CORONAVIRUS: PREPARING FOR THE NEXT PANDEMIC

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Novel Coronavirus in Wuhan, China
Travel Advice and Resources
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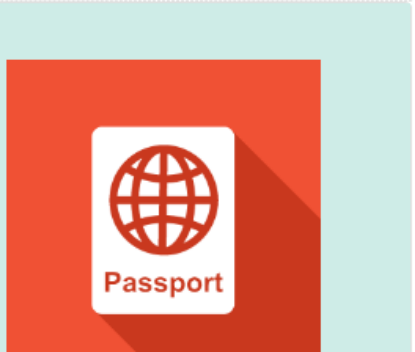
Frequently Asked Questions



Novel Coronavirus in Wuhan, China

Warning - Level 3, Avoid Nonessential Travel

Alert - Level 2, Practice Enhanced Precautions

Watch - Level 1, Practice Usual Precautions

Key Points

- **CDC recommends that travelers avoid all nonessential travel to Wuhan, China.**
- There is an ongoing outbreak of respiratory illness caused by a novel (new) coronavirus that can be spread from person to person.
- Chinese officials have closed transport within and out of Wuhan, including buses, subways, trains, and the international airport.
- Preliminary information suggests that older adults and people with underlying health conditions may be at increased risk for severe disease from this virus.
- The situation is evolving. This notice will be updated as more information becomes available.

What is the current situation?

- **CDC recommends that travelers avoid all nonessential travel to Wuhan, China. In response to an outbreak of respiratory illness,** Chinese officials have closed transport within and out of Wuhan, including buses, subways, trains, and the international airport.
- Information for travelers to other parts of China is available at wwwnc.cdc.gov/travel/destinations/traveler/none/china.

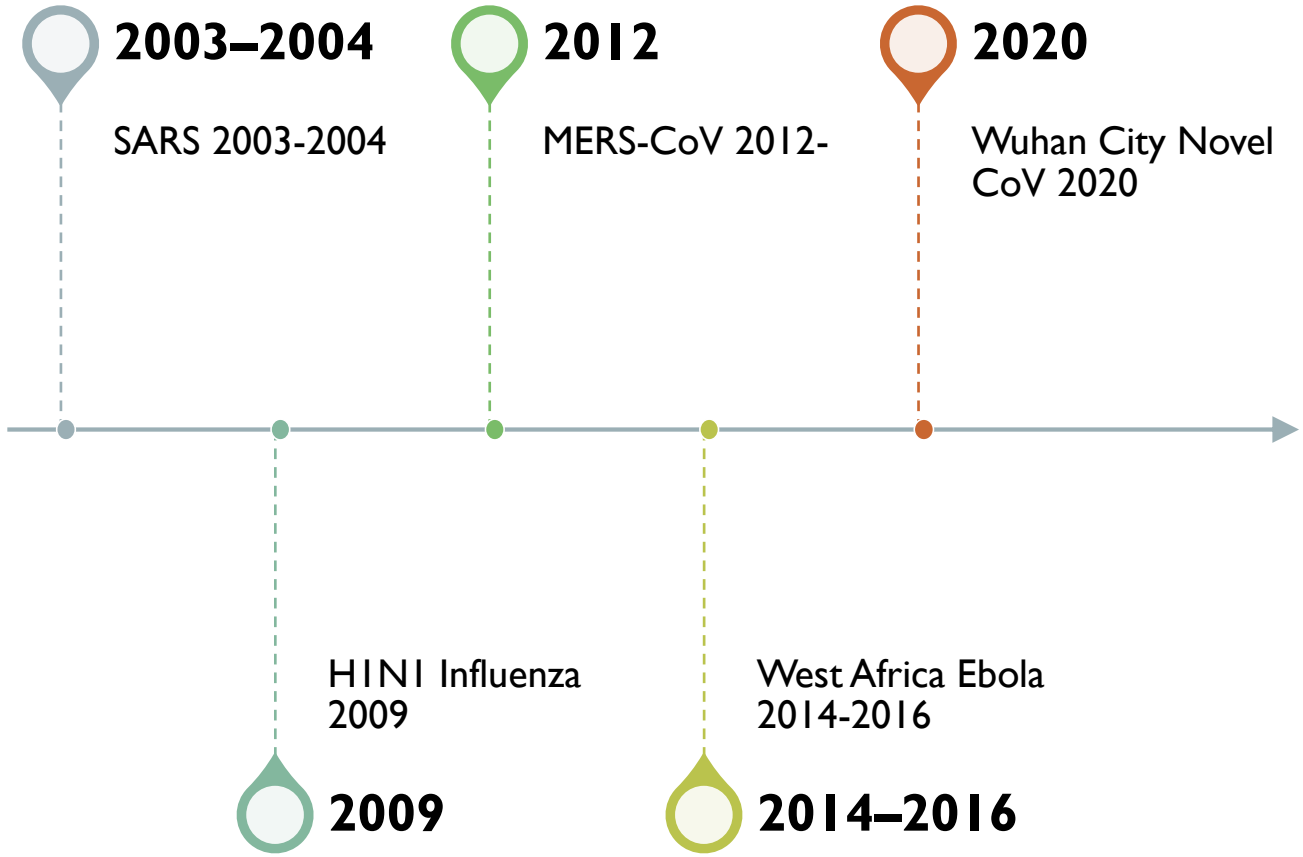
OBJECTIVES

Participant will be able to describe steps that can be taken to prepare for future outbreaks

Participant will be able to discuss lessons learned from prior outbreaks

Participant will identify gaps in current preparedness

PRIOR OUTBREAKS



Asia & Pacific

China identifies new strain of coronavirus as source of pneumonia outbreak

https://www.washingtonpost.com/world/asia_pacific/china-identifies-new-strain-of-coronavirus-as-source-of-pneumonia-outbreak/2020/01/09/f2625650-329f-11ea-971b-43bec3ff9860_story.html

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FEATURED NEWS TOPICS Ebola Zika MERS-CoV Chronic Wasting Disease

Wuhan nCoV outbreak quadruples, spreads within China

Filed Under: Coronavirus; Misc Emerging Topics

Lisa Schnirring | News Editor | CIDRAP News | Jan 19, 2020

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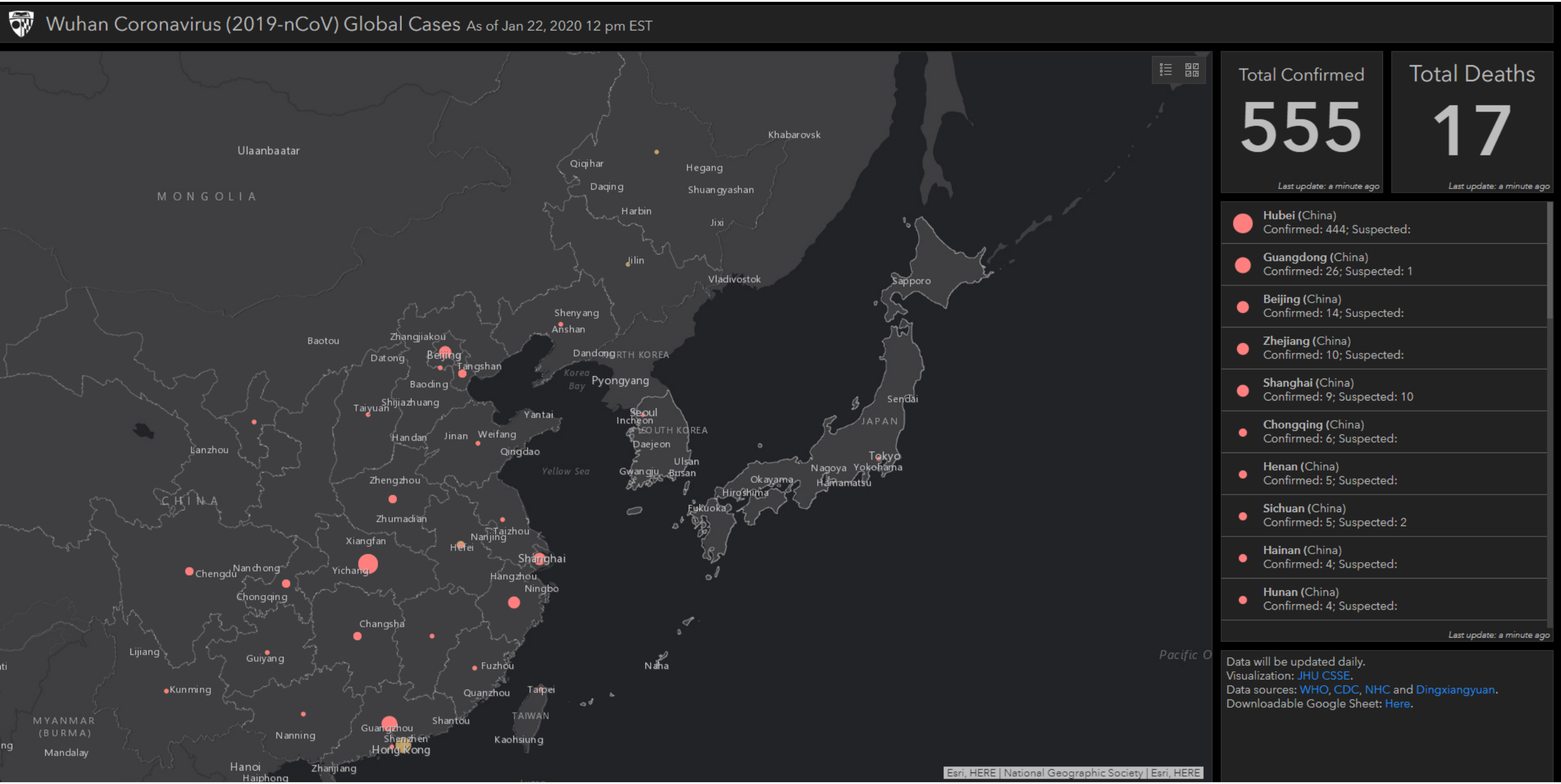
A surge of newly confirmed novel coronavirus (2019-nCoV) cases since Friday in Wuhan has pushed the outbreak total to 198 cases, some of them with no apparent links to the outbreak market, and health officials today announced a case in Shenzhen, China's first outside of Wuhan.

