Quarantine, Isolation, and Contact Investigation

Regional Aviation Medical Team

2 December 2009

Lima, Peru

Definition: Quarantine

"The restriction of activities and/or separation from others of suspect persons who are not ill…in such a manner as to prevent the possible spread of infection…"

International Health Regulations, 2005

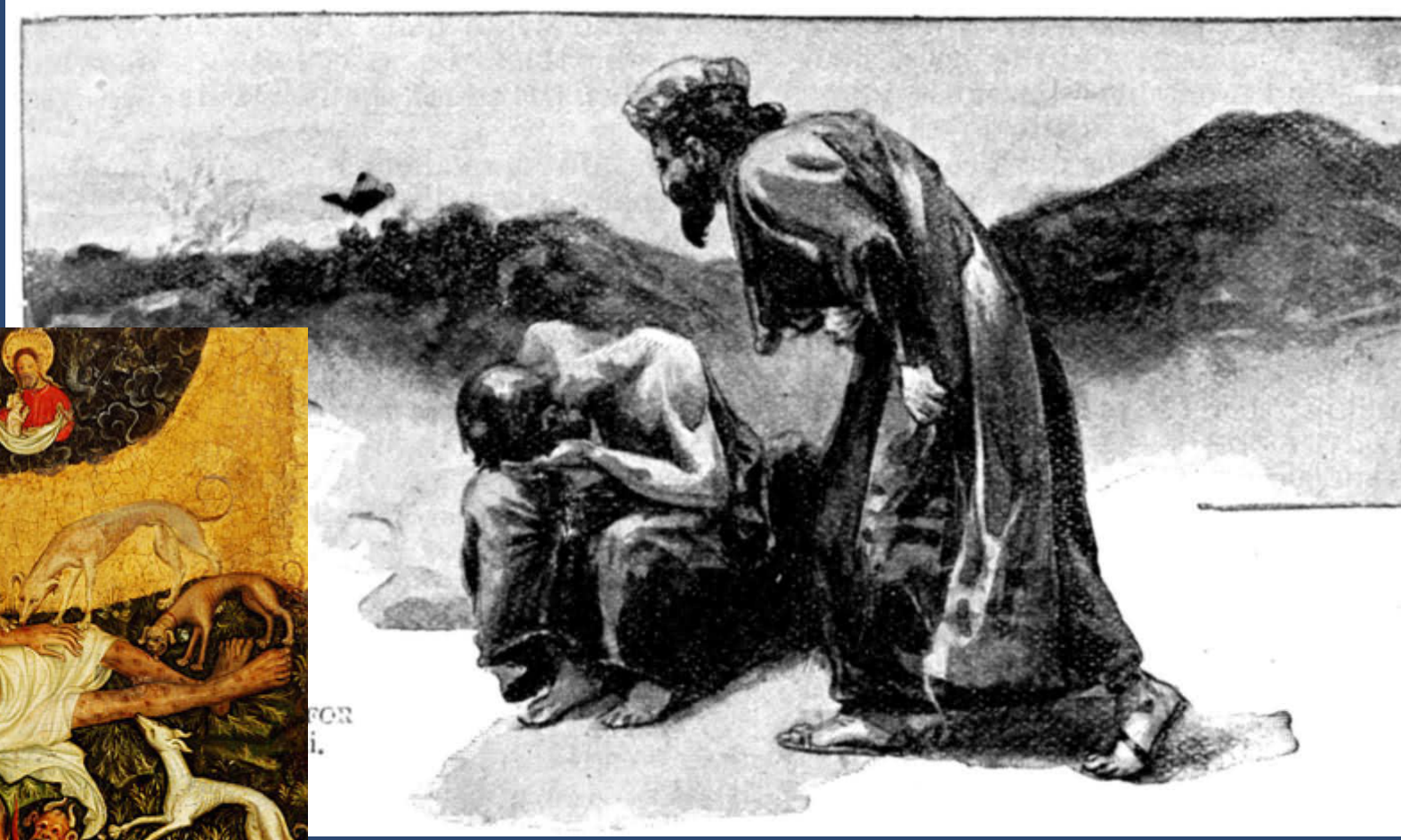
Definition: Isolation

"Separation of ill or contaminated persons…in such a manner as to prevent the spread of infection…."

