Swine Flu Update
5-13-09

Maricopa Association of Governments

Bob England, MD, MPH
Maricopa County Dept of Public Health

Prerequisites for the Start of a Pandemic

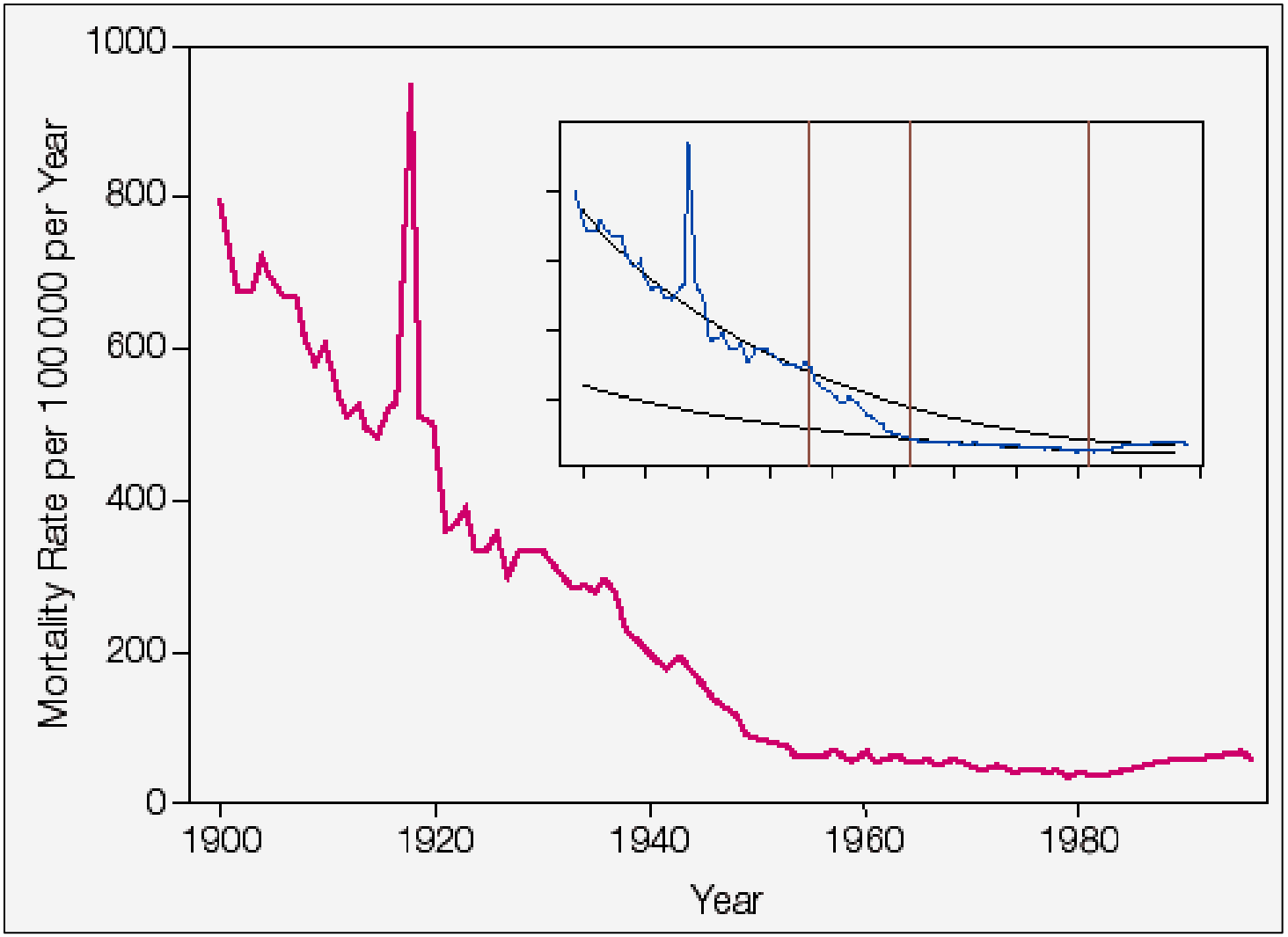
1. A novel virus must emerge – so people will have little or no immunity.
2. The new virus must be able to replicate in humans and cause disease.
3. The new virus must be efficiently transmitted from one human to another.