The expansion of the outbreak in China comes during Asia's heavy travel season ahead of the Jan 25 Lunar New Year observance. Meanwhile, the World Health Organization (WHO) said yesterday officials see evidence of limited human-to-human transmission, adding that it's closely watching for signs of sustained spread.

gjp311 / iStock



https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6

Middle East respiratory syndrome coronavirus (MERS-CoV)

Worldwide reduction in MERS cases and deaths since 2016

8 July 2019 - WHO and colleagues from the University of Oxford, Imperial College London and Institut Pasteur have estimated that, since 2016, 1,465 cases of Middle East Respiratory syndrome coronavirus (MERS-CoV) and between 300 and 500 deaths may have been averted due to accelerated global efforts to detect infections early and reduce transmission.

Read WHO summary

Read the full Research Letter published in the journal Emerging Infectious Diseases


EMERGING INFECTIOUS DISEASES®

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Volume 25, Number 9—September 2019

Research Letter

Worldwide Reduction in MERS Cases and Deaths since 2016

Christl A. Donnelly, Mamun R. Malik, Amgad Elkholy, Simon Cauchemez, and Maria D. Van Kerkhove

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Suggested citation for this article

Abstract

On This Page

Research Letter

Suggested Citation

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Since September 2012, WHO has been notified of 2494 laboratory-confirmed cases of infection with MERS-CoV.

For more: MERS Situation Updates

858

858 MERS-CoV associated deaths have occurred since September 2012.

For more: Coronavirus infections news

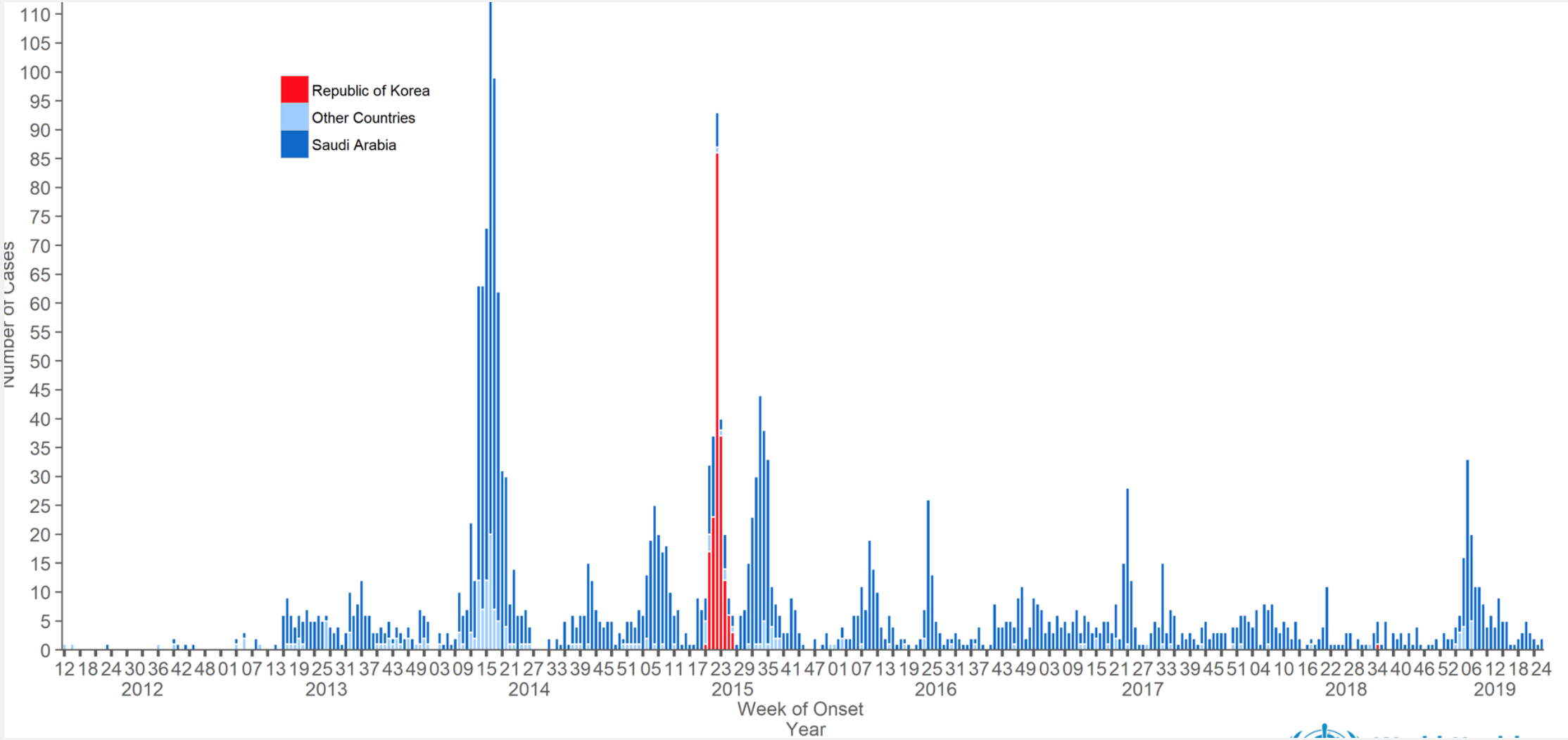
27

Since September 2012, 27 countries have reported cases of MERS-CoV

For more: Fact sheet on MERS-CoV

https://www.who.int/emergencies/mers-cov/en/

MERS CoV Epi Curve



SARS CASES 11/02-7/31/03

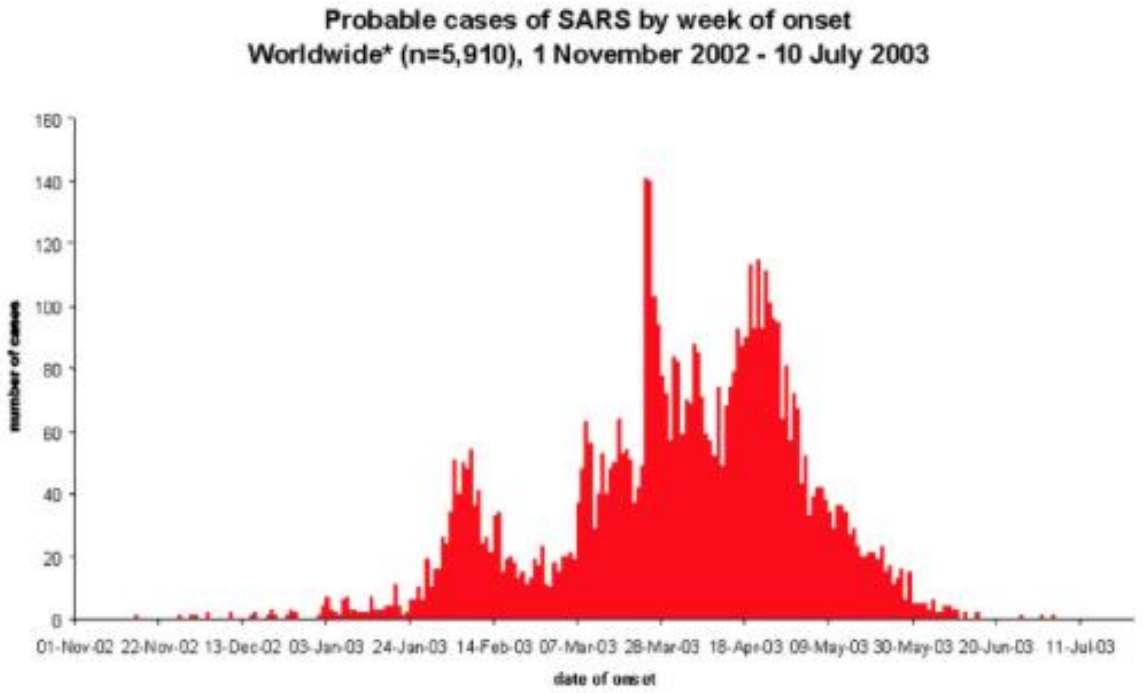
8098 Cases total/ 1707 HCW

8 confirmed U.S. cases/192 suspect

774 deaths (Case Fatality 9.6%)

Mortality ranges 3-15% overall	Mortality <1% in persons 24 yrs or less	Mortality 6% in ages 25-44	Mortality 15% in ages 45-64	Mortality >50% in those >65 years

Epidemic curves - Severe Acute Respiratory Syndrome (SARS)



WILL SARS RETURN?