International Health Regulations, 2005

7th Century & earlier

Roots of isolation & quarantine principles



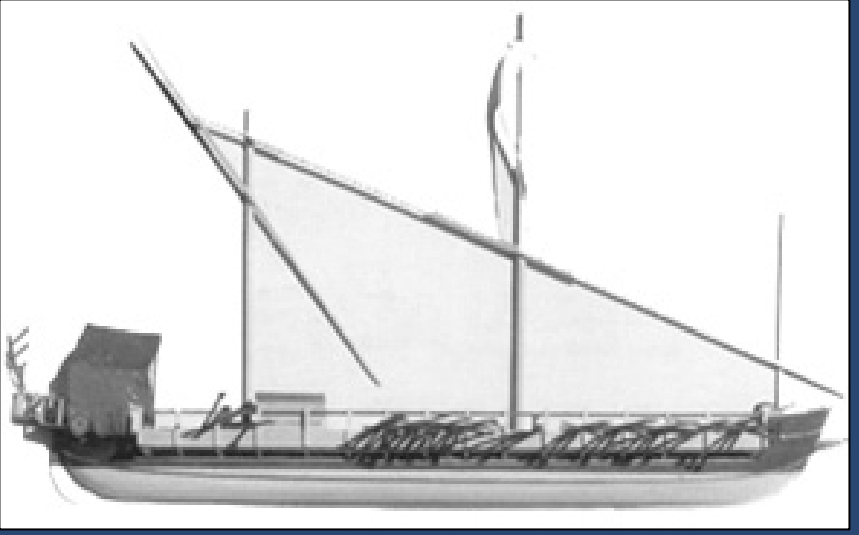
“Command the children of Israel, that they put out of the camp every leper…” **Numbers 5:2**

Emperor Justinian
Constantinople

542, first known plague pandemic to affect Europe
Moves along trade and military land routes

