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LEARNING FROM OUTBREAKS: SARS

IFIC - APECIH 2017

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SEVERE ACUTE RESPIRATORY SYNDROME (SARS)

- ▶ Nov 2002 – southern China (Guangdong)
- Several other clusters in China into 2003
- Initially, cases in animal handlers



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Subject: PRO/EDR> Pneumonia - China (Guangdong): RFI

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PNEUMONIA - CHINA (GUANGDONG): RFI

A ProMED-mail post

<<http://www.promedmail.org>>

ProMED-mail is a program of the
International Society for Infectious Diseases

<<http://www.isid.org>>

[1]

Date: 10 Feb 2003

From: Stephen O. Cunnion, MD, PhD, MPH <cunnion@erols.com>

This morning I received this e-mail and then searched your archives
and found nothing that pertained to it. Does anyone know anything
about this problem?

"Have you heard of an epidemic in Guangzhou? An acquaintance of mine
from a teacher's chat room lives there and reports that the
hospitals there have been closed and people are dying."

—

Stephen O. Cunnion, MD, PhD, MPH
International Consultants in Health, Inc
Member ASTM&H, ISTM

Virus outbreak in southern China kills 5, prompts panic buying of antibiotics

An unidentified pneumonia virus has killed 5 people and left hundreds hospitalized in southern China, while rumors of a surging death toll prompted frightened residents to stock up on antibiotics, officials said Tuesday.

Health officials said the outbreak in a region of Guangdong province near Hong Kong had been brought under control. They said Health Ministry investigators sent from Beijing were trying to find the source of the disease.

Some 300 people have been hospitalized, one third of them doctors, nurses, and other health workers, said an official of the provincial Disease Prevention and Control Center. He said 59 of those people had been treated and released. Officials wouldn't give any details about who was killed by the disease or when.

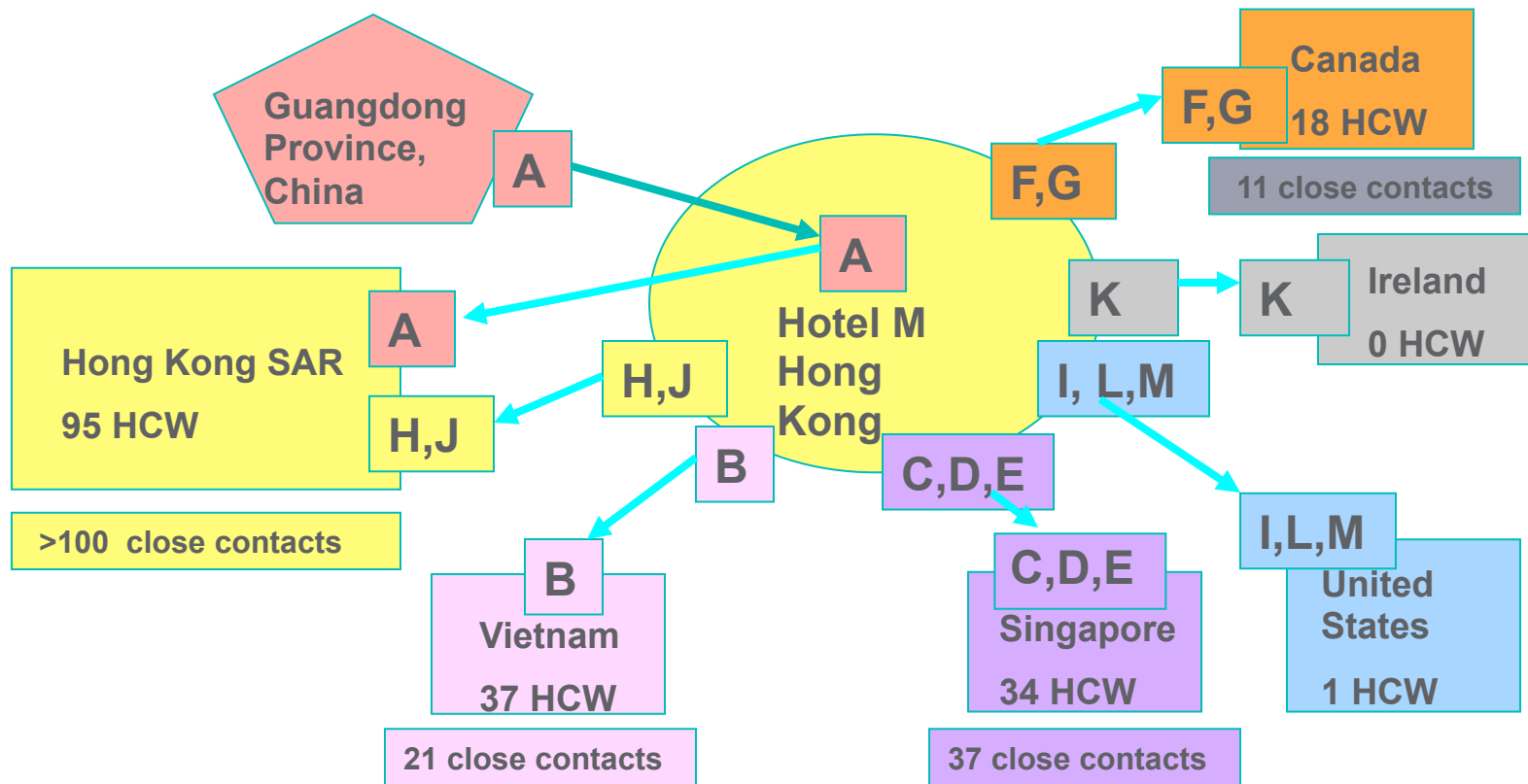
Rumors that hundreds of people had died prompted residents to clear store shelves of antibiotics and pay inflated prices for white vinegar for use as disinfectant, officials said. Photos in Hong Kong newspapers showed people in Guangdong wearing surgical masks in hopes of avoiding infection. Hospitals have been given extra antibiotics, officials said.