https://www.who.int/csr/sars/epicurve/epiindex/en/index1.html

PNEUMONIA, WUHAN CITY

- 4 patients admitted to hospital in Wuhan with pneumonia; all worked at Huanan Seafood Wholesale Market; field investigation yielded additional patients
- Initial lab testing was negative for respiratory pathogens
- A novel coronavirus sequence was found from clinical specimens with 3 distinct strains
- Outbreak of pneumonia reported 12/31/19, with 44 cases caused by a novel coronavirus (nCoV)
- Most cases had epidemiologic links to a large animal and seafood market in Wuhan City.
- PUI definition:
  - Fever and symptoms of lower respiratory illness within 14D prior
  - History of travel from Wuhan City or close contact with a PUI or close contact with an ill laboratory-confirmed 2019-nCoV patient

2019-NCOV

- Over 500 confirmed cases in China, including 444 in Wuhan, 14 in Beijing and 14 in Guangdong (as of 1/20/2020); 117 suspected in Hong Kong
- Most cases have been epidemiologically linked to a large seafood and animal market in Wuhan
- 16 cases have been reported in healthcare workers, demonstrating that there is human-to-human transmission
- A woman in South Korea who traveled to Wuhan, but did not visit any markets or have contact with animals or confirmed cases remains unexplained
- Cases have also been reported in Thailand and Japan
- Many of the cases have been relatively mild, but about 15% are severe; 17 deaths to date
- More severe in people over age 50 and with comorbidities

CASES

- Patients presented with severe and nonproductive cough; some had dyspnea
- Almost all had normal or decreased WBC and infiltrates on CXR
- Environmental specimens collected from market were positive, but no animal from the market has been identified as a possible source
- Of 198 confirmed cases, 22% had direct exposure to the market, 32% had contact with patients with fever and respiratory symptoms; 51% had neither visited the market nor had contact with sick people

CHINA CDC WEEKLY

CCDC weekly

中国疾病预防控制中心周报

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Notes from the Field: An Outbreak of NCIP (2019-nCoV) Infection in China — Wuhan, Hubei Province, 2019–2020

The 2019-nCoV Outbreak Joint Field Epidemiology Investigation Team[1,2,3]; Qun Li[1]

View author affiliations

For the most recent updates, follow China CDC Weekly's Tracking the Epidemic.

Emerging and re-emerging pathogens are great challenges to the public health (*1*). A cluster of cases of viral pneumonia of unknown etiology (VPUE), now known as novel coronavirus-infected pneumonia (NCIP), occurred in Wuhan, Hubei Province and was reported to health authorities on December 29, 2019 (*2*). A national, provincial, and municipal joint investigation team has been assembled to conduct field investigations and implement disease control and prevention measures. This report shows interim results of the investigation and makes recommendations for response measures.

Identification of the Epidemic

On December 29, 2019, a hospital in Wuhan admitted four individuals with pneumonia and recognized that all four had worked in the Huanan Seafood Wholesale Market, which sells live poultry, aquatic products, and several kinds of wild animals to the public. The hospital reported this occurrence to the local center for disease control (CDC), which lead Wuhan CDC staff to initiate a field investigation with a retrospective search for pneumonia patients potentially linked to the market. The investigators found additional patients linked to the market, and on December 30, health authorities from Hubei Province reported this cluster to China CDC. The following day, China CDC sent experts to Wuhan to support the investigation and control effort. Samples from these patients were obtained for laboratory analyses.

Article Contents

Identification of the Epidemic
Epidemiological Findings
Preliminary Conclusions
References

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TREND MD

INFECTION PREVENTION

Patients should be given a surgical mask when entering healthcare facility

PUI should be placed in airborne isolation

Standard, airborne, contact isolation should be used and eye protection

Home care guidance is available on CDC site for people who are PUI's but are not sick enough to require hospital admission

LABORATORY TESTING

- Virus isolation not recommended in hospital labs
- Multiple samples should be collected and sent to CDC
  - Upper respiratory, lower respiratory, serum; also stool, urine, other
- Specimens should be collected as soon as possible and stored appropriately until decision is made by CDC whether testing will be done
- ODH/LHD to be notified immediately if suspected cases are seen
- Instructions are available on CDC website

STANDARD BSL-2 ACTIVITIES

- Pathologic examination and processing of formalin-fixed or otherwise inactivated tissues
- Molecular analysis of extracted nucleic acid preparations
- Electron microscopic studies with glutaraldehyde-fixed grids
- Routine examination of bacterial and mycotic cultures
- Routine staining and microscopic analysis of fixed smears
- Final packaging of specimens for transport to diagnostic laboratories for additional testing. Specimens should already be in a sealed, decontaminated primary container.
- Inactivated specimens (e.g., specimens in nucleic acid extraction buffer)

USE CLASS II BSC FOR:

- Aliquoting and/or diluting specimens
- Inoculating bacterial or mycological culture media
- Performing diagnostic tests that do not involve propagation of viral agents in vitro or in vivo
- Nucleic acid extraction procedures involving potentially infected specimens
- Preparation and chemical- or heat-fixing of smears for microscopic analysis

SARS
(SEVERE ACUTE RESPIRATORY SYNDROME)

LESSONS FROM FIRST SARS EPIDEMIC

- If SARS were more contagious, would not have been contained
- Basic public health measures effective
  - Case definition, isolation, quarantine, PPE
- High level of commitment from affected governments important in containing disease
- Effective global surveillance system critical
- Luck played a big role in containing virus

SARS: Lessons from the first epidemic of the 21st century. CIA

EVIDENCE FOR ANIMAL SOURCE

Several CoV closely related to SARS found in palm civets, raccoon-dogs, and Chinese ferret badgers, horseshoe bats

Clusters of illness occurred in vendors at wholesale markets

Antibody prevalence greatest in those who directly handle these animals

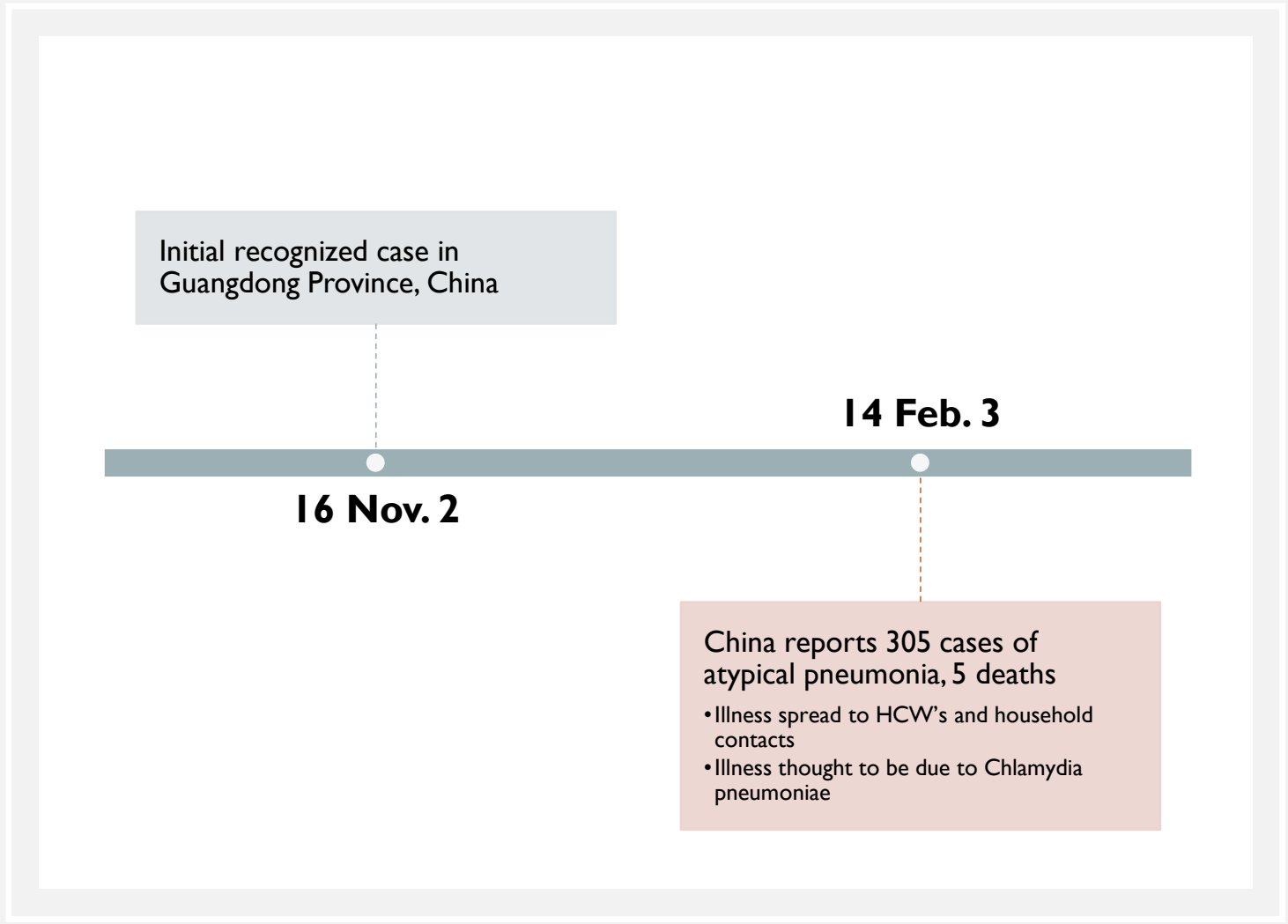
Cases were associated with restaurant that served palm civets