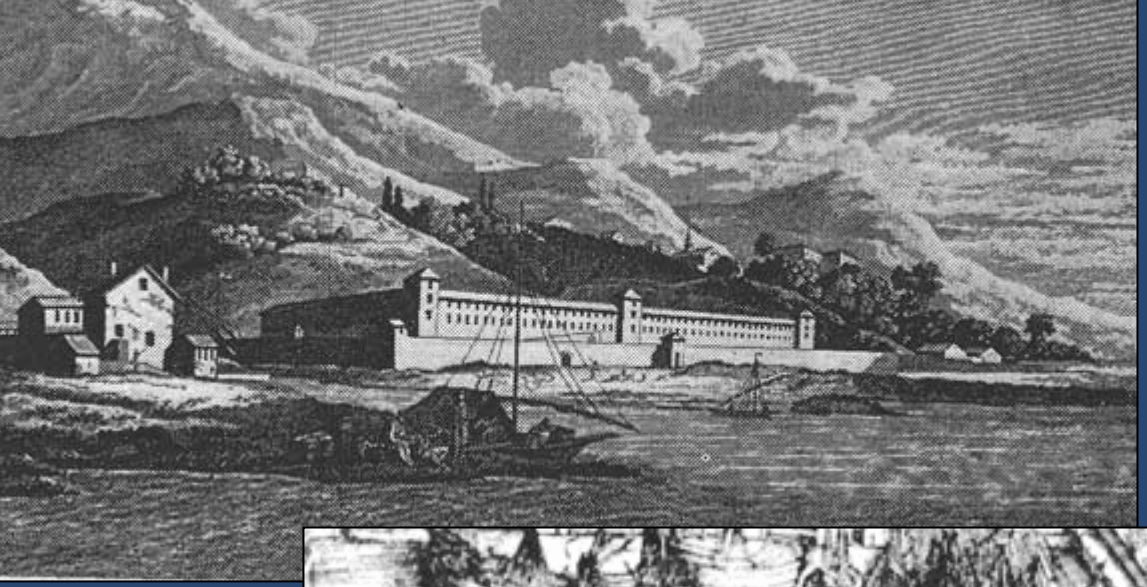
12th through 17th Centuries

New quarantine methods to accommodate expanding maritime trade



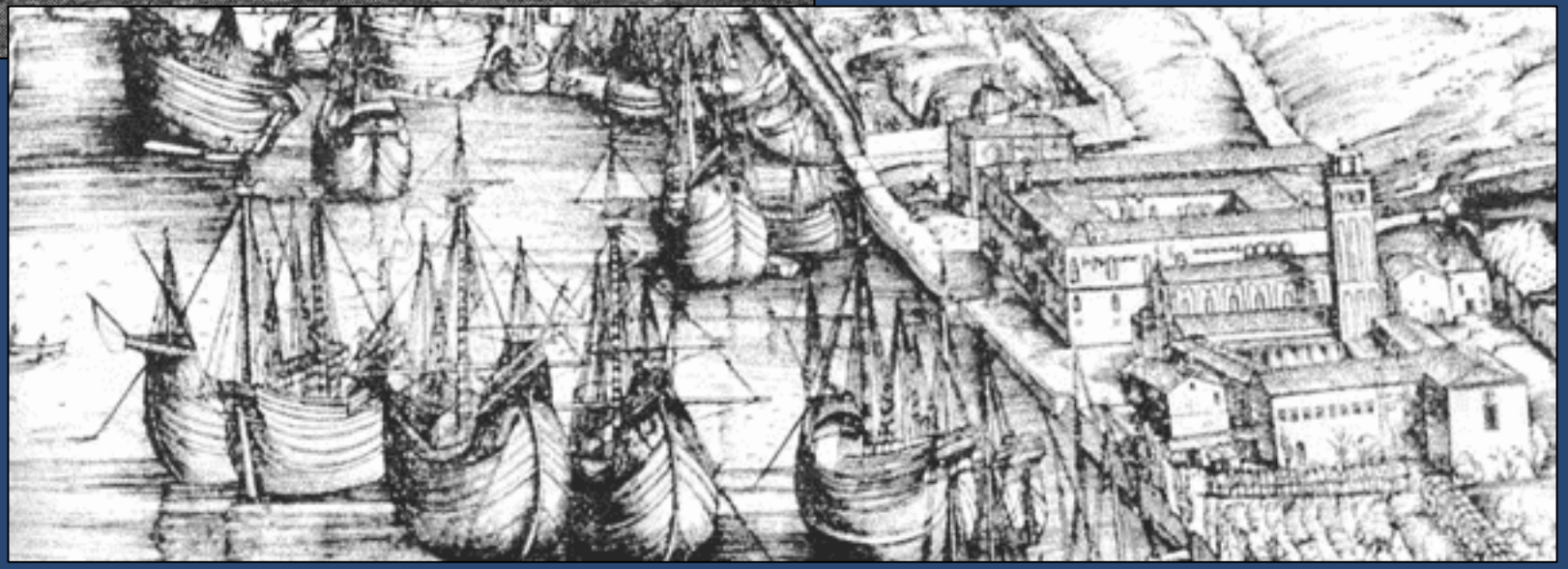
14th Century: Italian City-States as world hubs of merchant trade

Development of the *galea grossa* & *galeasse*



Genoa

Venice



- Large crews, sustained shipboard outbreaks (cholera/plague)
- 1st quarantine stations (*Lazzaretti*) - Venice, Genoa, & Ragusa

Shipboard outbreaks are impediments to commerce

- Laws & policies to stop disease introduction
- 1179: 1st international Q convention (leprosy)
- 1300s: China & Venice, armed enforcement of Q laws
- 1350-1630: Italy, hub of Q activity (plague)
  - Detain ships, cargoes, & persons, *quaranta giorni*
  - 1st maritime quarantine stations
  - Health officers evaluate & isolate ill persons
- 1520-1620: France (plague & cholera)
  - 1st maritime QS at Marseilles
  - All visitors need medical examination & clearance

