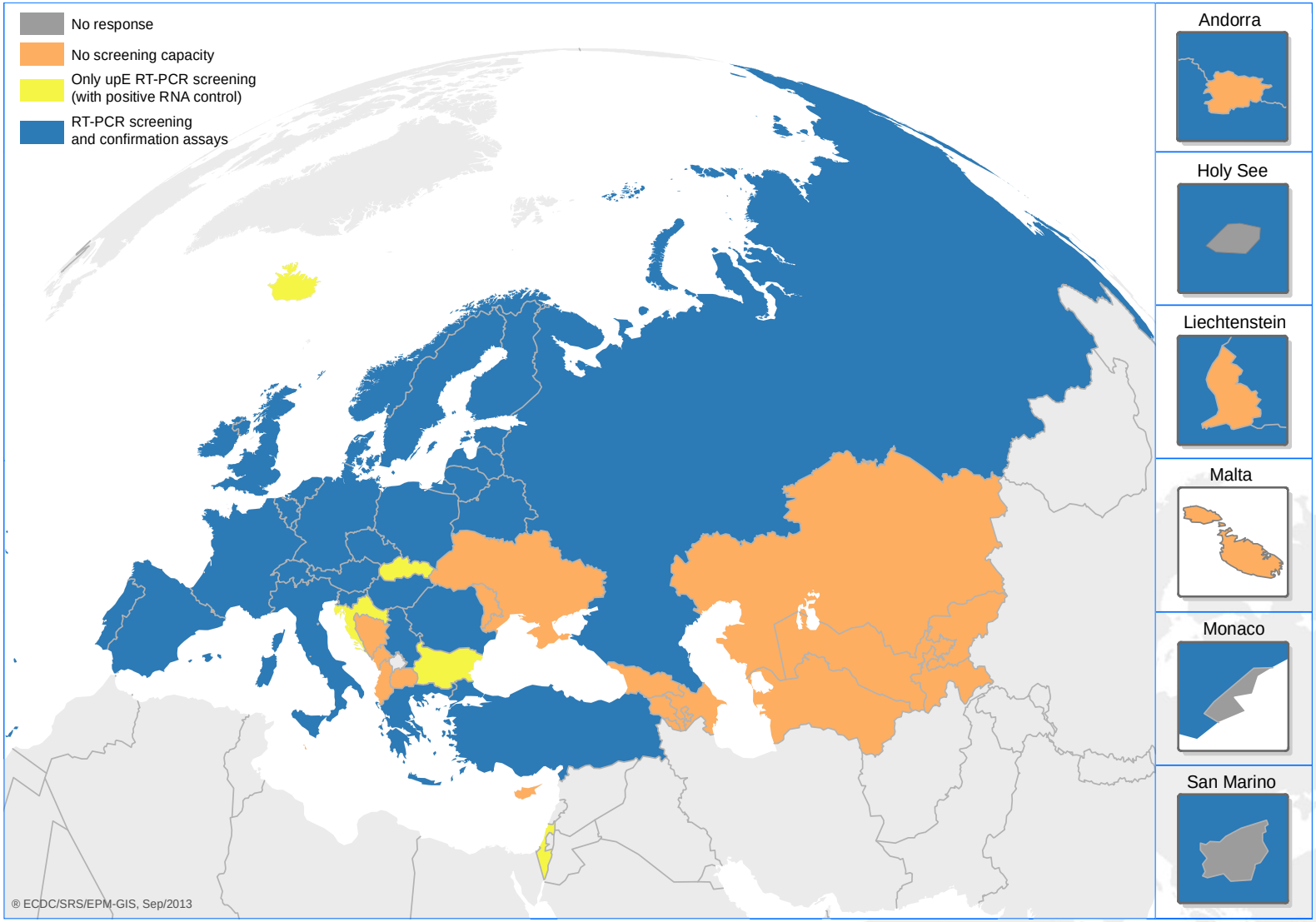
MERS CoV testing capability, EU/EEA countries and WHO Region, June 2013



Source: Palm et al *EuroSurveillance,* Dec 2012; Joint ECDC-WHO report 2013 (submitted)

Preparedness

WHO IHR emergency committee

- No public health emergency

WHO guidance

- Infection prevention and control in healthcare
- Advice for home care of patients
- Laboratory biorisk management

Decision support tool for treatment

- ISARIC/ Public Health England

Protocols for seroepidemiologic studies

- CONSISE – group

Vaccine development

- Several US and EU initiatives in early stages.

PP1

What do we still need?

Continued vigilance and monitoring

- Superspreading events?