- ▶ 11 Feb 2003 – first WHO report:
 - 305 cases, 5 deaths, 30% HCW
- ▶ 17 Feb 2003: Hong Kong
 - Atypical pneumonia, H5N1?



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SPREAD FROM HOTEL M – AS OF MARCH 28, 2003



SARS

- ▶ Feb 26 - Mar 11 2003: French Hospital in Hanoi, Vietnam
 - Severe pneumonia, no etiology
 - Suspicion of an unusual event – notification of WHO Feb 28 (Dr. Carlo Urbani)
 - Severely affected patients were often young
 - 10% mortality overall, > 50% in older people
 - 50% cases HCWs
 - Infection prevention precautions, isolation ward, hospital closure



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WORLD | THE SARS EPIDEMIC: CONTAINMENT

THE SARS EPIDEMIC: CONTAINMENT; How Vietnam Halted SARS And Saved the Life of a Nurse

By **SETH MYDANS** MAY 7, 2003

BOX. CDC preliminary case definition for severe acute respiratory syndrome (SARS)*

Suspected case

Respiratory illness of unknown etiology with onset since February 1, 2003, and the following criteria:

- Documented temperature >100.4°F (>38.0°C)
- One or more symptoms of respiratory illness (e.g., cough, shortness of breath, difficulty breathing, or radiographic findings of pneumonia or acute respiratory distress syndrome)
- Close contact[†] within 10 days of onset of symptoms with a person under investigation for or suspected of having SARS or travel within 10 days of onset of symptoms to an area with documented transmission of SARS as defined by the World Health Organization (WHO).

* As of March 19, 2003.

[†] Defined as having cared for, having lived with, or having had direct contact with respiratory secretions and/or body fluids of a person suspected of having SARS.

BOX. CDC preliminary case definition for severe acute respiratory syndrome (SARS)*

Suspected case

Respiratory illness of unknown etiology with onset since February 1, 2003, and the following criteria:

- Documented temperature >100.4°F (>38.0°C)
- One or more symptoms of respiratory illness (e.g., cough, shortness of breath, difficulty breathing, or radiographic findings of pneumonia or acute respiratory distress syndrome)
- Close contact[†] within 10 days of onset of symptoms with a person under investigation for or suspected of having SARS or travel within 10 days of onset of symptoms to an area with documented transmission of SARS as defined by the World Health Organization (WHO).

