

Quarantine and Isolation: Battling 21st Century Pathogens with a 14th Century Toolbox

Martin S. Cetron, M.D.

Deputy Director

Division of Global Migration and Quarantine

National Center for Infectious Diseases

Centers for Disease Control and Prevention

Presented at Public Health Law Conference Atlanta, June 14, 2004

Disclaimer

"The findings and conclusions in this presentation have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy."

Quarantine Symposium

- Dr M. Cetron, Overview
- Mr. S. Shakman, MN State Perspective
- Mr. S. Gravely, VA State Perspective
- Prof. L. Gostin, International concerns
- Dr H. Markel, Historical Context



Quarantine Issues

- Definition
- Epidemic Transmission Dynamics
- Historical Context
- Legal Framework
- Principles 21st Century Quarantine
- Misconceptions
- Key Questions

Definitions

- ***Isolation***

- Separation of ill persons with contagious diseases
- Often in a hospital setting, not always
- Applied to the individual(s), cohorts, populations

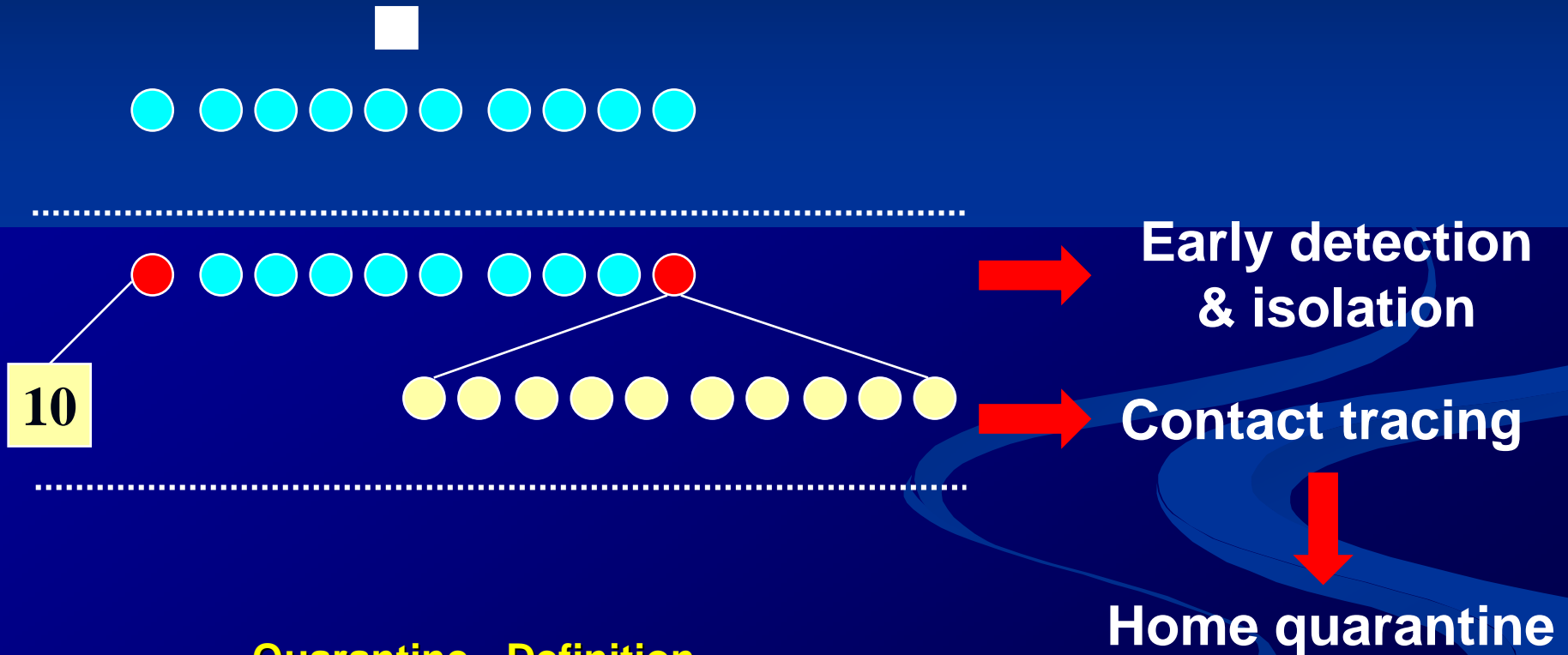
- ***Quarantine***

- Restriction of persons who are not ill but presumed exposed
- Usually in the home or a designated facility
- Applied at the individual, group, or community level