SARS PREDATING OUTBREAK

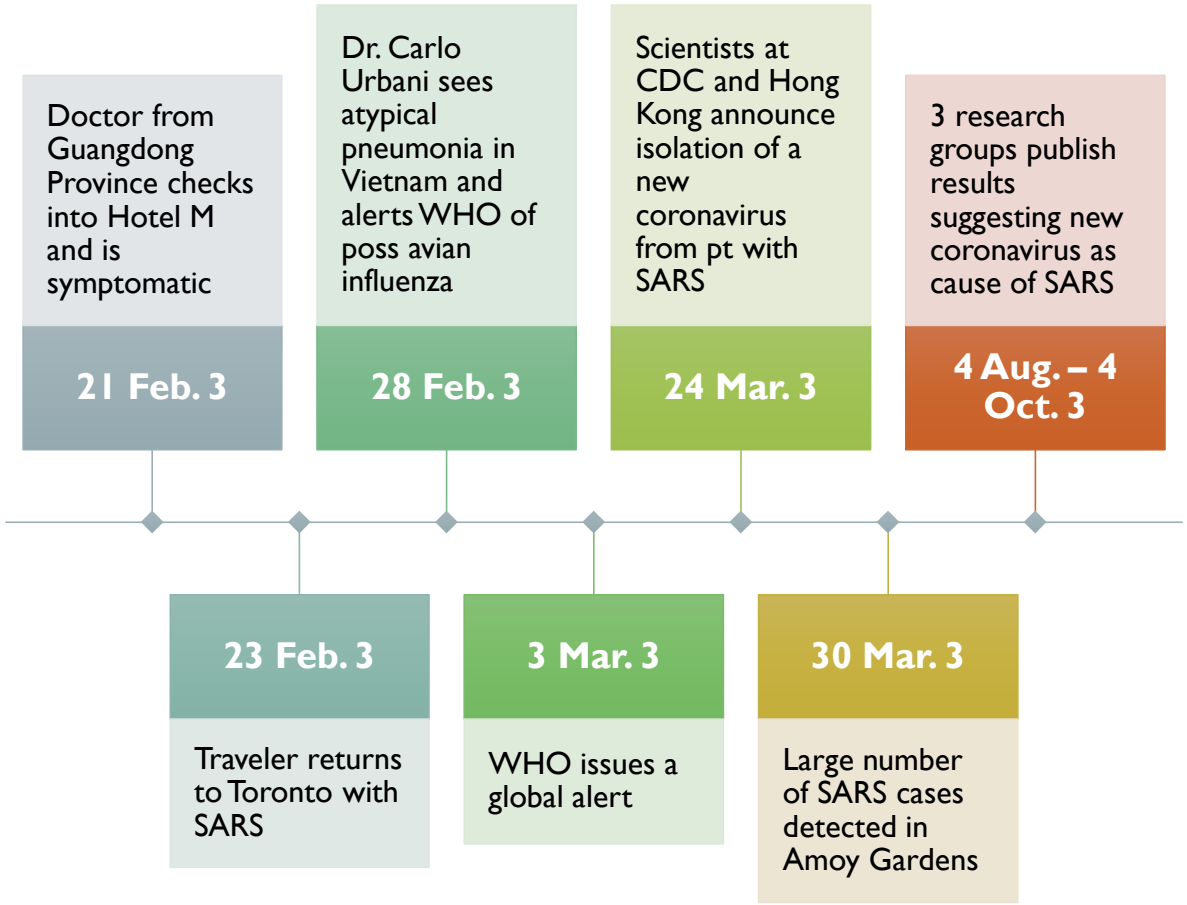
- Serological evidence of SARS CoV in wild animal handlers prompted investigation of others
- Serum collected in 5/01 for HBV study from 938 healthy Chinese adults compared to 48 confirmed SARS cases
- Samples tested for human SARS CoV and animal SARS CoV
- 17/938 (1.8%) showed ab to human virus, animal virus or both
- Most had higher neutralization ab titers to the animal virus
- All 48 confirmed SARS cases had higher ab titer to human virus

Zheng et al. Emerg Infect Dis Feb 2004

TIMELINE


Initial recognized case in Guangdong Province, China
16 Nov. 2
14 Feb. 3
China reports 305 cases of atypical pneumonia, 5 deaths
• Illness spread to HCW's and household contacts
• Illness thought to be due to Chlamydia pneumoniae

TIMELINE


Doctor from Guangdong Province checks into Hotel M and is symptomatic
21 Feb. 3
Dr. Carlo Urbani sees atypical pneumonia in Vietnam and alerts WHO of poss avian influenza
28 Feb. 3
Scientists at CDC and Hong Kong announce isolation of a new coronavirus from pt with SARS
24 Mar. 3
3 research groups publish results suggesting new coronavirus as cause of SARS
4 Aug. – 4 Oct. 3
23 Feb. 3
Traveler returns to Toronto with SARS
3 Mar. 3
WHO issues a global alert
30 Mar. 3
Large number of SARS cases detected in Amoy Gardens

HOTEL M

Index pt became ill 2/15, and traveled to Hong Kong on 2/21 to visit family; checks into Hotel M

Pt checks into hospital on 2/22, and dies next day

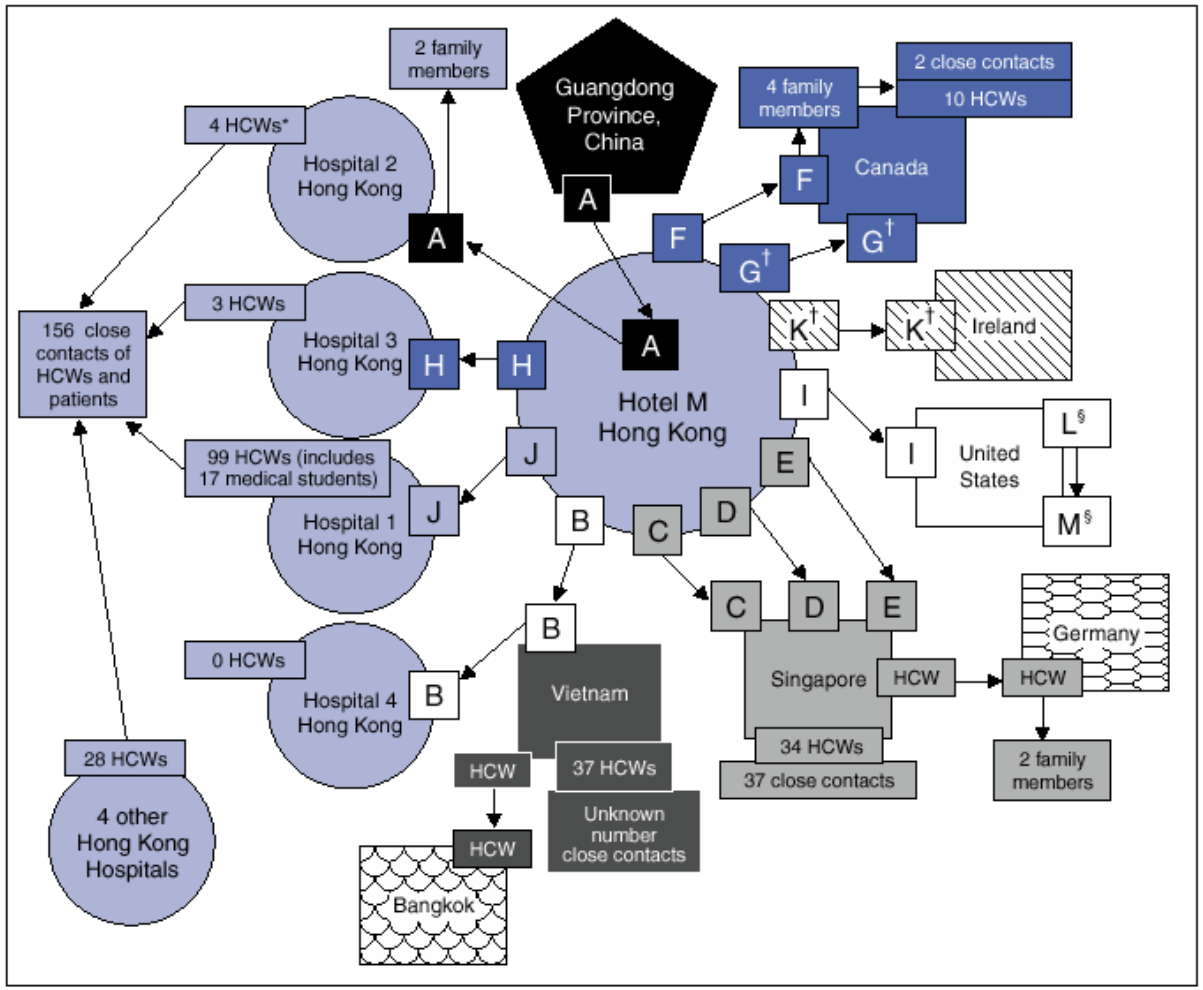
4 HCW's and 2 family members get sick; one family member dies

12 other patients subsequently linked to index pt export virus to 6 other countries

HOTEL M

- MMWR 2003;52:241-8

FIGURE 1. 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.

