

# Disease Mitigation Measures in the Control of Pandemic Influenza

**D.A. Henderson, MD, MPH**

Inglesby TV, Nuzzo JB, O'Toole T, Henderson DA

*Biosecurity and Bioterrorism: Vol 4, No 4, 2006*

[Upmc-biosecurity.org](http://Upmc-biosecurity.org)

---

**Center for Biosecurity**



**UPMC** | University of Pittsburgh  
Medical Center

# Public health realities

- History
  - Pandemic flu spreads very rapidly – locally, nationally and internationally
  - A variety of non-vaccine mitigation measures have been used to try to deter influenza spread. None have been shown with any certainty to be effective
  - Applications of deterrent measures involving large numbers have the potential to cause serious adverse secondary effects that are difficult to anticipate and impossible to model

# Epidemiologic expectations

- Pandemic planning premises:
  - Proportion of population ill: 25 – 30%
  - Duration of outbreak: 8 weeks
  - Average duration of illness: 10 days
  - Case/fatality ratio: 2.5%
- **Maximum % ill on any given day ~10%**
- Outbreak “waves” occur at intervals no more often than once in 6 months

# Clarification of terms

- Isolation

Confinement of symptomatic persons in the home or hospital

- Quarantine

Separation from circulation of *asymptomatic* persons who may have been exposed to infection so that they will not infect others if they become ill

May pertain to a household up to an entire city and extend for periods of days to weeks

# Evaluation of mitigation measures

- Epidemiologic assessment: Do available data or experience suggest measures that will work?
  - Historical data -- limited and incomplete
  - Modeling predictions -- potentially misleading
    - Epidemiological data re: influenza are very limited
      - Contagiousness of patients during illness
      - Transmissibility variation with humidity and temperature
      - Uncertainty re: aerosol vs. droplet spread
      - Role of fomites
    - Probable secondary and tertiary effects of interventions can be serious but cannot be modeled

# Evaluation of mitigation measures

- Logistical assessment: Is the disease mitigation measure feasible?
  - Implications of duration of enforcement
  - Manpower needed for mandatory or voluntary measures
  - Economic impact

# Evaluation of mitigation measures

- Social, Economic, and Political Assessment: What are the possible unintended adverse societal consequences?
  - School closure
    - Increased absenteeism of work force
    - School feeding programs (30 million children)
    - Cessation of payments for school employees
  - Home quarantine
    - Increased work-force absenteeism

# Potential disease control measures *recommended*

- Vaccination
  - Most important measure to be taken
  - Vaccine will not be available until 6 months after disease begins human-to-human spread
  - No vaccine available until after first wave
- Isolation of sick in hospital or at home
  - The sick are presumably most contagious
  - Isolation throughout symptomatic phase
    - Mandatory isolation – not feasible and counter-productive

# Potential disease control measures *recommended*

- Use of anti-viral medications
  - Potential for epidemic “quenching” – low to nil
  - Supply is limited
    - Amount needed for prevention for epidemic period requires 5-7 times amount needed for treatment
  - Priorities for use and method for distribution -- ?
- Hand-washing and respiratory etiquette

# Potential disease control measures

*not recommended*

- Large-scale quarantine
  - “forced isolation and quarantine are ineffective and impractical” (WHO)
- Home quarantine
  - Secondary problems
    - Absentee rates in essential and commercial services
    - Provision of supplies to those in quarantine
    - Loss of wages for hourly workers
    - What to do for such as college students

# Potential disease control measures *not recommended*

- Travel restrictions

“screening and quarantining entering travelers at international borders did not substantially delay virus introductions in past pandemics...and will likely be even less effective in the modern era”  
(WHO)

# Potential disease control measures

## *selective use*

- Prohibition of social gatherings
  - Widespread prohibition not advisable
    - Potentially, many possible sites --e.g. theaters, churches, restaurants, bars, athletic events, malls, stores.
    - Selective for large, crowded events
- School closure
  - 7 to 10 closure early in epidemic is common
  - Longer closure has serious secondary effects

# Potential disease control measures

## *selective use*

- Masks and personal protective equipment
  - Hospital
    - Staff – N95 masks or PAPRs if possible
    - Patients – surgical masks
  - Community
    - Masks are not recommended

# Community response to a pandemic

*an overriding principle*

*Experience has shown that communities faced with serious adverse events respond best and with the least anxiety when the normal social functioning of the community is least disrupted.*

# Community response to a pandemic

## *summary*

- 1) Community-wide vaccination
- 2) Provision for medical care and isolation of patients
  - Regional Health Care Operations Committee
  - Community-wide plan for caring for large numbers of patients
  - Stockpiling of masks, antibiotics, etc
  - Plan for added staff for medical care facilities
  - Control center to monitor beds, supplies, personnel

# Community response to a pandemic

## *summary*

### 3) Planned communications strategy

- Frequent communication with public thro press and civic leaders
- Requests for those who are ill to remain isolated
- Encouragement of employees to come to work so as to assure continuity in essential services

### 4) Hand washing and respiratory hygiene

# Community response to a pandemic

## *summary*

- 5) Possible early closure of schools for 10-14 days
- 6) Selective canceling or postponing of large meetings or events to be held in crowded halls

### Not recommended

- 1) Mandatory isolation of patients
- 2) Quarantine of anyone – including families or groups
- 3) Closure of air or rail hubs or transportation systems
- 4) Screening of travelers at borders

*Think twice before taking actions driven primarily by the perceived need to demonstrate to the public that government authorities can take some definitive action to cope with the problem.*

**“primum non nocere”**