****voluntary vs. compulsory, legal vs. public health***



Isolate and Contain Strategy



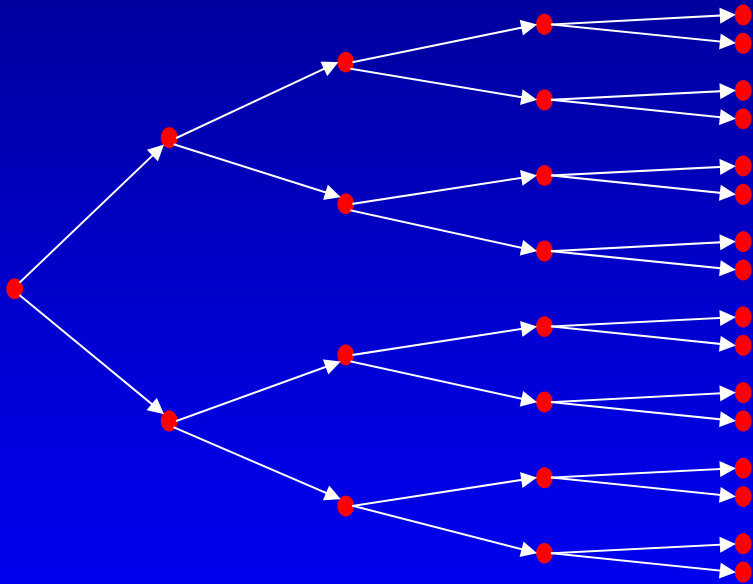
Quarantine - Definition

- The restriction of movement of a person who has been exposed to an infectious disease for a period of time not longer than the longest incubation period of the disease to prevent effective contact with those who have not been exposed to the infective agent



Effect of *Increasing Social Distance* (Q&I) on Epidemic Dynamics

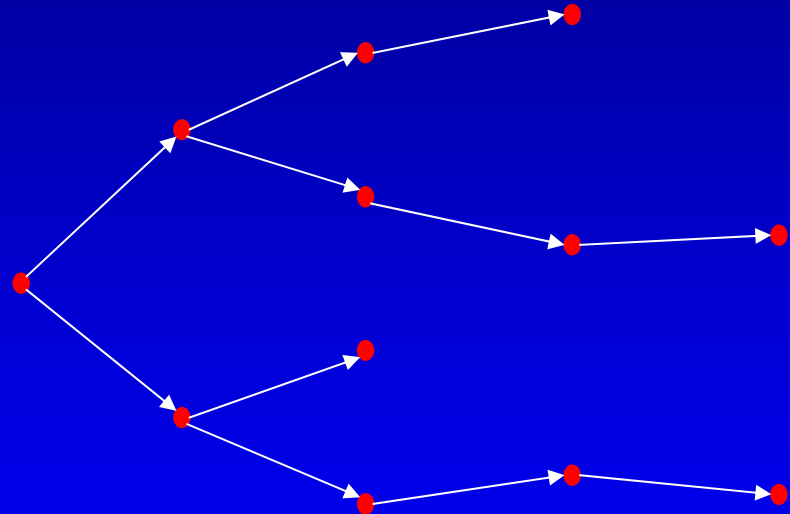
Exponentiation



$R_0 = 2.0,$

Progression = 1:2:4:8:16

Suppression



$R_0 = 0.67,$

Progression = 1:2:4:3:2



Quarantine

Historical Precedent

- Biblical references wrt Leprosy
- Italian *quaranta* and Latin *quadragina*
40 days duration
- *Black Death* 15th Century Venetian seaports, plague epidemics
- Plague “*Pest houses*” home quarantine
- Smallpox epidemics 16th Century Europe
- Yellow fever epidemics 18th, 19th Century

Q=Torture, exile, and death



“Quarantine” = Torture, exile, and death

Death in a sailor's uniform holding the yellow quarantine flag knocking on the door of NYC during the 1898 yellow fever epidemic