TORONTO

- Couple visit family in Hong Kong and stay at Hotel M same time as index patient
- Woman returns to Toronto on 2/23; shares apt with 2 sons, a daughter-in-law and a 5-month-old grandson
- On 2/25, she develops fever, anorexia, myalgia, sore throat, non-prod cough. Pt seen by PCP, diagnosed with pharyngitis. She died 9 days later at home.

TORONTO

The index pt's 43 y/o son developed fever 2 days after mother's symptoms

He is admitted to hospital, develops respiratory deterioration and dies 3/13

On 3/8 and 3/9 Five remaining adult family members and 3 children evaluated. 4 had fever, cough, dyspnea, and infiltrates on CXR. Children remain asymptomatic.

TORONTO

Subsequent investigation reveals SARS in 37 y/o previously healthy family physician of patients 2 and 4

Individual with a-fib in ED at same time as pt 2 subsequently develops SARS

HONG KONG, AMOY GARDENS

- Pt with SARS and diarrhea visits brother on 3/14 and 3/19
- 321 people develop SARS, 41% in same building as brother
- Spread partially blamed on fecal droplets

ORIGINAL ARTICLE

Evidence of Airborne Transmission of the Severe Acute Respiratory Syndrome Virus

Ignatius T.S. Yu, M.B., B.S., M.P.H., Yuguo Li, Ph.D., Tze Wai Wong, M.B., B.S., Wilson Tam, M.Phil., Andy T. Chan, Ph.D., Joseph H.W. Lee, Ph.D., Dennis Y.C. Leung, Ph.D., and Tommy Ho, B.Sc.

ABSTRACT

BACKGROUND

There is uncertainty about the mode of transmission of the severe acute respiratory syndrome (SARS) virus. We analyzed the temporal and spatial distributions of cases in a large community outbreak of SARS in Hong Kong and examined the correlation of these data with the three-dimensional spread of a virus-laden aerosol plume that was modeled using studies of airflow dynamics.

METHODS

We determined the distribution of the initial 187 cases of SARS in the Amoy Gardens housing complex in 2003 according to the date of onset and location of residence. We then studied the association between the location (building, floor, and direction the apartment unit faced) and the probability of infection using logistic regression. The spread of the airborne, virus-laden aerosols generated by the index patient was modeled with the use of airflow-dynamics studies, including studies performed with the use of computational fluid-dynamics and multizone modeling.

RESULTS

The curves of the epidemic suggested a common source of the outbreak. All but 5 patients lived in seven buildings (A to G), and the index patient and more than half the other patients with SARS (99 patients) lived in building E. Residents of the floors at the middle and upper levels in building E were at a significantly higher risk than residents on lower floors; this finding is consistent with a rising plume of contaminated warm air in the air shaft generated from a middle-level apartment unit. The risks for the different units matched the virus concentrations predicted with the use of multizone modeling. The distribution of risk in buildings B, C, and D corresponded well with the three-dimensional spread of virus-laden aerosols predicted with the use of computational fluid-dynamics modeling.

CONCLUSIONS

Airborne spread of the virus appears to explain this large community outbreak of SARS, and future efforts at prevention and control must take into consideration the potential for airborne spread of this virus.

CORONAVIRIDAE

Family of large enveloped single stranded RNA viruses

Virions show characteristic surface projections that give effect of a crown

Coronaviruses cause respiratory disease in animals- generally species specific

C Humphrey, Pathology Activity Program

CORONAVIRUS

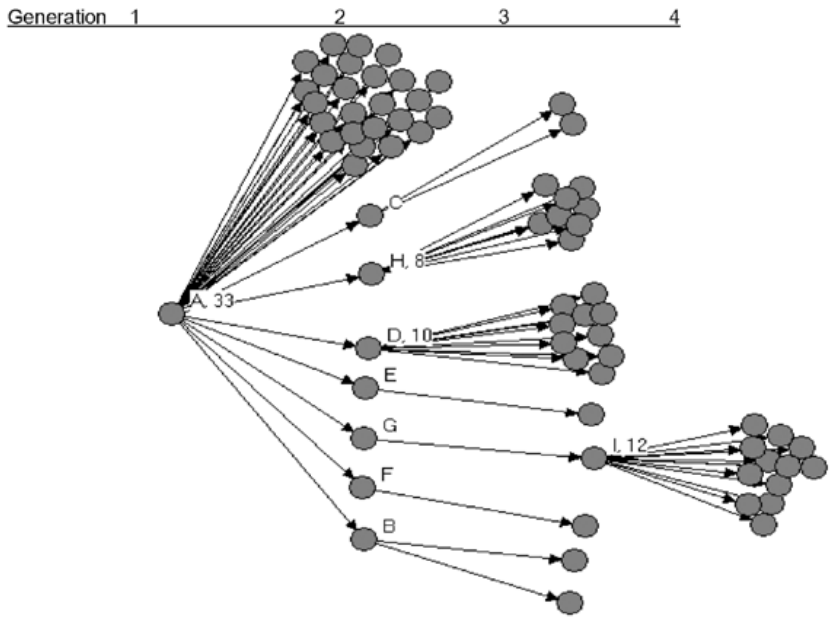
- Major cause of colds in humans
- Transmitted person-to-person by droplets, hand contamination, fomites and small particle aerosol
- Virus found in stool, respiratory secretions, urine
- Virus stable in feces and urine at room temp for 1-2 days
- Virus killed by heating to 56 degrees Celsius and common disinfectants

TRANSMISSION

- Primarily by droplets from respiratory secretions- a little further than ordinary
- Fecal and airborne transmission may also occur
- Moderately transmissible- R_o approx 3
  - Virus isolated in Guangdong Province for 3 mo
  - 81% of 162 pts in Singapore did not infect anyone else
  - Report from Philippines describes individual who had close contact with 254 people while symptomatic, only transmitted to 3 people

TRANSMISSION

- Superspreaders or superspreading events
  - In Singapore 103 of 201 initial cases linked to 5 source cases
- Nosocomial transmission common feature in outbreaks
  - 77% of cases in Toronto linked to nosocomial transmission
- No known transmission after pts discharged from hospital



Shen et al. Emerg Infect Dis Feb 2004

SARS Among Critical Care Nurses, Toronto

Table 1. Relative risk of critical care nurses acquiring SARS by patient care activity

Patient care activity	SARS attack rate (No. cases/No. exposed or unexposed) (%)		Relative risk (95% CI)	p value
	Exposed	Unexposed		
Intubation	3/4 (75)	5/28 (18)	4.20 (1.58 to 11.14)	0.04
Suctioning before intubation	3/4 (75)	5/28 (18)	4.20 (1.58 to 11.14)	0.04
Suctioning after intubation	4/19(21)	4/13(31)	0.68 (0.21 to 2.26)	0.68
Nebulizer treatment	3/5(20)	5/27 (8)	3.24 (1.11 to 9.42)	0.09
Manipulation of oxygen mask	7/14 (50)	1/18 (6)	9.00 (1.25 to 64.89)	0.01
Manual ventilation	2/7 (29)	6/25 (24)	1.19 (0.30 to 4.65)	1.00
Mouth or dental care	5/21 (24)	3/11(27)	0.87 (0.25 to 2.99)	1.00
Insertion of a nasogastric tube	2/6 (33)	6/26 (23)	1.44 (0.38 to 5.47)	0.62
Insertion of an indwelling urinary catheter	2/2 (100)	6/30(0.20)	5.00 (2.44 to 10.23)	0.06
Insertion of a peripheral intravenous catheter	3/5 (60)	5/27 (19)	3.24 (1.11 to 9.42)	0.09
Chest tube insertion or removal	0 (0)	0 (0)		
Insertion of a central venous catheter	2/6 (33)	6/26 (23)	1.44 (0.38 to 5.47)	0.62
Bathing or patient transfer	7/26 (27)	1/6 (17)	1.62 (0.24 to 10.78)	1.00
Manipulation of BiPAP mask	3/6 (50)	5/26 (19)	2.60 (0.8 to 7.99)	0.15
Administration of medication	5/23 (22)	3/ 9 (33)	0.65 (0.20 to 2.18)	0.65
Performing an electrocardiogram	4/12 (33)	4/20 (20)	1.67 (0.51 to 5.46)	0.43
Venipuncture	6/17 (35)	2/ 15 (13)	2.65 (0.63 to 11.19)	0.23
Manipulation of commodes or bedpans	3/5 (60)	5/ 27 (19)	3.24 (1.11 to 9.42)	0.09
Feeding	2/10 (20)	6/22 (27)	0.73 (0.18 to 3.02)	1.00
Debrillation	0/2 (0)	8/ 30 (0.27)		1.00
Cardiopulmonary resuscitation	0/3 (0)	8/29 (28)		0.55
Chest physiotherapy	2/7 (29)	6/25 (0.24)	1.19 (0.30 to 4.65)	1.00
Assessment of patient	6/ 23 (26)	2/ 9 (22)	1.17 (0.29 to 4.77)	1.00
Insertion of peripheral intravenous line	1/1 (100)	7/31 (23)	4.43 (2.31 to 8.50)	0.25
Endotracheal aspirate	3/12 (25)	5/ 20 (25)	1.00 (0.29 to 3.45)	1.00
Bronchoscopy	1/2 (50)	7/ 30 (23)	2.14 (0.46 to 9.90)	0.44
Radiology procedures	4/15(26)	4/17 (24)	1.13 (0.34 to 3.76)	1.00
Dressing change	1/6 (17)	7/26 (27)	0.62 (0.09 to 4.13)	1.00
Urine specimen collected	1/2 (50)	7/30 (23)	2.14 (0.46 to 9.90)	0.44
Fecal specimen collected	0/1 (0)	8/31(26)		1.00
Rectal swab obtained	0/1 (0)	8/31 (26)		1.00
Nasopharyngeal swab obtained	0/2 (0)	8/30 (27)		1.00
Other	2/5 (40)	6/27 (22)	1.80 (0.50 to 6.50)	0.58