- Combined with degree of virulence…

20th Century Influenza Pandemics

- 1968-69 “Hong Kong flu,” (H3N2)
  - 34,000 US deaths (1-4 million worldwide)
- 1957-58 “Asian flu,” (H2N2)
  - 70,000 US deaths (1-4 million worldwide)
- 1918-19 “Spanish flu,” (H1N1)
  - >600,000 US deaths (20-100 M worldwide)
  - 30-40% infected
  - 2.5% overall mortality
  - Most deaths among young, healthy adults

Trends in Infectious Disease Mortality in the United States During the 20th Century



Armstrong, GL. JAMA. 1999 Jan 6;281(1):61-6.

“These men start with what appears to be an ordinary attack of… influenza… rapidly develop the most vicious type of Pneumonia that has ever been seen… a few hours later you can begin to see the Cyanosis… until it is hard to distinguish the colored men from the white. It is only a matter of a few hours then until death comes… It is horrible. One can stand to see one, two or 20 men die, but to see these poor devils dropping like flies… We have been averaging about 100 deaths per day… We have lost an outrageous number of Nurses and Drs. It takes special trains to carry away the dead.”

--letter from physician at U.S. Army camp

Case Count as of 5-13-09

Case Count as of 5-13-09

Who cares?

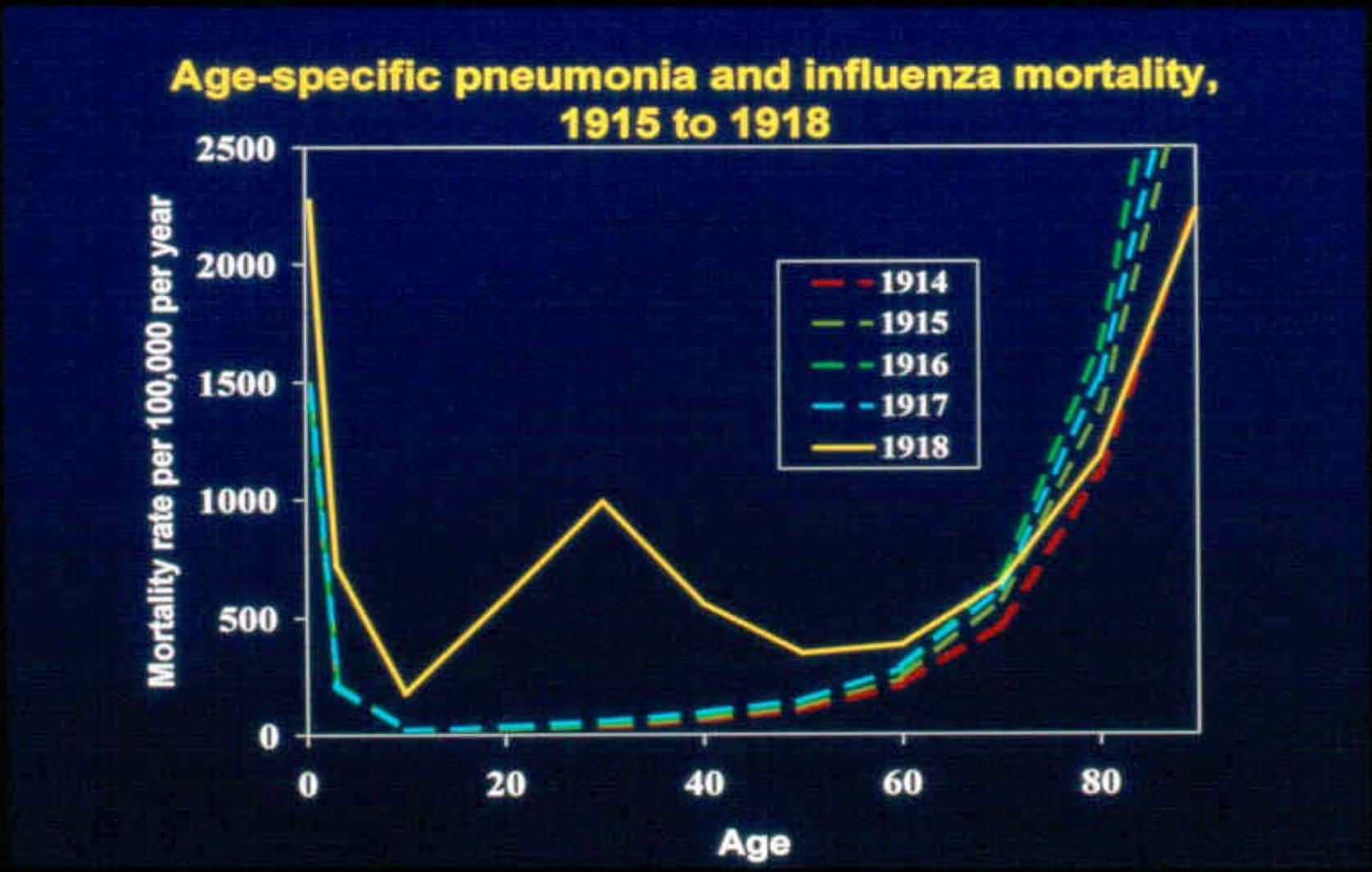
Case Count as of 5-13-09

Who cares?

- Tip of the iceberg
- What matters is virulence

Typical year

- 36,000 deaths in U.S.
- 8,000 deaths in Mexico
- Early stories from Mexico *not* data


Age-specific pneumonia and influenza mortality, 1915 to 1918
Mortality rate per 100,000 per year
2500
2000
1500
1000
500
0
0
20
40
60
80
Age
1914
1915
1916
1917
1918

Pandemic Flu Plans

- Goals
  - Prevent morbidity & mortality
  - Prevent social disruption
- Tools
  - Vaccine
  - Antivirals
  - Other interventions