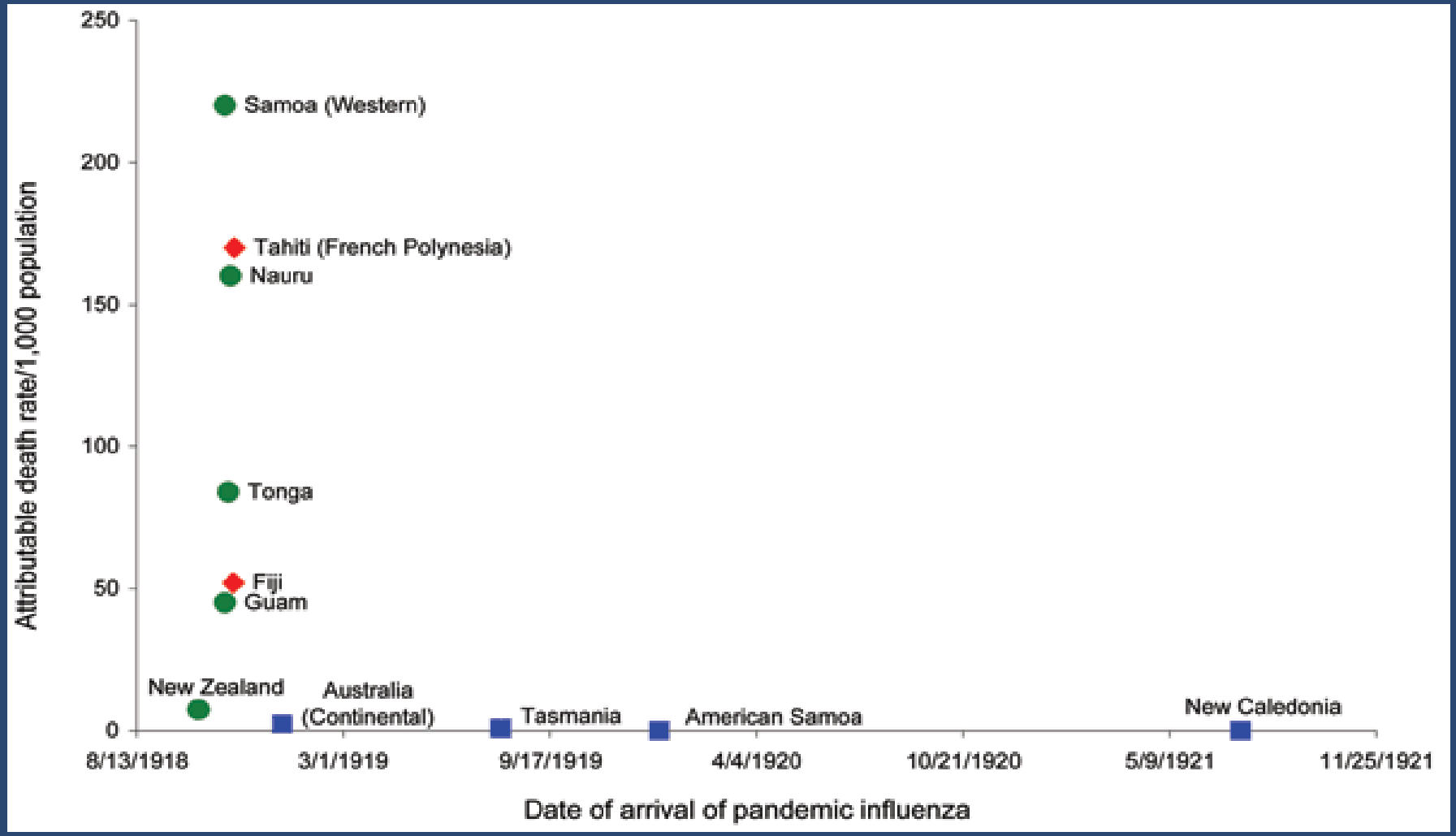
Does Quarantine Work?

Protective Effect of Maritime Quarantine in South Pacific Jurisdictions, 1918-19 Influenza Pandemic

- Historical look at 11 Pacific jurisdictions
- Four had strict maritime quarantine
- American Samoa: 5 days
- Australia, Tasmania, New Caledonia: 7 days