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 10, No. 2, February 2004

RISK FACTORS FOR SARS IN PTS WITHOUT CLOSE SARS CONTACTS

Table 2. Factors significantly associated with acquisition of clinically diagnosed SARS in multivariate analysis[a]

Potential risk or protective factor for SARS	Matched OR (95% CI)[a]	p value
Healthcare related		
Visited any fever clinic[b]	12.7 (3.1 to 52.0)	<0.001
Having any chronic disease	4.8 (1.7 to 13.2)	0.002
Visited any farmer's market	0.4 (0.2 to 0.8)	0.01
Eating out		
Never	Reference	
Once a week	1.6 (0.7 to 3.8)	0.3
More than once a week	3.1 (1.2 to 7.7)	0.02
Taking a taxi		
Never	Reference	
Once a week	0.2 (0.1 to 0.8)	0.02
More than once a week	3.0 (0.9 to 10.3)	0.07
Had a pet	0.4 (0.2 to 0.9)	0.03
Wore a mask when going out		
Never	Reference	
Sometimes	0.4 (0.2 to 0.9)	0.03
Always	0.3 (0.1 to 0.6)	0.002

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ASYMPTOMATIC CASES

Hong Kong: 674 HCW's had paired blood samples tested; none tested positive for SARS

Hong Kong: Serologic testing of 101 HCW's who worked in SARS wards, but did not get sick; 1 nurse found with antibody, no illness

Toronto: 2 asymptomatic HCW's found with antibody, but no illness

CLINICAL FEATURES OF SARS

- Three phases of illness
  - Phase 1: fever, myalgia, other systemic sx, may improve after a few days
  - Phase 2: recurrence of fever in 85% by day 9, clinical deterioration by day 10-15
  - Phase 3: 20% progress to ARDS, requiring ventilatory support; nosocomial infections, organ failure

SARS DIARRHEA

- May be presenting feature, but often occurs in second week
- Occurred in 2/3 pts in SE Asia, 1/3 in Toronto
- Large volume diarrhea, 20-30 bowel movements per day
- No blood in stool
- No inflammation seen grossly on colonoscopy, but viral particles on bx

SARS PCR

Lower resp tract specimens more useful than upper tract specimens

Virus peaks during 2nd week of illness; less than 50% + by PCR first week; < 50% serologically confirmed cases had +PCR during outbreak

Contamination possible during specimen processing; all + results require confirmation with different PCR test

MENTAL HEALTH AND SARS

- PTSD very common in both HCW and pts in Toronto
- Staff asked to perform under stressful circumstances for extraordinary length of time
- Infection Control measures isolating, and made stress of event more difficult
- HCW's often cared for colleagues, some of whom died

ARE WE PREPARED?

ARE WE PREPARED?

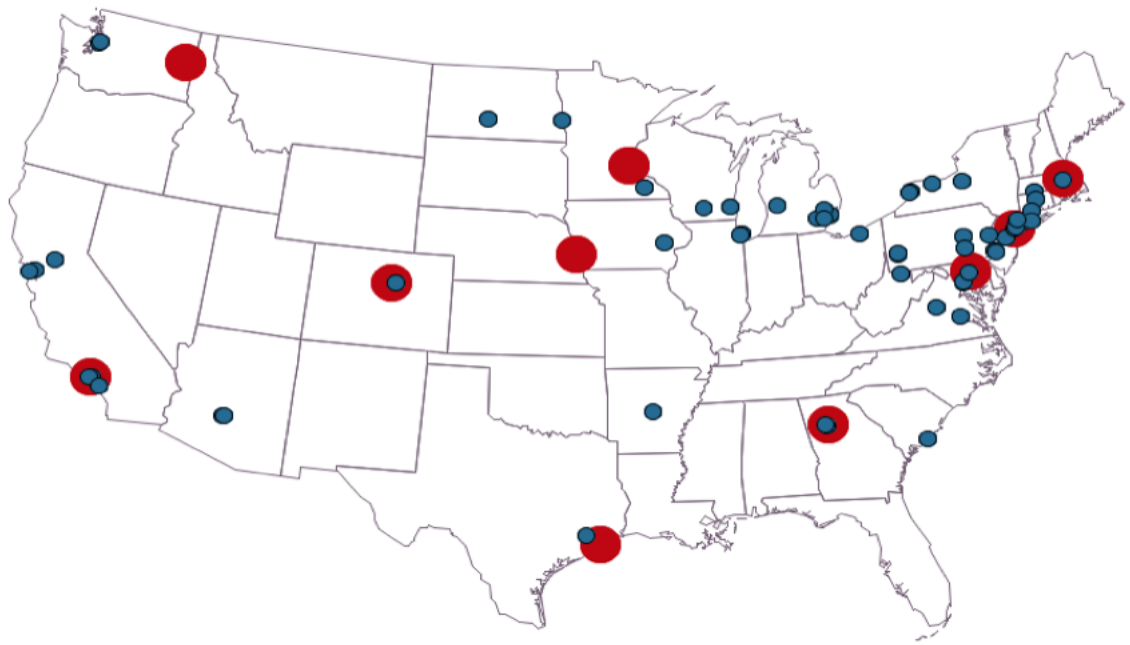
- Survey of 1603 practicing physicians across multiple specialties (2011-2012)
- 50% felt prepared to handle a natural disaster, foodborne illness, or major outbreak of an airborne infection
- 44% did not know if their hospital had an emergency plan

SteelFisher GK, et al. *Disaster Med Public Health Prep*. 2015;9(6):666-680.

HOSPITAL PREPAREDNESS

"Administrators reported improved preparedness in the years since the Ebola cases, with only 14 percent of hospitals reporting they are not prepared for a future EID threat."

Exhibit 3: Special Pathogen Centers and Ebola Treatment Centers are located across the country.



Special Pathogen Centers **Ebola Treatment Centers**

Source: OIG analysis of HHS documentation, 2017.

ARE WE BETTER PREPARED NOW?

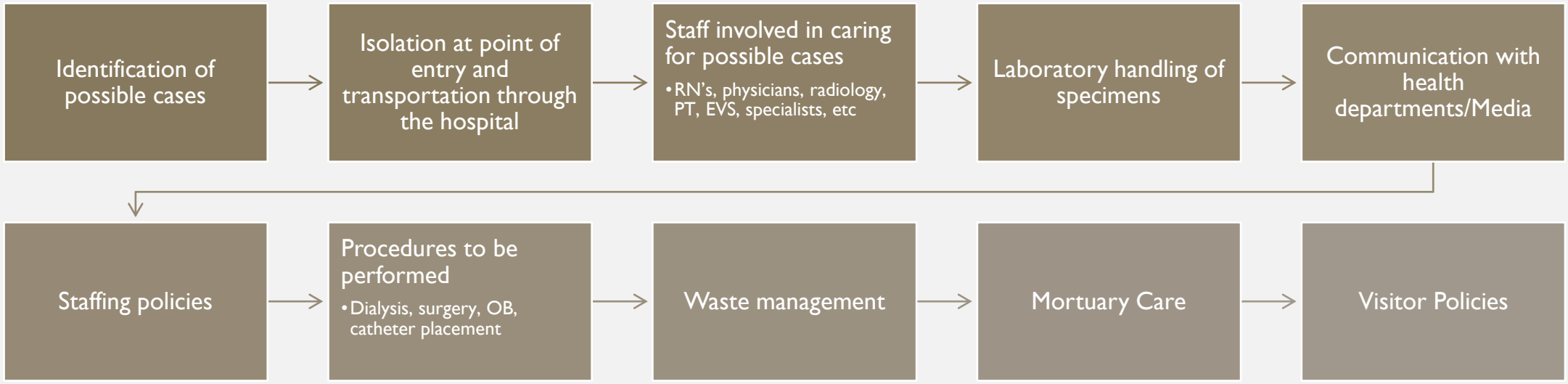
- Yes and No
- There were (are?) 55 designated Ebola Treatment Centers in the U.S., as well as 10 regional facilities that can care for adults and children
- The designated facilities conduct training and simulations in order to maintain skills needed to care for individuals with highly contagious diseases.
- The type of personal protective equipment and the attention to donning and doffing properly are completely different than what we normally do.
- The PPE recommended for caring for an Ebola patient would be usable for any highly contagious disease.
- We now have the capacity to care for a limited number of people with highly contagious diseases, and if recognized early, could prevent large outbreaks.

PREPAREDNESS TOOLS

- Two recent systematic reviews of evaluation tools for hospital preparedness highlight their need for improvement
- Most evaluation tools focused on structural components and paid little attention to functional aspects of hospitals
- None of the checklists or tools included all dimensions for hospital preparedness or were specific for biologic threats

Nekoie-Moghadam M, et al. *Disaster Med Public Health Prep*. 2016;10(5):781-788;
Heidaranlu E, et al. *PLoS Curr*. 2015;14:7.