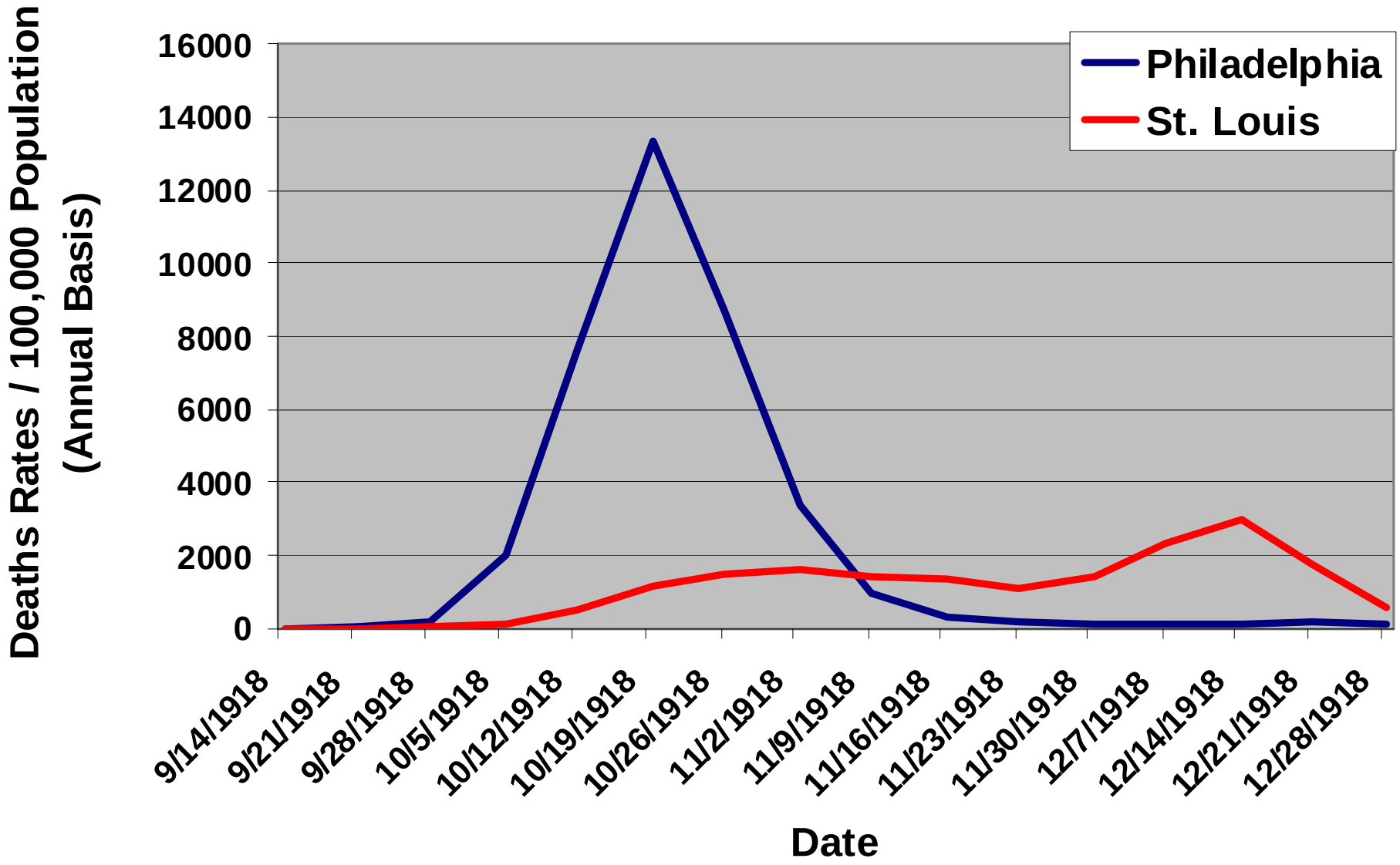
MCDPH Roles

- Surveillance
  - Now selective testing
  - Daily ILI surveillance
  - Investigating serious illness & clusters
- Guidance
  - Health care, labs, schools, etc
  - Own staff
- Public Info
  - Website, etc
  - Phone (CIR)
  - Media
- Medication & supply distribution
  - Especially vaccine?
- "Community Mitigation"

“Social Distancing” and others