* As of March 19, 2003.

[†] Defined as having cared for, having lived with, or having had direct contact with respiratory secretions and/or body fluids of a person suspected of having SARS.

BOX. CDC updated interim case definition for severe acute respiratory syndrome (SARS)*

Suspected case[†]

Respiratory illness of unknown etiology with onset since February 1, 2003, and the following criteria:

- Measured temperature >100.4°F (>38.0°C)
- One or more clinical findings of respiratory illness (e.g., cough, shortness of breath, difficulty breathing, hypoxia, or radiographic findings of either pneumonia or acute respiratory distress syndrome)
- Travel within 10 days of onset of symptoms to an area with suspected or documented community transmission of SARS,[§] (excluding areas with secondary cases limited to health-care workers or direct household contacts)

OR

- Close contact[¶] within 10 days of onset of symptoms with either a person with a respiratory illness and travel to a SARS area or a person under investigation or suspected of having SARS

* As of March 22, 2003.

[†] Suspected cases with either radiographic evidence of pneumonia or respiratory distress syndrome, or evidence of unexplained respiratory distress syndrome by autopsy, are designated “probable” cases by the World Health Organization case definition.

[§] Hong Kong Special Administrative Region and Guangdong province, China; Hanoi, Vietnam; and Singapore.

[¶] Close contact is defined as having cared for, having lived with, or having had direct contact with respiratory secretions and/or body fluids of a patient suspected of having SARS.

SARS: TIMELINE

- ▶ 12 March: WHO global alert
- ▶ 15 March: WHO travel advisory
- ▶ 24 March: previously unrecognized coronavirus identified in CDC (US) labs
- ▶ 5 July: global outbreak declared over



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BOX. CDC preliminary case definition for severe acute respiratory syndrome (SARS)*

Suspected case

Respiratory illness of unknown etiology with onset since February 1, 2003, and the following criteria:

- Documented temperature $>100.4^{\circ}\text{F}$ ($>38.0^{\circ}\text{C}$)
- One or more symptoms of respiratory illness (e.g., cough, shortness of breath, difficulty breathing, or radiographic findings of pneumonia or acute respiratory distress syndrome)
- Close contact[†] within 10 days of onset of symptoms with a person under investigation for or suspected of having SARS or travel within 10 days of onset of symptoms to an area with documented transmission of SARS as defined by the World Health Organization (WHO).

* As of March 19, 2003.

† Defined as having cared for, having lived with, or having had direct contact with respiratory secretions and/or body fluids of a person suspected of having SARS.

Clinical Criteria

Early illness

- Presence of two or more of the following features: fever (might be subjective), chills, rigors, myalgia, headache, diarrhea, sore throat, or rhinorrhea

Mild-to-moderate respiratory illness

- Temperature of $>100.4^{\circ}\text{F}$ ($>38^{\circ}\text{C}$)* **and**
- One or more clinical findings of lower respiratory illness (e.g., cough, shortness of breath, or difficulty breathing)

Severe respiratory illness

- Meets clinical criteria of mild-to-moderate respiratory illness **and**
- One or more of the following findings:
 - Radiographic evidence of pneumonia, **or**
 - Acute respiratory distress syndrome, **or**
 - Autopsy findings consistent with pneumonia or acute respiratory distress syndrome without an identifiable cause

Epidemiologic Criteria

Possible exposure to SARS-associated coronavirus (SARS-CoV)

One or more of the following exposures in the 10 days before onset of symptoms:

- Travel to a foreign or domestic location with documented or suspected recent transmission of SARS-CoV[†] **or**
- Close contact[§] with a person with mild-to-moderate or severe respiratory illness and history of travel in the 10 days before onset of symptoms to a foreign or domestic location with documented or suspected recent transmission of SARS-CoV[†]

Likely exposure to SARS-CoV

One or more of the following exposures in the 10 days before onset of symptoms:

- Close contact[§] with a person with confirmed SARS-CoV disease **or**
- Close contact[§] with a person with mild-to-moderate or severe respiratory illness for whom a chain of transmission can be linked to a confirmed case of SARS-CoV disease in the 10 days before onset of symptoms

Laboratory Criteria

Tests to detect SARS-CoV are being refined and their performance characteristics assessed[‡]; therefore, criteria for laboratory diagnosis of SARS-CoV are changing. The following are general criteria for laboratory confirmation of SARS-CoV:

- Detection of serum antibody to SARS-CoV by a test validated by CDC (e.g., enzyme immunoassay), **or**
- Isolation in cell culture of SARS-CoV from a clinical specimen, **or**
- Detection of SARS-CoV RNA by a reverse transcription polymerase chain reaction test validated by CDC and with subsequent confirmation in a reference laboratory (e.g., CDC).

Information about the current criteria for laboratory diagnosis of SARS-CoV is available at <http://www.cdc.gov/ncidod/labdiagnosis.htm>.

Exclusion Criteria

A case may be excluded as a SARS report under investigation (SARS RUI), including as a CDC-defined probable SARS-CoV case, if any of the following apply:

- An alternative diagnosis can explain the illness fully**, **or**
- Antibody to SARS-CoV is undetectable in a serum specimen obtained >28 days after onset of illness^{††}, **or**
- The case was reported on the basis of contact with a person who was excluded subsequently as a case of SARS-CoV disease; then the reported case also is excluded, provided other epidemiologic or laboratory criteria are not present.

Case Classification

SARS RUI

Reports in persons from areas where SARS is not known to be active

- SARS RUI-1: Cases compatible with SARS in groups likely to be first affected by SARS-CoV^{§§} if SARS-CoV is introduced from a person without clear epidemiologic links to known cases of SARS-CoV disease or places with known ongoing transmission of SARS-CoV

SARS CASES: 1 NOV 2002 TO 31 JULY 2003

Country	No. cases	Median age (range)	Deaths	CFR (%)	HCWs (%)
China	5327	N/A	349	7	1002 (19)
Hong Kong	1755	40 (0-100)	299	17	386 (22)
Taiwan	346	42 (0-93)	37	11	66 (20)
Singapore	238	35 (1-90)	33	14	95 (41)
Canada	251	49 (1-98)	44	17	109 (43)
US	27	36 (0-83)	0	0	0 (0)
TOTAL	8096		774	9.6	1706 (21)

WHAT FACILITATED THE SPREAD OF SARS?



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WHAT FACILITATED THE SPREAD OF SARS?

- ▶ Close contact between humans and animal reservoirs
- ▶ New disease - delayed recognition of unusual features?
- ▶ Reluctance to disclose outbreak in China
- ▶ Absence of an early warning system?
- ▶ Global universe – travel
- ▶ Novel coronavirus
 - No case definition for disease
 - No testing available, at least early in outbreak

SARS IN CANADA

“WHO warns travellers not to visit Canada’s largest city....” – Independent, UK, 23 April 2003