PLANNING


Identification of possible cases
Isolation at point of entry and transportation through the hospital
Staff involved in caring for possible cases
• RN's, physicians, radiology, PT, EVS, specialists, etc
Laboratory handling of specimens
Communication with health departments/Media
Staffing policies
Procedures to be performed
• Dialysis, surgery, OB, catheter placement
Waste management
Mortuary Care
Visitor Policies

Outbreak Response Tool Kits

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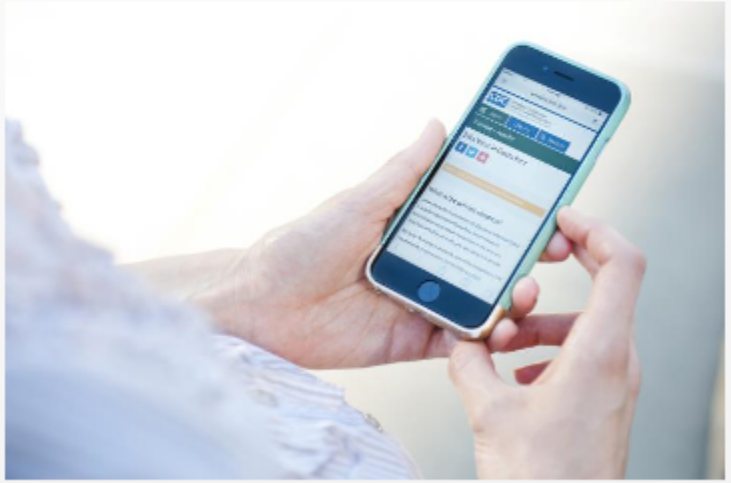
SHEA Outbreak Response Training Program (ORTP)



Outbreak Response Tool Kits

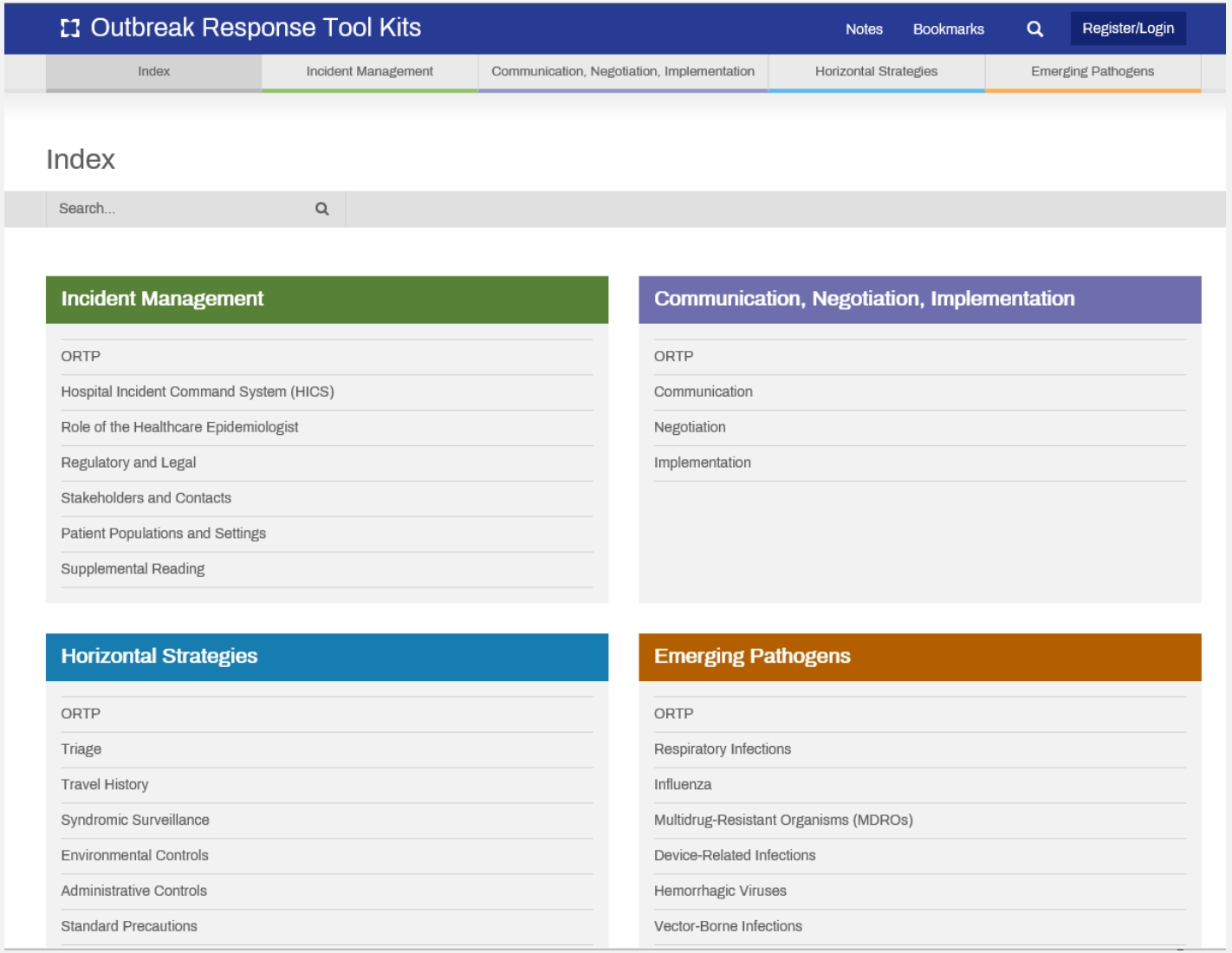
Four free tool kits to help healthcare providers rapidly find resources important to outbreak preparedness, response, and recovery.

- Expert-selected checklists, flow charts, case studies, and more
- Guidance in implementation and leadership during a crisis
- Downloadable, fillable, printable tables to make sure you have the information you need
- Bookmarking and notes capability when you create a free account
- Full access online on mobile devices and desktops
- Offline access to internal content through the Guideline Central app on iTunes and Google Play
- Notifications when tool kit is updated

your@email.com

Create Free Account

https://ortp.guidelinecentral.com/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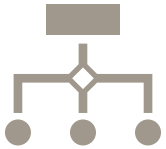
Influenza
Multidrug-Resistant Organisms (MDROs)
Device-Related Infections
Hemorrhagic Viruses
Vector-Borne Infections

HICS

All hospitals credentialed by the joint commission have emergency management plans

Who is responsible for each component of the plan?

What tasks are a part of each plan component?



Utilize the infrastructure of this plan to organize activities in an outbreak setting

SPECIFIC CONSIDERATIONS FOR PLANNING

Population served by the hospital

Travelers

- Hospital proximity to major airport
- Travelers from specific areas that visit the area

Industry near the hospital

- Farms/animal exposure
- Research facilities with possible exposures

TRAVEL SCREENING

Active vs passive travel screen

Passive approach would involve patient signs and clinician education; active approaches are discussed further below

Patients should be screened reliably and at all points of entry

Surgery, outpatient sites, emergency rooms, admissions, self register kiosks

If there is a positive screen, have a process in place for escalation

Establish the availability of expert and support personnel outside of regular hours

CDC. General Approach to the Returned Traveler. www.cdc.gov

LESSONS LEARNED, REPEATEDLY

Critical to screen at all sites of entry

Front-line staff training and communication is essential

- Assess staff knowledge on communication pathway
- Test immediate proper isolation for patients who screen positive

The travel screen should be simple and easy to use

FACILITY DESIGN: IS YOUR FACILITY READY?

- A facility prepared for an infectious agent is prepared with:
  - A private area to care for patients away from other patients or public areas
  - Isolation capacity
    - Negative pressure rooms
    - Conversions of direction of airflow-individual room or units
  - Overflow capacity
    - Create additional triage/patient care areas (ED, tents, etc.)
    - Collaboration with public health department, schools, churches

COMMUNICATION: INTERNAL AND EXTERNAL

- Multiple lines of communication needed
  - General public
  - Confidentiality
- Managing media
- Public health departments
  - Contact persons from hospital and public health department
  - Availability for off-hours communication
- Internal operational communication
  - Bedside staff – reassurance and change in operations
- Consistent messaging

INTERNAL COMMUNICATION

1

Make sure all phone numbers are up-to-date

2

Have regular drills

3

Include hospital leadership in town halls with bedside staff to build trust and show engagement of commitment of leadership for safety of the staff

4

Be transparent and honest

5

Circle back to check staff understanding and the potential need for additional messaging

CALL TREE

Identify all individuals who need to be contacted

Save up-to-date contact information for all of those individuals

Hold training to ensure that each person knows who they are supposed to call to avoid multiple phone calls

Consider a commercial software system to initiate automatic alerts that have been pre-specified

Have a call-in number to ensure that everyone gets the same message

STAFFING: HOW DO YOU ENSURE YOU HAVE STAFF READY AND ABLE TO RESPOND?

- Willingness to respond
  - 25-50% of hospital staff would not be willing to work in a biologic disaster or for pandemic influenza
  - Concern for family is the greatest factor in the lack of willingness to work

Masterson L, et al. J Emerg Med. 2009;36(1):43-49; Balicer RD, et al. *BMC Public Health*. 2010;10:436;
Devnani M. *Prehosp Disaster Med*. 2012;27(6):551-566.