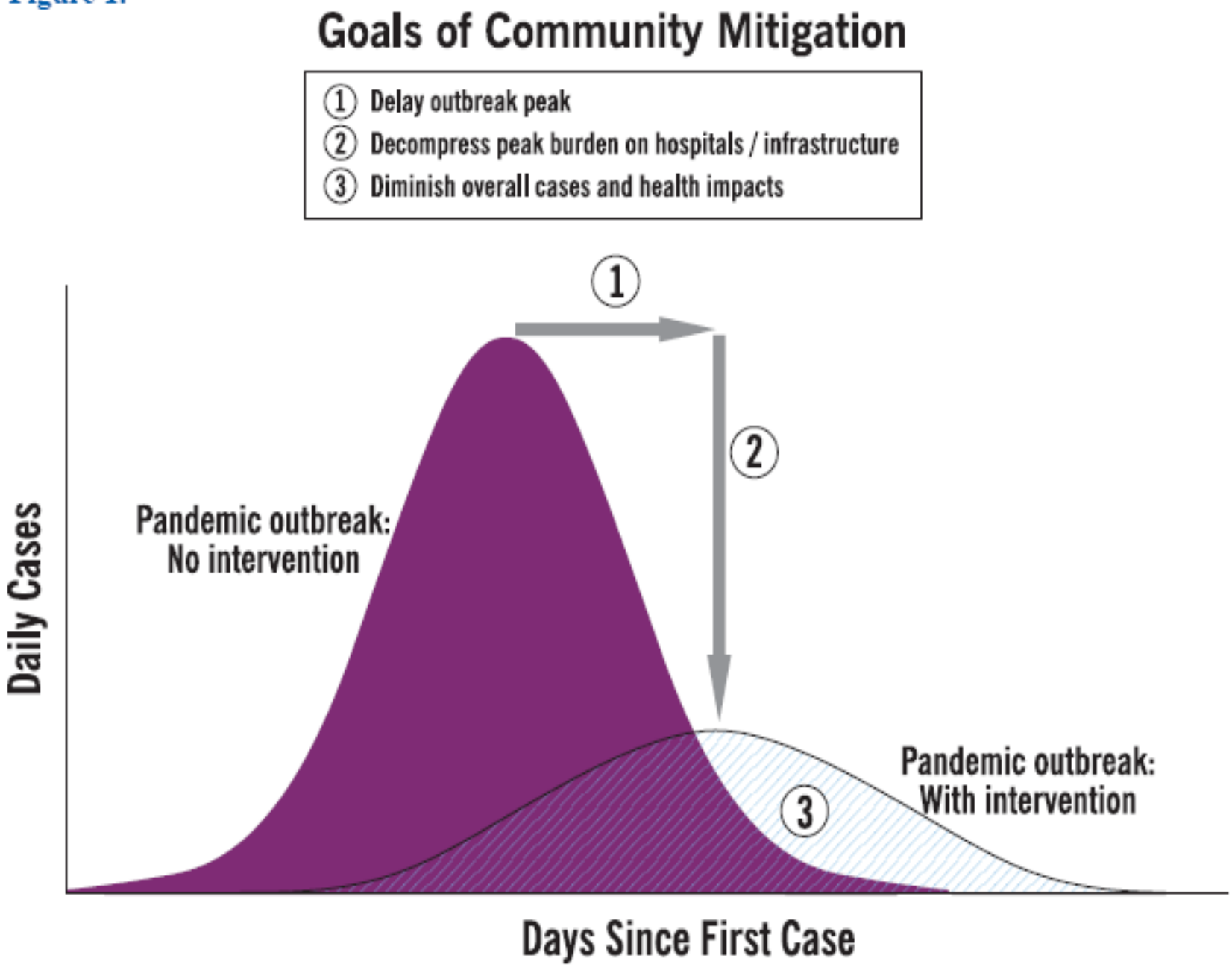
- Travel advisories/limit travel
- Limit large public gatherings; close schools
- Encourage telecommuting
- Limit availability of public transportation
- Hand hygiene, respiratory hygiene
- Screening travelers from affected areas
- “Isolation” of sick persons (e.g., at home)
- Quarantine of exposed persons
- Education to allow early identification and isolation of cases