McLeod et al. Emerging Infectious Diseases. 2008;14:468-70

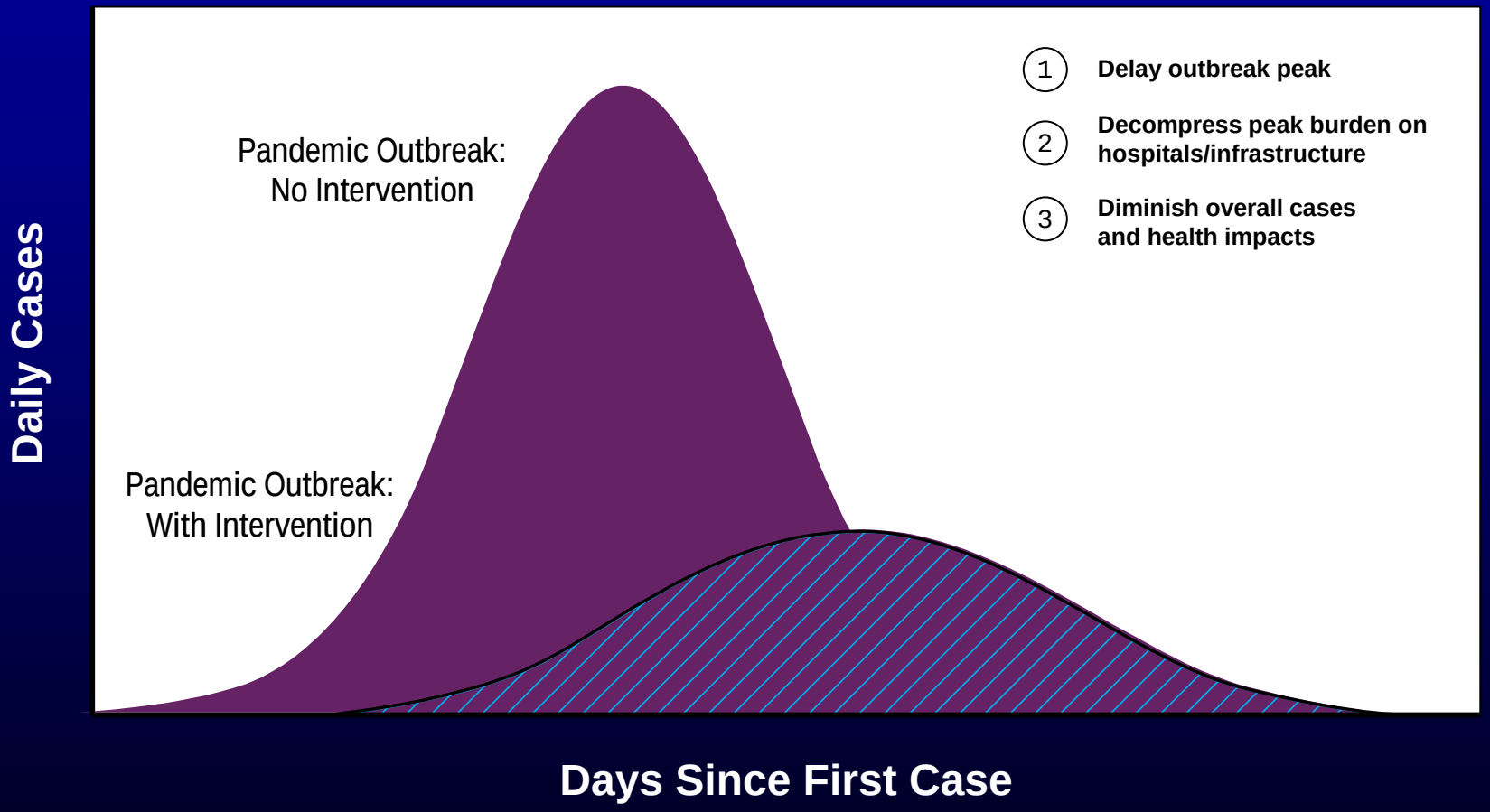
Pandemic Arrival Time and Death Rates, 11 Pacific Jurisdictions, 1918-19



Summary Findings

- Delayed arrival and reduced mortality associated with strict quarantine
- Partial quarantine did not work (Fiji, Tahiti)
- Causal association?
- Applicable to modern situation?