Open Forum Infectious Diseases

MAJOR ARTICLE

Healthcare Workers' Attitudes Toward Patients With Ebola Virus Disease in The United States

Deepa Maheswari Narasimhulu,[1] Vernee Edwards,[1] Cynthia Chazotte,[2] Devika Bhatt,[1] Jeremy Weedon,[3] and Howard Minkoff[1]

[1]Department of Obstetrics and Gynecology, Maimonides Medical Center, Brooklyn, [2]Department of Obstetrics and Gynecology and Women's Health, Albert Einstein College of Medicine, Bronx, and [3]Statistical Design and Analysis, Research Division, State University of New York, Brooklyn, New York

Background. We assessed healthcare workers' (HCWs) attitudes toward care of patients with Ebola virus disease (EVD).

Methods. We provided a self-administered questionnaire-based cross-sectional study of HCWs at 2 urban hospitals.

Results. Of 428 HCWs surveyed, 25.1% believed it was ethical to refuse care to patients with EVD; 25.9% were unwilling to provide care to them. In a multivariate analysis, female gender (32.9% vs 11.9%; odds ratio [OR], 3.2; 95% confidence interval [CI], 1.4–7.7), nursing profession (43.6% vs 12.8%; OR, 2.7; 95% CI, 1.4–5.2), ethical beliefs about refusing care to patients with EVD (39.1% vs 21.3%; OR, 3.71; 95% CI, 2.0–7.0), and increased concern about putting family, friends, and coworkers at risk (28.2% vs 0%; $P = .003$; OR, 11.1) were independent predictors of unwillingness to care for patients with EVD. Although beliefs about the ethics of refusing care were independently associated with willingness to care for patients with EVD, 21.3% of those who thought it was unethical to refuse care would be unwilling to care for patients with EVD. Healthcare workers in our study had concerns about potentially exposing their families and friends to EVD (90%), which was out of proportion to their degree of concern for personal risk (16.8%).

Conclusion. Healthcare workers' willingness to care for patients with Ebola patients did not precisely mirror their beliefs about the ethics of refusing to provide care, although they were strongly influenced by those beliefs. Healthcare workers may be balancing ethical beliefs about patient care with beliefs about risks entailed in rendering care and consequent risks to their families. Providing a safe work environment and measures to reduce risks to family, perhaps by arranging child care or providing temporary quarters, may help alleviate HCW's concerns.

Keywords. Ebola; ethics; healthcare workers.

MULTI-DISCIPLINARY CLINICAL CARE PLANNING

- Include ancillary services
  - Phlebotomy, radiology, respiratory procedures, EVS
- Minimize:
  - Exposed staff
    - Consultants, cross-train staff
  - Transport
  - Procedures
    - Intubation, central line placement, hemodialysis, catheter insertion, deliveries, surgeries

SPECIAL CASES: ETHICS

- Obstetric Care
  - no C-section, no high-risk intervention in known Ebola cases previously. Is this still true?
- Surgery: not performed in documented Ebola cases
  - Negative pressure operating room
  - Identified surgeons/OR techs willing to perform procedures
  - Balance risk to patient vs. risk to HCW
- Pediatrics: need to plan for care/entertainment of child who may be a PUI, but may feel relatively well
- Visitation policy

TRAINING: DOFFING PPE

Incorrect PPE and frequent self-contamination are commonly found in evaluations of health care settings

In an observational study of 30 HCW, only 17% removed PPE in the correct order and disposed of it in the patient room

A point-prevalence study in 4 hospitals showed contamination in 200/435 episodes of gown and glove removal

An assessment of self-contamination when trained HCP doffed EVD PPE using a standardized protocol demonstrated:

A structured doffing protocol with a trained monitor reduced rates of contamination

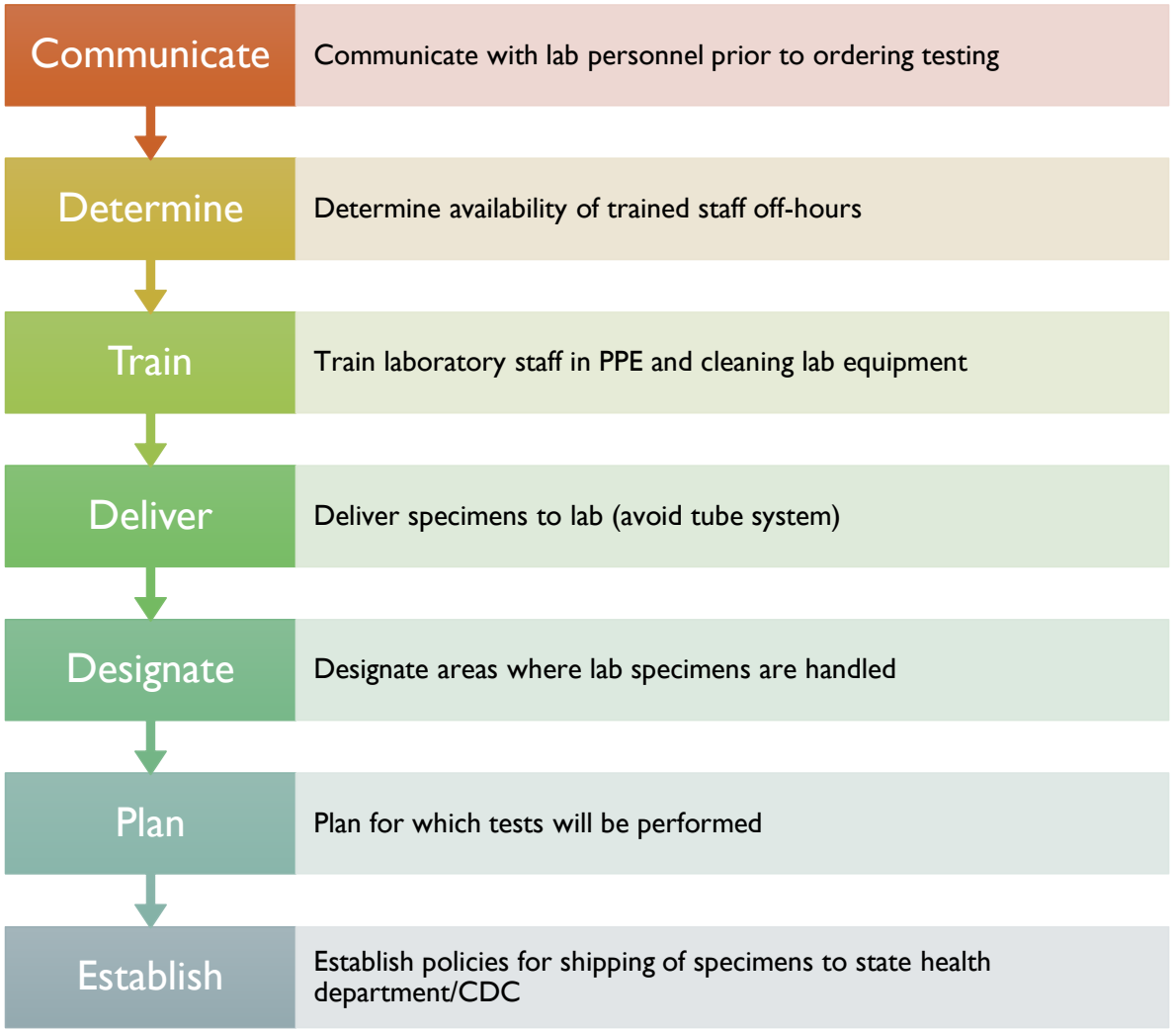
Non-enveloped viruses showed more contamination than enveloped viruses

Zellmer C, et al. *Am J Infect Control.* 2015;43(7):750-751; Tomas ME, et al. *JAMA Intern Med.* 2015;175(12):1904-1910; Casanova LM, et al. *Infect Control Hosp Epidemiol.* 2016;37(10):1156-1161.

KEY COMPONENTS OF A TRAINING PROGRAM

- Use of a competency-based training program for use of PPE
- Training includes:
  - Appropriate indications for specific PPE components
  - Proper donning, doffing, adjustment, and wear of PPE
  - Proper care, maintenance, useful life, and disposal of PPE
  - Hand Hygiene!
- Training should be provided to all personnel who use PPE
- Re-training provided to prevent deterioration of learned skills
- Hospital administration needs to support this activity by setting aside time

LABORATORY MANAGEMENT: HOW DO YOU BEST PREPARE YOUR LABORATORY?



WASTE MANAGEMENT

1

Plan early

2

Consider all types of waste

- PPE
- Contaminated equipment and supplied
- Sewage

3

Plan beyond hospital with the state department, local water treatment department, and waste-handling vendors

MORTUARY SERVICES

- Establish how/where a body will be transported if an individual dies
- Identify local funeral homes that are willing to handle contagious diseases
- Train funeral directors to use PPE

SUPPLIES

- Equipment
  - Supply – contracts and contingency plans, stockpiling (National Stockpile Reserve)
  - Distribution plan with scarce resources
  - Special supplies (masks, point-of-care tests)
- Medications
- PPE

GAPS IN REGIONAL PLAN

Transportation

Need Identified patient travel plan, especially if longer distance travel is required

Deciding which hospital will admit a PUI

Standardized Training Plan

Doffing Protocols for Outside Staff

EMS Drop off may have different PPE than the hospital

ONGOING CHALLENGES

- Most of the worst diseases currently known, are difficult to distinguish early on.
- Most are "influenza-like illnesses" that start with nonspecific symptoms
- Physicians have to think about specific disease in order to diagnose them
- It is difficult to prevent epidemics when disease spreads through the respiratory route
- New diseases will continue to emerge
- People lose interest quickly; "Ebola is over"