1918 Death Rates: Philadelphia v St. Louis

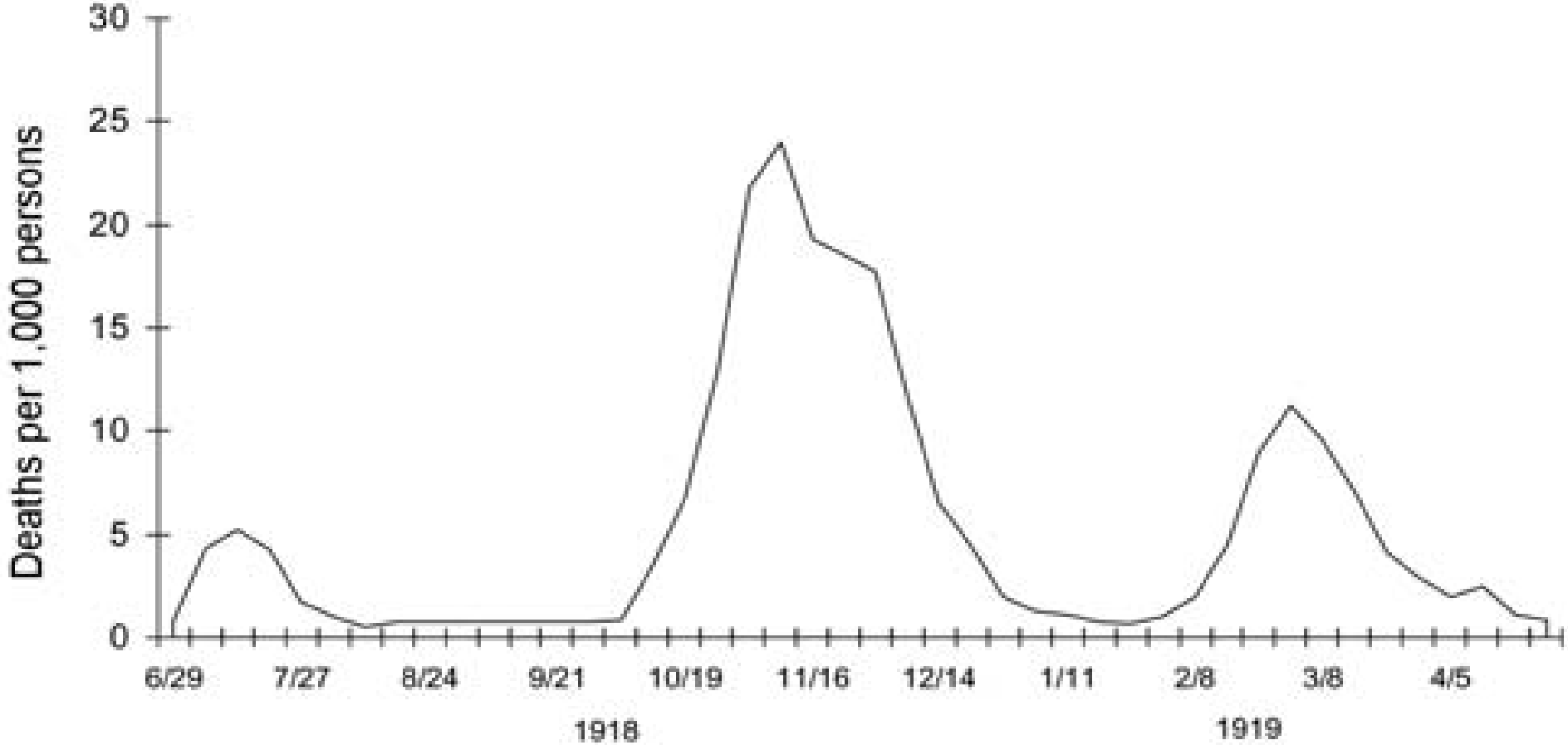


Collins SD, Frost WH, Gover M, Sydenstricker E: Mortality from influenza and pneumonia in the 50 largest cities of the United States First Edition Washington: U.S. Government Printing Office 1930.

Figure 1.


Goals of Community Mitigation
1 Delay outbreak peak
2 Decompress peak burden on hospitals / infrastructure
3 Diminish overall cases and health impacts
1
2
3
Pandemic outbreak:
No intervention
Pandemic outbreak:
With intervention
Daily Cases
Days Since First Case

Three pandemic waves: weekly combined flu and pneumonia mortality, U K, 1918–1919 (*21*).



Pandemic Flu Vaccine Timelines

- Optimal timing ~3-4 months for first doses
- 2 doses per person will be needed
- Sanofi (only manufacturer in US) can make ~250 M monovalent doses/yr (~5M doses/wk)
- Implication: ~1% of the population/wk
- Feds will distribute all through local public health

Population Size of Potential Vaccine Priority Groups

Group	Population	% of U.S. pop.
Health care workers	11 m	3.7%
Hospital workers	5 m	1.7%
"Frontline" hosp.	3.2 m	1.1%
Public safety workers	2.3 m	0.8%

Estimated vaccine production 5 m doses/wk (~1-2%) at 15 ug or 7.5 ug antigen given current U.S. capacity.

Target Categories for Vaccination

Homeland and National Security

Critical Infrastructure

Healthcare and Community Support Services

General Population

Pandemic Severity Index

Case Fatality Ratio		Projected Number of Deaths* US Population, 2006	
≥2.0%	Category 5	≥1,800,000	Severe
1.0 - <2.0%	Category 4	900,000 - <1,800,000	Severe
0.5 - <1.0%	Category 3	450,000 - <900,000	Moderate
0.1% - <0.5%	Category 2	90,000 - <450,000	Less Severe
<0.1%	Category 1	<90,000	Less Severe

*Assumes 30% illness rate and unmitigated pandemic without interventions

Category:
Homeland & National Security

Level		Severe	Moderate	Less Severe
A	▪ Deployed and mission critical personnel	Tier 1	Tier 1	Tier 1
B	▪ Essential support and sustainment personnel ▪ Intelligence services ▪ Border protection personnel ▪ National Guard personnel (not in level A) ▪ Other domestic national security personnel	Tier 2	Tier 2	Tier 2
C	▪ Remaining active duty military and essential support personnel	Tier 3	Tier 3	Not targeted