Goals of Quarantine and Other Measures in a Pandemic



Contact Tracing

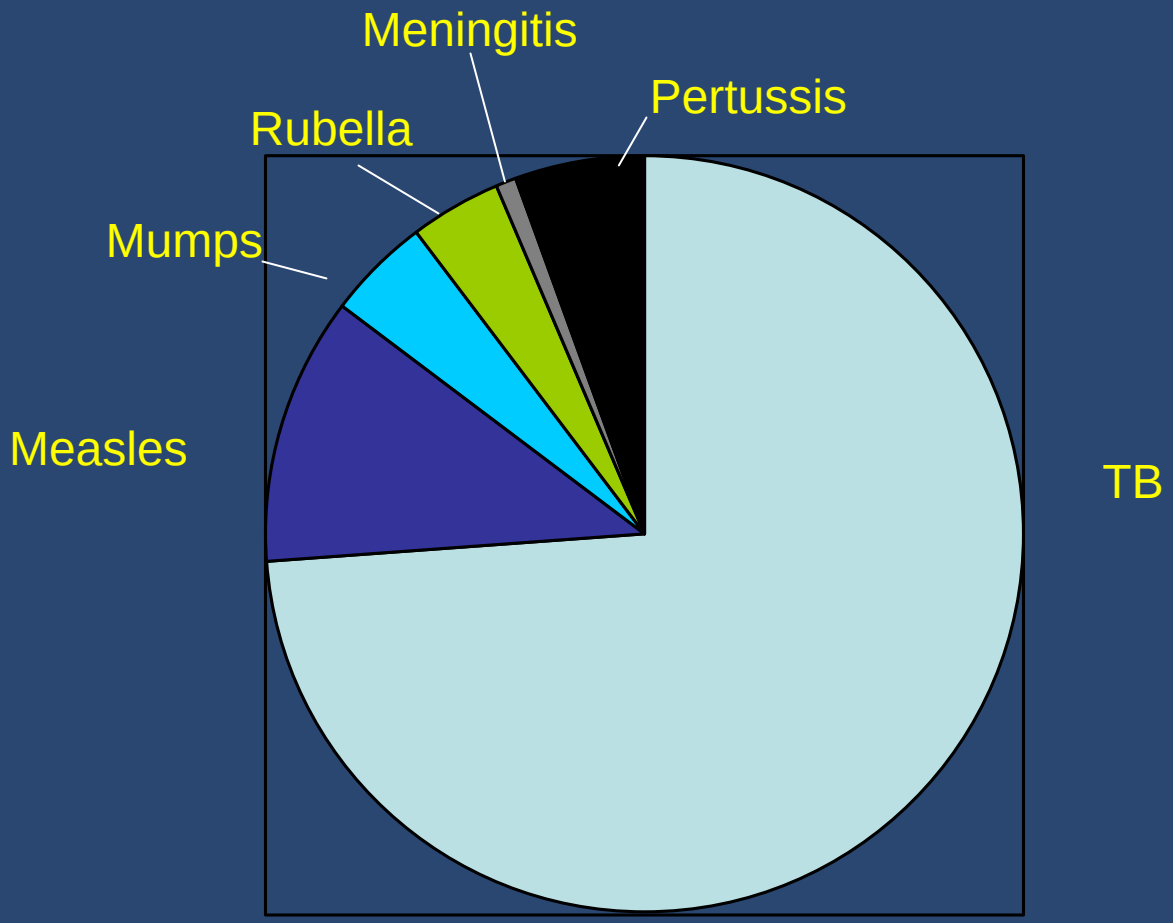
Quarantinable and Other Communicable Diseases of Public Health Significance*

- **Quarantinable Diseases**
  - **Cholera, Diphtheria, Plague, SARS, Smallpox, Infectious Tuberculosis, Viral Hemorrhagic Fevers, Yellow Fever, Novel Influenza Virus (with pandemic potential)**

- **Examples of Diseases of Public Health Significance***
  - **Dengue, infectious diarrhea, Legionella, malaria, measles, meningococcal disease, mumps, pertussis, polio, rabies, rubella, typhoid, varicella, zoonotic poxvirus**