Source and exposure is still elusive

- Studies in KSA to be finalised urgently

Generic infectious disease preparedness strenghtening

- International Health Regulations
- EU Decision on serious cross border health threats

Diapositiva 21

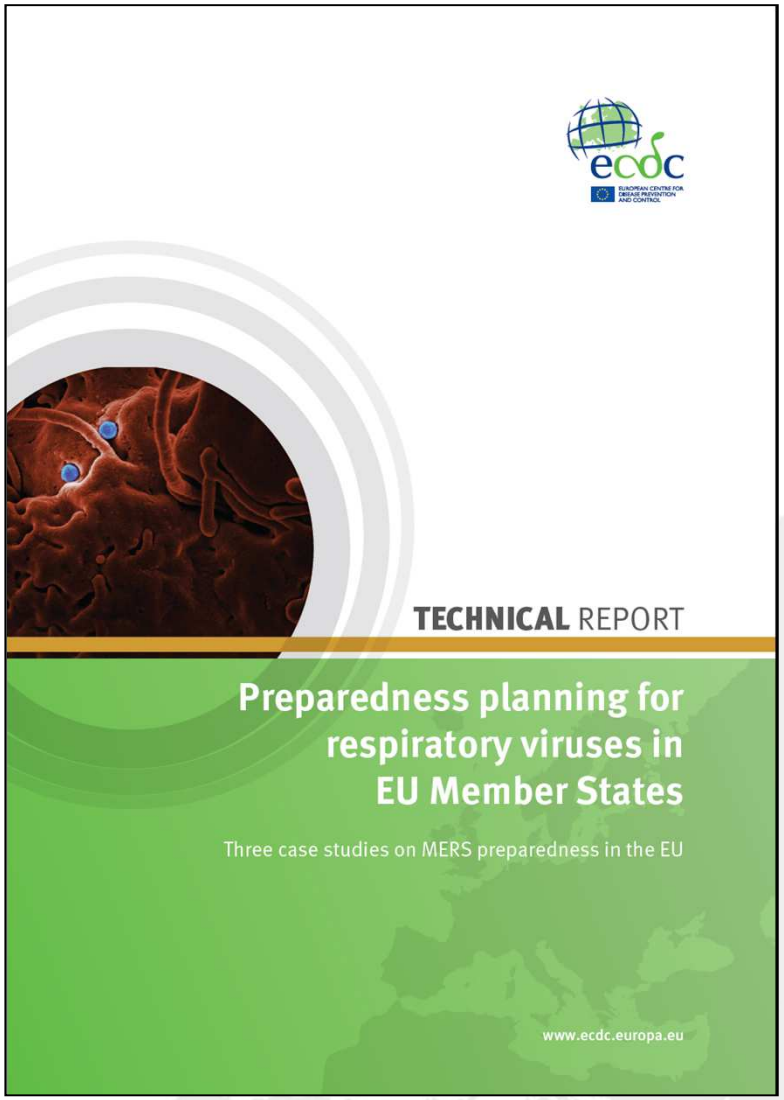
PP1

Size and sustainability of this event
Seroepidemiology?
Comparable importance

Pasi Penttinen; 06/11/2013

ECDC 2014 preparedness country visits

- Greece, UK, Spain
- Multi-sectoral preparedness
- Pandemic preparedness
- Experiences from handling cases