Frank Leslie's Illustrated Newspaper, Sept. 1878



CHAPPATTE
Inf'l Herald Tribune

NAW... IT'S SARS ALRIGHT, BOSS,
ALL FOUR OF US ARE
IN QUARANTINE



DONATO
Illustration © 2003

**Andy Donato,
The Toronto
Sun, 4/26/03**

Contact Management: Home Quarantine for Close Contacts

Quarantined residents in
Jihe Public Housing project,
Taiwan



Contact Management: Institutional Quarantine for selected HCWs and close contacts



Quarantine Dorms, Taipei

djernigan@cdc.gov



Nurses in Quarantine
Hoping Hospital - Taiwan



Quarantine Dorms, Taipei

djernigan@cdc.gov



Quarantine Dorms, Taipei

djernigan@cdc.gov

21st Century Quarantine

*A collective action for the common good
predicated on aiding individuals infected or
exposed to infectious agents while protecting
others from the dangers of inadvertent exposure*

Public good

Individual liberties





CURRENT SITUATION

U.S. STATE AND LOCAL LAWS



IN GENERAL: Individual states are responsible for intrastate public health control measures using their laws.

- Significant variation among state laws.
- Some local jurisdictions may have p. h. control provisions that are easier to use



U.S. FEDERAL LAW



- Federal Government also has concurrent power to apprehend, detain, or conditionally release individuals to prevent the interstate spread or international importation of certain diseases. (42 U.S.C. 264)
- Such federally “quarantinable” diseases must first be listed in an Executive Order signed by the President.

Executive Order 13295:

Revised List Of Quarantinable Communicable Diseases

- (a) Cholera; Diphtheria; Infectious Tuberculosis; Plague; Smallpox; Yellow Fever; and Viral Hemorrhagic Fevers** (Lassa, Marburg, Ebola, Crimean-Congo, South American, and others not yet isolated or named).
- (b) Severe Acute Respiratory Syndrome (SARS)**, which is a disease associated with fever and signs and symptoms of pneumonia or other respiratory illness, is transmitted from person to person predominantly by the aerosolized or droplet route, and, if spread in the population, would have severe public health consequences.

President George W. Bush
April 4, 2003





FEDERAL LAW



- Executive Order 13295 of April 4, 2003 added SARS to Q list, as a prudent public health preparedness measure.
- By law, U.S. Customs and Coast Guard assist in the enforcement of federal quarantine regulations.
- Violation → Criminal Misdemeanor



INTERPLAY FEDERAL & STATE / LOCAL LAWS



- State & Local have primary responsibility for Q/I.
- Federal has authority to prevent interstate spread of disease, plus int'l importation.
- HHS Secretary may accept state & local assistance in enforcement of federal Q regulations
- HHS may assist state & local officials in their control of communicable diseases.
- HHS provides Grant \$ State “legal preparedness” assessments & “Q preparedness”

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Interplay of Federal & State / Local Laws



- It is possible for federal, state, AND local laws to ALL come into play in a particular situation. (e.g. An arriving aircraft at a large city airport) Hence coordination is crucial
- **ENFORCEMENT ISSUE:**
Each level of P.H. Officials must effectively connect with their respective Law Enforcement counterparts to assist as necessary in carrying out a mandatory public health order.



FEDERAL, STATE, & LOCAL “Intergrated Q-Preparedness” Merge the Silos



	PUBLIC HEALTH ↓	LAW ENFORCEMENT ↓	EMER. MGMT. ↓	MED. CARE SERVICE ↓	COURTS ↓
FEDERAL →	P.H.	L.E.	EMA	MED CARE	FED. CTS.
STATE →	P.H.	L.E.	EMA	MED CARE	STATE CTS.
LOCAL →	P.H.	L.E.	EMA	MED CARE	LOCAL CTS.



DUE PROCESS QUARANTINE AND ISOLATION



- STATE PROCEDURES WILL VARY, OR MAY NOT DIRECTLY ADDRESS DUE PROCESS ISSUES FOR QUARANTINE AND ISOLATION ORDERS.
- COURTS MAY ULTIMATELY REVIEW QUARANTINE / ISOLATION ORDERS
- DUE PROCESS → A FLEXIBLE CONCEPT

REMEMBER THE BALANCING TEST!