Category: Healthcare and Community Support Services

Level		Severe	Moderate	Less Severe
A	▪ Public health personnel ▪ Inpatient healthcare providers ▪ Outpatient and home health providers ▪ Healthcare providers in LTCFs	Tier 1	Tier 1	Tier 1
B	▪ Community support and emergency management	Tier 2	Tier 2	Not targeted
C	▪ Other important healthcare personnel	Tier 3	Tier 3	Not targeted

Category:
Critical Infrastructure

Level		Severe	Moderate	Less Severe
A	▪ EMS, law enforcement, fire personnel ▪ Mfrs of pan vaccine and antivirals ▪ Key government leaders	Tier 1	Tier 1	Tier 1
B	▪ Electricity, natural gas, water personnel ▪ Communications personnel ▪ Critical government personnel	Tier 2	Tier 2	Not targeted
C	▪ Transportation, food and agriculture, banking and finance personnel ▪ Pharmaceutical sector personnel ▪ Chemical and oil sector personnel ▪ Postal and shipping personnel ▪ Other important government personnel	Tier 3	Tier 3	Not targeted

Category:
General Population

Level		Severe	Moderate	Less Severe
A	▪ Pregnant women ▪ Infants and toddlers 6 to 35 months old	Tier 1	Tier 1	Tier 1
B	▪ Household contacts of infants <6 months ▪ Children 3-18 yrs with ↑ risk conditions	Tier 2	Tier 2	Tier 2
C	▪ Children 3-18 yrs without ↑ risk conditions	Tier 3	Tier 2	Tier 3
D	▪ Persons 19-64 years with ↑ conditions	Tier 4	Tier 3	Tier 2
E	▪ Persons ≥ 65 years	Tier 4	Tier 3	Tier 2
F	▪ Healthy adults 19-64 years	Tier 5	Tier 4	Tier 4