“Don’t go to Canada warn SARS experts” – Daily Mirror, UK, 24 April 2003

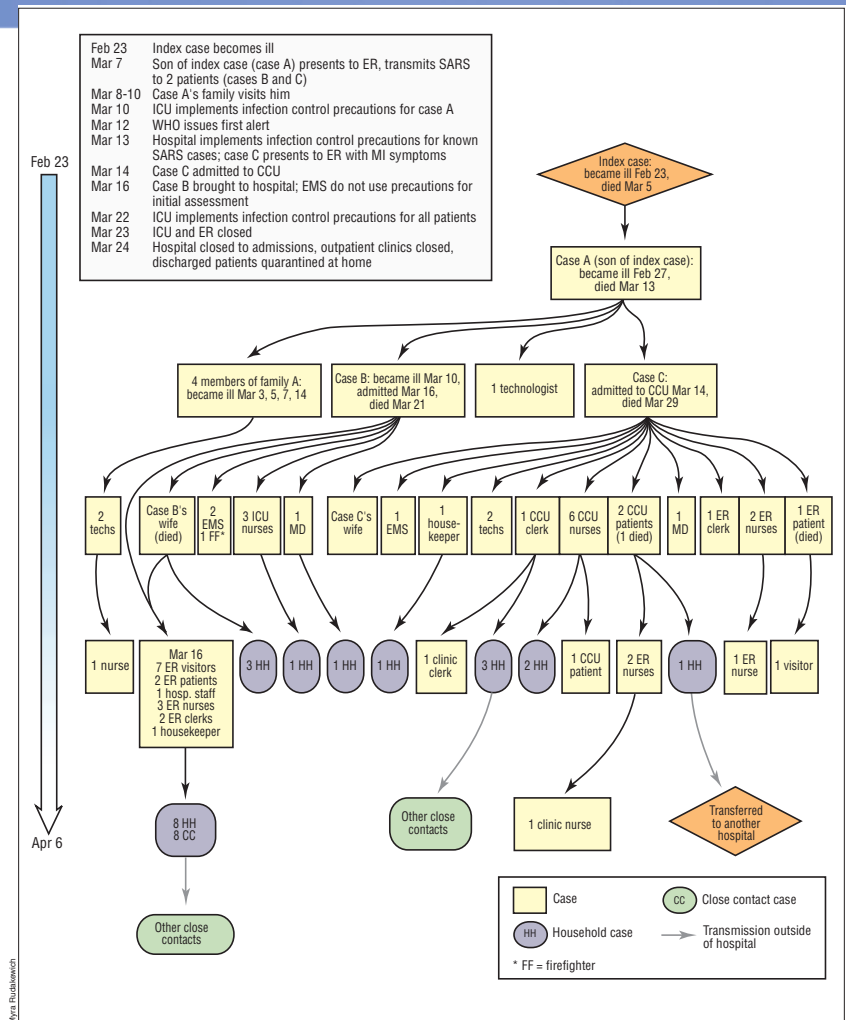
“SARS became Toronto’s 9/11, the worst crisis in its history” – Globe and Mail, Canada, 25 April 2003



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Myra Buchanach

Fig. 2: Transmission of 84 probable and suspect cases of SARS in the nosocomial outbreak that could be linked to the 6 members of the index family (the index case, her son [case A] and 4 members of case A's family).

AMERICAS

Poor Hospital Practices Blamed for 2003 SARS Epidemic in Toronto

By CHRISTOPHER MASON JAN. 10, 2007



TORONTO, Jan. 9 — A provincial commission investigating the [SARS](#) outbreak in 2003 reported Tuesday that poor hospital infection-control procedures led to the epidemic in the Toronto area that killed 44 people.

WHAT WENT WELL IN SARS?

- ▶ Instant recognition of an unusual event in Hanoi
- ▶ Rapid response by WHO, CDC with international collaboration
- ▶ Advances in molecular diagnostics – agent identified within 4 weeks
- ▶ Enhanced public health systems in many regions



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LESSONS LEARNED FROM SARS

- ▶ Importance of surveillance and early communication – public health
 - National public health agencies
- ▶ Recognition and reporting of unusual occurrences
- ▶ Preparedness for emerging infections
 - Eliciting the correct risk factors during patient assessments – travel history
 - Readiness by staff – training, training, training, behaviour change; in all areas
 - Having a plan – include redundancy



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LESSONS LEARNED FROM SARS

- ▶ Clear, concise communication is key
- ▶ Need to be adaptable
- ▶ Physical and psychological impact on staff
 - Fear of working
 - Exposure, quarantine
- ▶ Impact on patients
 - Fear of presenting for medical care when needed



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ADDITIONAL READING

- ▶ Skowronski DM et al. Severe acute respiratory syndrome (SARS): a year in review. *Annu Rev Med* 2005;56:257-81.
- ▶ Wenzel WP et al. Lessons from severe acute respiratory syndrome (SARS): implications for infection control. *Arch Med Res* 2005;36:610-6.
- ▶ Tan CC. SARS in Singapore: key lessons from an epidemic. *Ann Acad Med Singapore* 2006;35:345-9.
- ▶ Koplan JP et al. Public health lessons from severe acute respiratory syndrome a decade later. *Emerg Infect Dis* 2013;19:861-3.



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