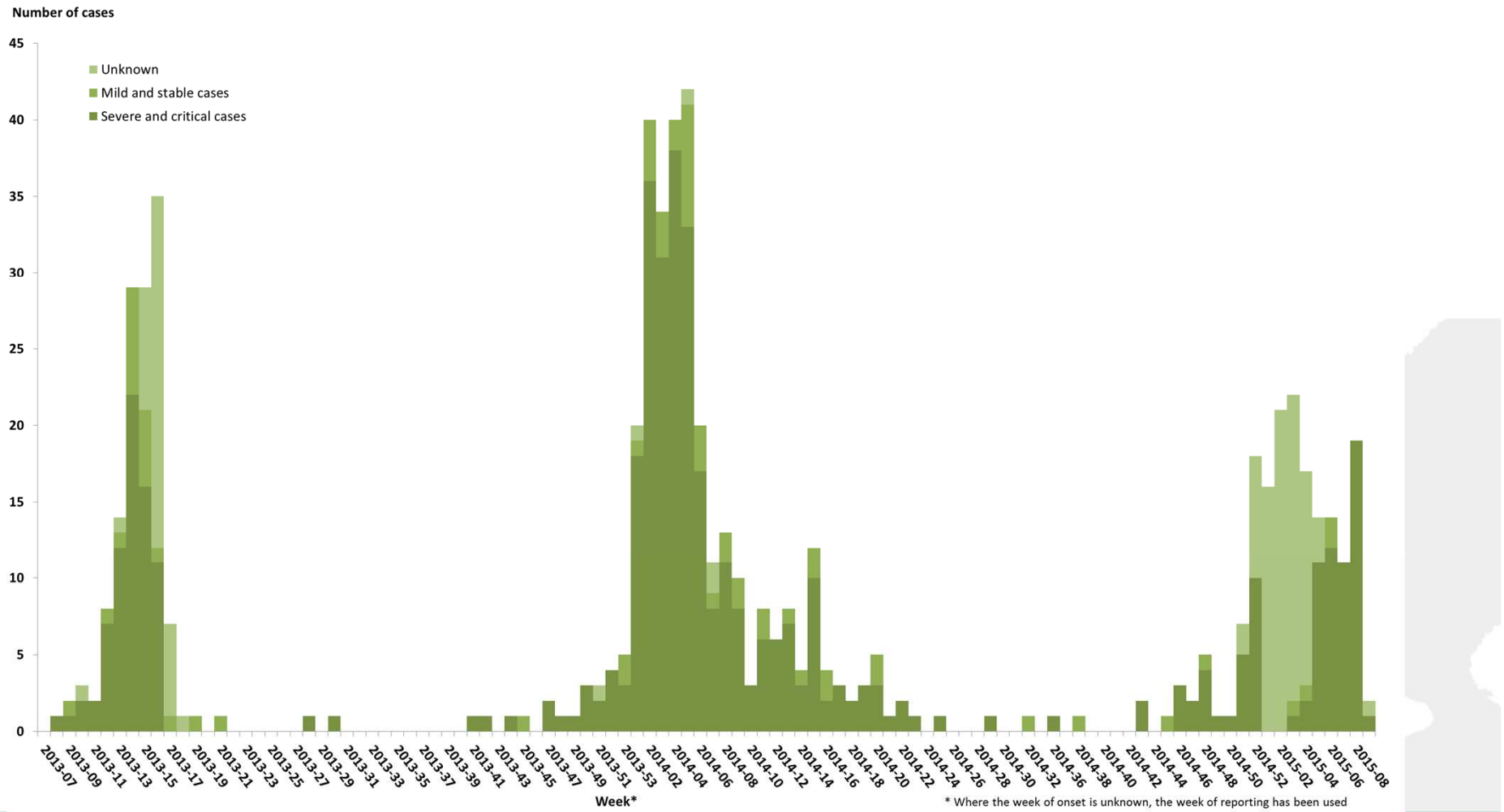


Public Health England

Courtesy of Alison Bermingham, PHE

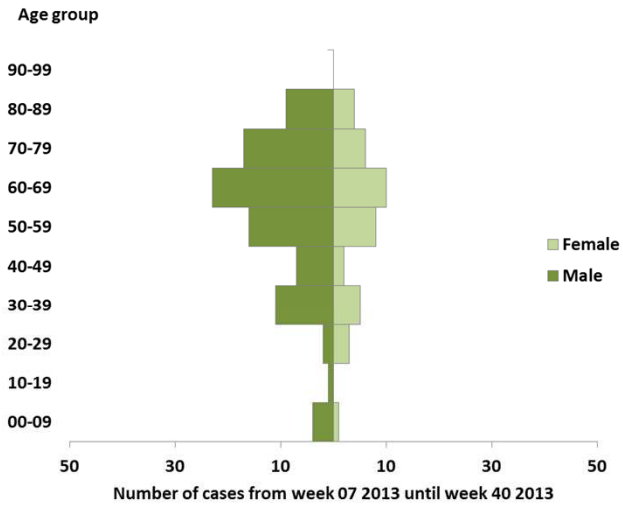
Influenza A(H7N9)

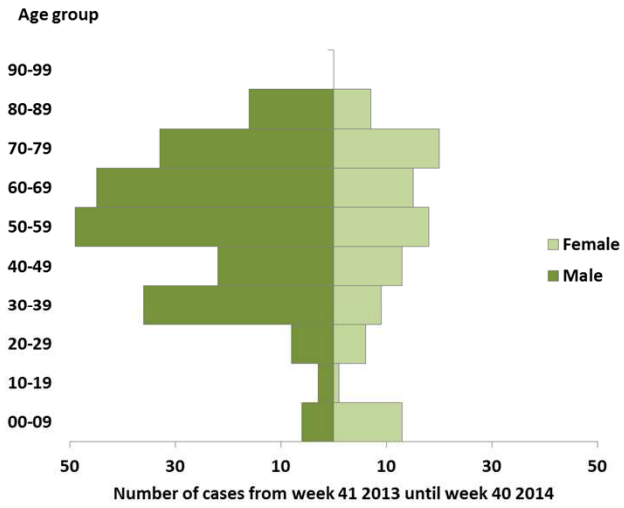
Distribution of confirmed cases of A(H7N9) by week of onset* (n=628) and severity from February 2013 until 11 March 2015