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Principles of Modern Quarantine

- Used when exposed to **highly dangerous and contagious disease** and when **resources available to implement** and maintain
- Encompasses a wide **range of strategies**
- Used in **combination** with other interventions
- Ensures **rapid isolation** of contagious persons from exposed and that those in Q/I are among **first to receive interventions**
- **Lasts only as long as necessary**

Principles of Modern Quarantine

- Does not have to be absolute to be effective, therefore **favor voluntary over compulsory**
- More likely to involve small numbers of exposed persons in small areas
- Requires clear understanding of **roles** of **jurisdictions** and legal **authorities**
- Requires **coordination and planning** with many partners
- Requires education, **trust** and participation of general public

Misconceptions

- **Does the effectiveness of containment measures require 100% compliance?**
- Does “quarantine” always mean using a legal order to restrict someone’s activity?
- Must quarantine be mandatory to be effective?
- Does being placed in quarantine increase a person’s risk for acquiring the disease?

Misconceptions

- **Is quarantine really necessary if everyone who develops symptoms is rapidly placed in isolation?**
- Is quarantine useful only for diseases in which transmission is possible before the onset of symptoms?
- Is quarantine useful only for diseases that are spread by the airborne route?
- Will the public accept the use of quarantine?

Ways to Increase “Social Distance”

- **Implement “Snow Day” restrictions (shelter-in-place)**
 - Close schools, daycare centers, etc.
 - Cancel large public gatherings (concerts, theaters)
 - Minimize other exposures (markets, churches, public transit)
 - Encourage non-essential workers to stay home
 - Telecommuting can minimize economic impact
- **Consider additional community measures**
 - Temperature or other symptom monitoring
 - Distribution of surgical masks, barrier precautions, hand hygiene
 - Scaling back transportation services (holiday schedule)



Advantages of “Snow Day” Approach

- **Intuitive**
- **Leverages the public’s instinct for self-preservation**
 - **Cordon sanitaire *conflicts* with this instinct**
- **Can be implemented instantaneously**
- **Does not require similar level of dedicated resources as full-scale quarantine**

Percent experiencing problems while quarantined

BASE: Toronto area residents who had been quarantined or had a friend or family member who had been quarantined (n=111)



Specific Problems



■ Major Problem
■ Minor Problem

*Robert Blendon, Harvard School of Public Health

Key Q-Questions

- What are the key trigger points for implementing movement restrictions?
- What epidemic parameters are useful to monitor impact?
- When is it safe to declare “all clear” & scale back
- Who will make the decision(s)?
- Who will implement?
- Will the measures be voluntary or enforced?
- Who will enforce, if needed?
- Who are all the partners/stakeholders and their roles?
- Are there sufficient resources for planning, education and response?

Q-Conclusions

- Quarantine (Q) is an important tool used in conjunction with other measures, but is resource intensive
- Q needs to integrate broad sectors of society: PH, legal, social, political
- Q-specific advance planning and preparedness are crucial to respond to natural EIDs and intentional BT
- Q must be implemented following strict ethical principles including due process and respect civil liberties
- Stigmatization must be specifically combated (fear and ignorance escalate epidemics)
- Communication and education are paramount

Acknowledgements

- Gene Matthews
- James Misrahi
- Pattie Simone
- Susan Maloney
- Ram Koppaka
- Ava Navin
- Dan Jernigan
- Richard Hatchett
- Robert Blendon
- Photojournalists
(listed by slide)
- Singapore MOH
- Taiwan MOH

Range of Responses to SARS at the National, State, and Community Level

Public Health Criteria for Community Response

- Number of cases/exposed
- Exposure category
 - Known
 - Travel
 - Close contact
 - Health care-related
 - Household
 - Unknown (unlinked)
- Type of transmission
- Generations of transmission
- Morbidity and mortality
- Ease/ rapidity of spread
- Movement in /out of community
- Resources
- Need urgent public health action
- Risk of public panic



No restrictions



Targeted restrictions

- Population-specific
(i.e., congregate settings or
group gatherings)