Vaccination Strategy for a Severe Pandemic

Deployed forces

Critical healthcare

EMS, Fire, Police

Key govmt leaders

Pregnant women

Toddlers

Tier 1 Tier 2 Tier 3 Tier 4 Tier 5

Vaccination Strategy for a Severe Pandemic

Military support

Border protection

National Guard

Intelligence services

Community Services

Utilities

Communications

Critical govmt

Infant contacts

High-risk children

Tier 1 Tier 2 Tier 3 Tier 4 Tier 5

Vaccination Strategy for a Severe Pandemic

Other active duty

Other important healthcare personnel

Transportation, food, agriculture

Banking/finance

Pharmaceutical

Chemical, oil

Postal/shipping

Other government personnel

Healthy children

Tier 1 Tier 2 Tier 3 Tier 4 Tier 5

Vaccination Strategy for a Severe Pandemic

High risk adults

Elderly

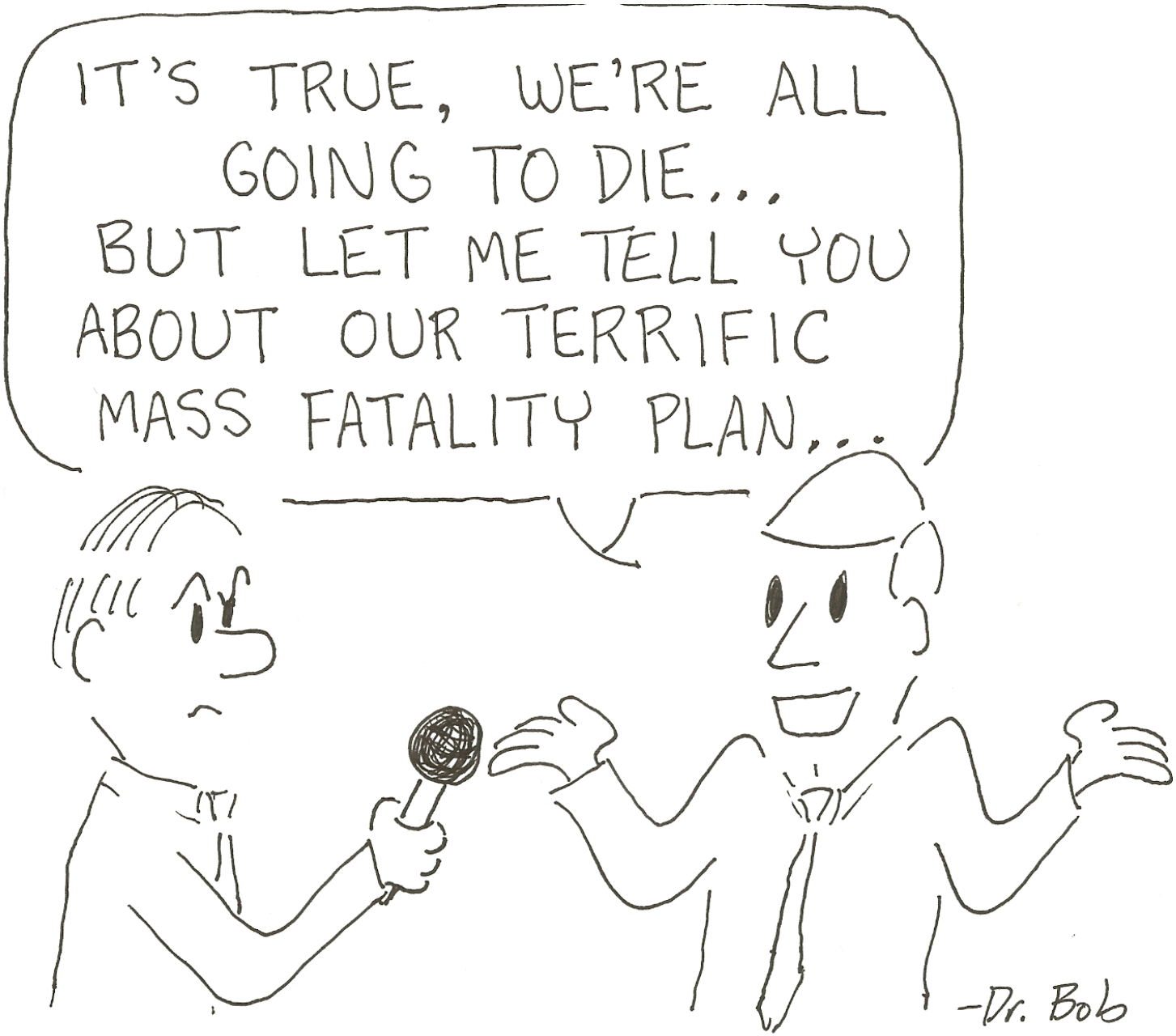
Tier 1 Tier 2 Tier 3 Tier 4 Tier 5

Vaccination Strategy for a Severe Pandemic

Healthy adults

Tier 1 Tier 2 Tier 3 Tier 4 Tier 5

Health Education?


IT'S TRUE, WE'RE ALL GOING TO DIE... BUT LET ME TELL YOU ABOUT OUR TERRIFIC MASS FATALITY PLAN...
-Dr. Bob

Are we missing the big picture?

ACIP 2/27/08