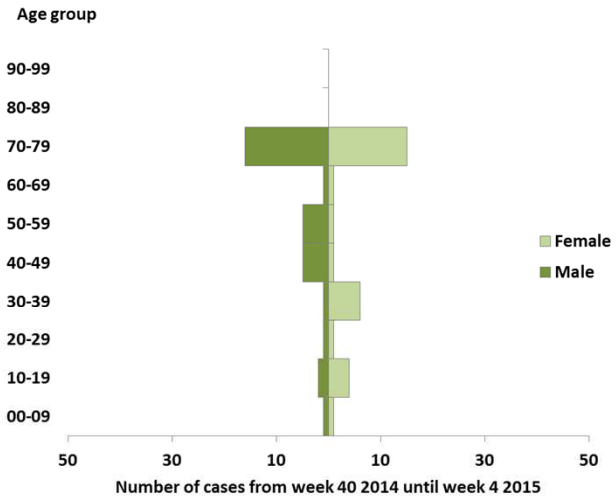


Number of cases of A(H7N9) by province and season, China 2013- 2015

Age and sex distribution of A(H7N9) cases by season 2013-2015







Clinical Characteristics and Selected Laboratory Abnormalities of 111 Patients Infected with H7N9 Virus

Table 2. Clinical Characteristics and Selected Laboratory Abnormalities of 111 Patients Infected with H7N9 Virus *

Characteristic	Value
Fever	
Any — no. (%)	111 (100.0)
Maximal temperature — °C	39.2±0.8
Subgroup — no. (%)	
37.3–38.0°C	11 (9.9)
38.1–39.0°C	43 (38.7)
>39.0°C	57 (51.4)
Fatigue — no. (%)	40 (36.0)
Conjunctivitis — no. (%)	0
Cough — no. (%)	100 (90.1)
Sputum production — no. (%)	62 (55.9)
Hemoptysis — no. (%)	27 (24.3)
Shortness of breath — no. (%)	62 (55.9)
Diarrhea or vomiting — no. (%)	15 (13.5)
White cells	
Median — per mm^3	4450
Interquartile range — per mm^3	2900–6230
Subgroup — no. (%)	
>10,000 per mm^3	5 (4.5)
<4000 per mm^3	51 (45.9)
Lymphocytes — per mm^3	
Median	460
Interquartile range	320–700
Lymphocytopenia — no. (%)	98 (88.3)
Hemoglobulin — g/dl	12.9±3.1
Platelets — per mm^3	
Median	115,500
Interquartile range	82,000–149,500
Thrombocytopenia — no. (%)	81 (73.0)
C-reactive protein >10 mg/liter — no. (%)	85 (76.6)
Procalcitonin >0.5 ng/ml — no. (%)	28 (37.3)
Aspartate aminotransferase >40 U/liter — no. (%)	73 (65.8)
Creatinine >133 μmol/liter (1.5 mg/dl) — no. (%)	10 (9.0)
Lactate dehydrogenase >250 U/liter — no. (%)	91 (82.0)
Creatine kinase >200 U/liter — no. (%)	49 (44.1)
Myoglobulin >80 μg/ml — no. (%)	16 (55.2)
PaO_2:FiO_2	
Median	144.0
Interquartile range	107.1–226.9
Potassium — mmol/liter	3.8±0.5
Sodium — mmol/liter	136.8±6.0
D-dimer >0.5 mg/liter — no. (%)	47 (90.4)
Chest radiologic findings — no. (%)	
Involvement of both lungs	60 (54.1)
Ground-glass opacity	62 (55.9)
Consolidation	99 (89.2)

* Plus–minus values are means ±SD. A complete list of ranges of laboratory measures in this table is provided in Table S4 in the Supplementary Appendix. Lymphocytopenia was defined as a lymphocyte count of less than 1500 per cubic millimeter. Thrombocytopenia was defined as a platelet count of less than 150,000 per cubic millimeter. Procalcitonin was measured in 75 patients, myoglobulin was measured in 29 patients, and total D-dimer was measured in 52 patients. PaO_2:FiO_2 denotes the ratio of the partial pressure of arterial oxygen to the fraction of inspired oxygen.

Gao H et al. N Engl J Med 2013;368:2277-2285.

The NEW ENGLAND JOURNAL of MEDICINE

A(H7N9) - conclusions

- Virus transmits mainly in live bird markets bird-to human
- Only limited human-to-human transmission
- Continued transmission of H7N9 in China poses pandemic risk
- Risk to European citizens currently limited to residents or visitors to Chinese live bird markets
- n.b. rapid expansion of H5 strains to multiple continents in recent months

Acknowledgements

Kaja Kaasik Aaslav and ECDC EI group

Influenza and other respiratory viruses DP at ECDC

Alison Bermingham and WHO MERS team