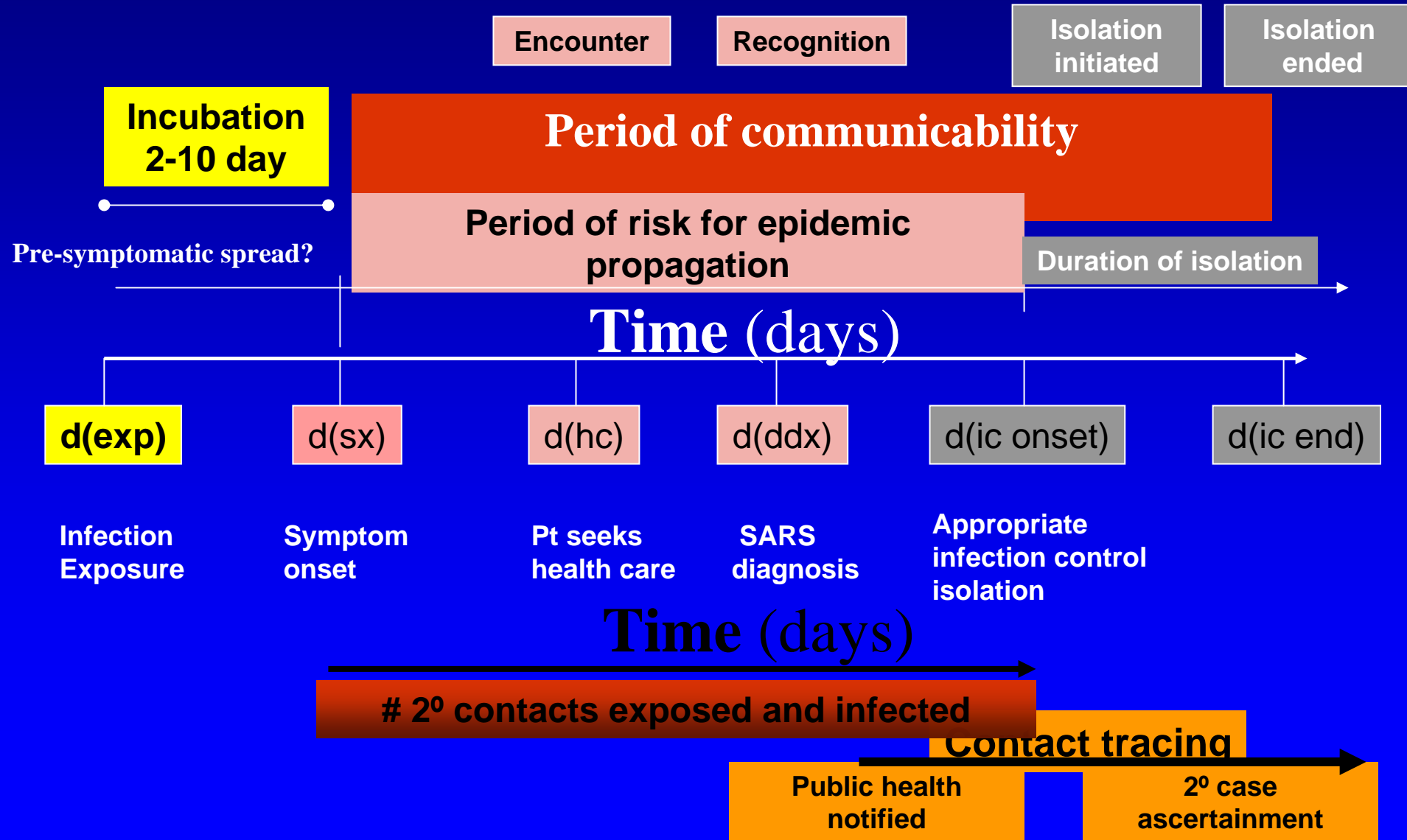
- Voluntary general movement restrictions
 - “Shelter in Place” or “Snow Day”
- Closing of public places
- Suspension of public gatherings
- Restriction of mass transit schedules



- Compulsory movement/activity restrictions
 - Curfews on activities
 - Closing of mass transit
 - Closing access routes
 - Roads, Airports, Seaports
 - Closing borders
 - Border surveillance/monitoring
 - “SARS checkpoints”
 - Travel permits

Contagion Epidemic Modeling

Goal: $R < 1$, Extinction or Quenching



Transmission Dynamics and Control of Severe Acute Respiratory Syndrome

Marc Lipsitch,¹ Ted Cohen,¹ Ben Cooper,¹ James M. Robins,¹ Stefan Ma,² Lyn James,² Gowri Gopalakrishna,² Suok Kai Chew,² Chorh Chuan Tan,² Matthew H. Samore,³ David Fisman,^{4,5} Megan Murray^{1,6*}