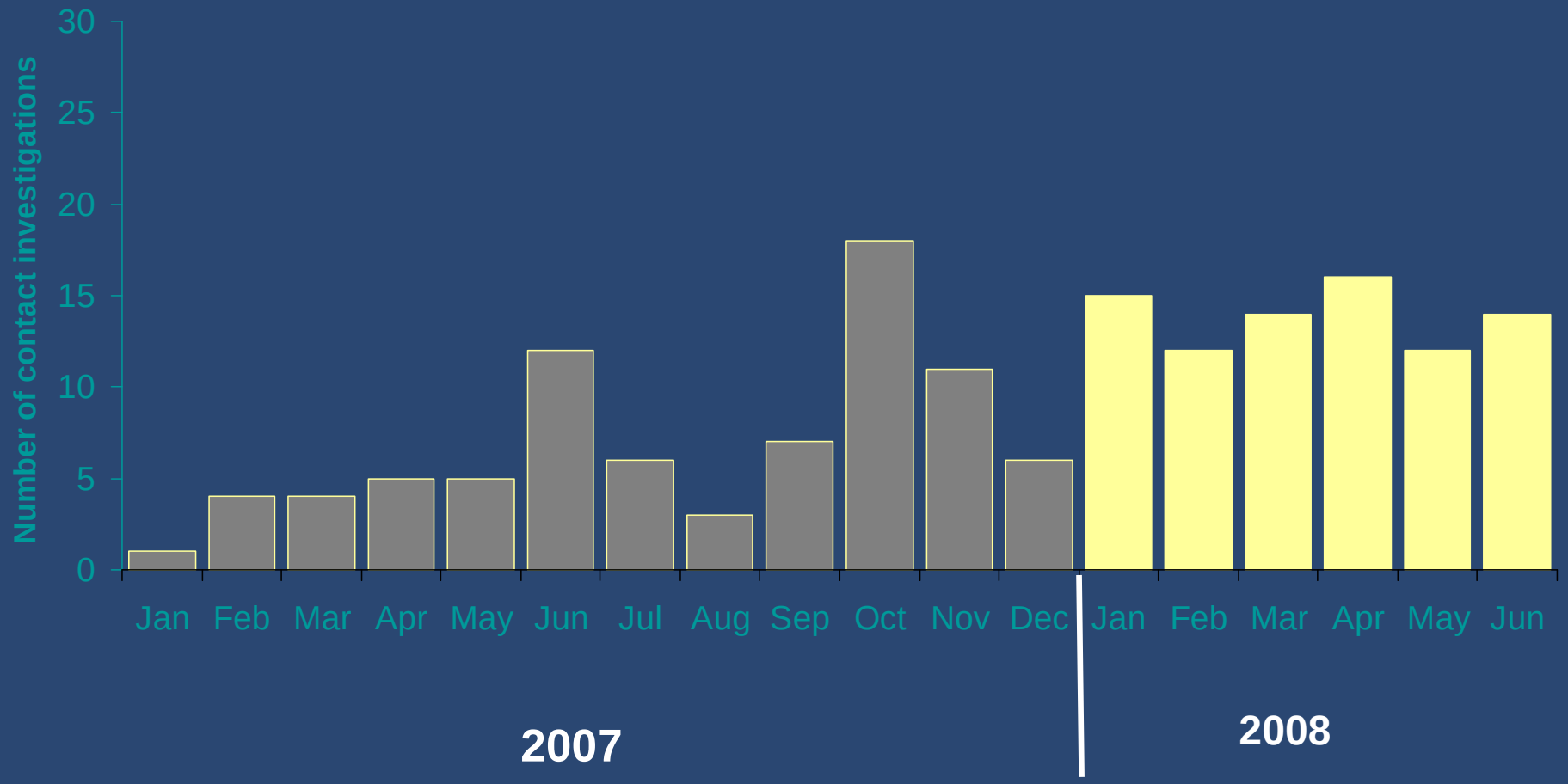
• **Based on potential to: a) cause significant morbidity and spread within the United States; b) spread among passengers; c) be controlled by pharmaceutical and/or non-pharmaceutical interventions.**

Aviation Investigations Conducted When Illness Reported After Travel, U.S., January 1, 2007 to September 30, 2008



Unpublished data

TB Contact Investigations Conducted
Jan-Dec 2007 (N=83) and Jan-Jun 2008 (N=85)



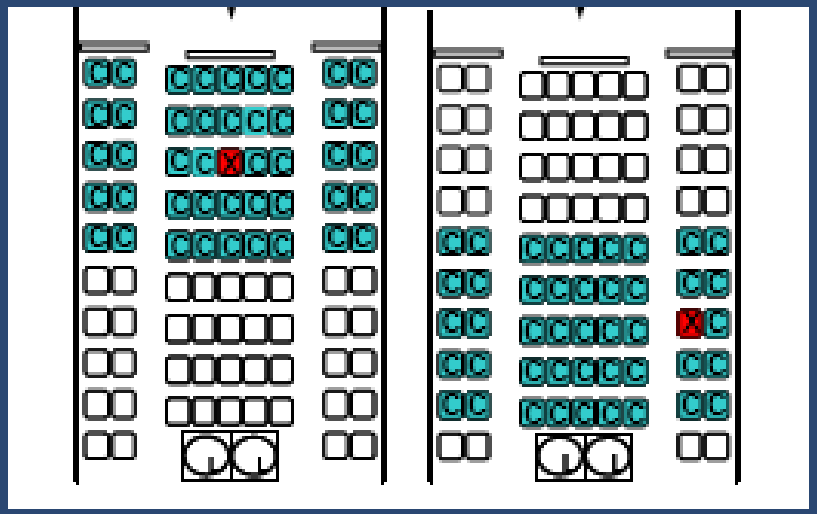
Unpublished data

Basic Approach: TB investigations on Airplanes

- Limited evidence base for risk of TB transmission during commercial air travel
- Risk of TB transmission on board aircraft is low and limited to persons in close contact with an infectious case for 8 hours or longer
- In most situations, TB not suspected or reported until after travel completed
- Since high-profile events of XDR TB case, increased reporting of passengers who flew while infectious with TB