Recommended universal flu vaccination for children 6 mo-18 yrs

Kids are the vectors

- Attack rates highest in children
- Viral shedding longer in children (up to 10 days in young kids, vs. 6 in adults)
- Viral shedding starts earlier

Children are the main disseminators of flu

Monto AS, Sullivan KM. *Epidemiol Infect*. 1993;110:145-160; Blezen WP. *Rev Infect Dis*. 1980;2:408-420; Neuzil KM et al. *Arch Ped Adol Med*. 2002;156:986-991.

Indirect protection of household contacts

- Unvaccinated HH contacts of vaccinated day care kids had 42% fewer resp illnesses
- Unvaccinated school-aged HH contacts of vaccinated day care kids had
  - 80% less febrile resp illness
  - >70% fewer missed school days, earaches, provider visits, and work days missed for adults to care for sick kids

Hurwitz ES et al. *J Infect Dis*. 2000;182:1218-21 & *JAMA*. 2000;284:1677-82.

Mathematical Model

- Vaccinate 20% of children → reduce total flu cases in US by 46%
- Vaccinate 80% of children → reduce by 91%
- ~1M <18 yrs old in Maricopa County:
  - 800k to reach 80%, perhaps two doses each

Weycker D et al. *Vaccine*.2005;23:1284-1293;

Longini Jr IM et al. *Am J Epidemiol*.2005;161:303-306.