Exposed Passengers

- Passengers within 2 rows of the index case
  - 2 rows ahead of the index case
  - Row of the index case
  - 2 rows behind the index case



Initiating a Contact Investigation

- **Index case confirmed as TB**
- **Index case diagnosed within 3 months of flight**
- **Flight occurred within 6 months of notification**
- **Flight ≥ 8 hours**
- **Index case not on adequate treatment and meets other WHO criteria for infectiousness:**
  - **Smear positive**
  - **Smear negative, but culture positive with cavitary lesions**
  - **MDR-TB and XDR-TB culture positive**

Text in yellow are per CDC protocol rather than WHO guideline

Reference: *Tuberculosis and Air Travel: Guidelines for Prevention and Control* – 3rd ed. Geneva, WHO, 2008. WHO/HTM/2008.399

Contact Investigations Challenges

- **Passenger locater data**
  - **Passenger manifest from airline often missing, incomplete or inaccurate**
  - **Supplement with CBP data, but still incomplete/inaccurate**
  - **Data cleaning is labor intensive**

- **Obtaining contact tracing outcomes**
  - **Voluntary reporting by states**
  - **Data reported not standardized**
  - **Little to no results reported from foreign public health authorities**

The Legal Basis of Quarantine

Due Process Considerations

Deprivation of liberty under the Fifth & Fourteenth Amendments to the U.S. Constitution

Balance the needs of the many while protecting the rights of the few

Constitutional design

- **U.S. is a federal system of government**
- **States are independent, sovereign governments in and of themselves**
  - **Retain all powers not expressly delegated to the United States**
  - **Public health is a "police power" retained by the States under the 10th Amendment to the U.S. Constitution**

Public Health Service Act, 1944

- Federal quarantine authority
- Under Commerce Clause
- Limited to international and interstate travel

State Quarantine Statutes

- Quarantine authority resides with state and/or local health agency
- Health officer's authority often based on broadly worded statutes

International Health Regulations

International Health Regulations

- Original IHR adopted in 1969 monitor and control six infectious diseases: cholera, plague, yellow fever, smallpox, relapsing fever and typhus
- Purpose: maximum protection of people against the international spread of diseases, while minimizing interference with world travel and trade
- Shift away from specific diseases

Revised IHR

- Notification of public health emergencies of international concern (PHEIC)
  - Algorithm + Disease List
- Authorize WHO to rely on “other sources” beyond notifications by State Parties
- Obligations to build capacities to detect, report and respond to PHEIC
- WHO authorized to make recommendations in response to PHEIC, e.g., travel restrictions, quarantine
- State parties authorized to take “additional measures”

Recommendations – Persons/Goods (IHR Part III, Articles 15 – 18)

- **Implement Isolation and Quarantine**
- **Implement Contact Tracing**

- **Require medical examination**
- **Implement Entry/Exit Screening**
- **Refuse Entry**

International Public Health Measures*
156 countries - June 29 –
55 countries with 70,893 confirmed cases

- 104 (67%) countries screening travellers for ILI
  - Thermal scanners used by 48/104 countries
    - 5/48 (10%) departing travelers
    - 21/48 (44%) arriving travellers from affected regions
    - 32/48 (67%) arriving travellers from all countries
- 17 (11%) countries cancel trips
- 57 (36%) countries have travel advisories
- 54 (35%) countries impose trade bans
- 38 (24%) countries impose quarantine measures

* Source: Global Public Health Intelligence Network

WHO Re-issues Temporary Recommendations – June 11

“Countries should not close borders or restrict international traffic and trade“

“Countries should assess their specific situation and make a timely transition from focusing national efforts on containment to focusing on mitigation measures, including appropriate non-pharmaceutical interventions”