

Social Distancing to Limit Transmission of Pandemic Influenza

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Transmission of Human Influenza

- ✦ Inhalation of infectious droplets and droplet nuclei
 - Expelled by coughing, sneezing, travel through the air no more than 3 feet from infected person
 - Requires close contact
- ✦ Direct contact (skin to skin)
- ✦ Indirect (fomite) contact (virus can survive 24-48 hrs on non-porous surface; < 12 hrs on porous surface)
- ✦ Self-inoculation onto the upper respiratory tract of conjunctival mucosa
- ✦ Relative efficiency of the different routes of transmission not defined

Pandemic Influenza

- ✦ A “novel” influenza virus detected in humans (not previously known to infect humans)
- ✦ Little to no immunity in the general public
- ✦ The virus will infect all age groups
- ✦ The “novel” virus spreads from person-to-person throughout multiple countries and continents

Pandemic Influenza Disease Containment Principles

- ✦ Interrupt disease transmission**
- ✦ Isolate and treat infectious persons**
- ✦ Treat exposed persons**
- ✦ Minimize exposure of uninfected persons**

During pandemic period– focus is on

- ✦ Delaying spread and reducing effects through population-based measures**
- ✦ Gain time to get vaccine and antivirals to affected populations**

Planning for Pandemic Influenza Caused by a Highly Pathogenic AIV

- ✦ What is human-to-human transmissibility of the virus?
 - R_0 = the average number of secondary infections caused by a single typical infected individual among a completely susceptible population
- ✦ What is the pandemic phase?
- ✦ What is severity of illness?
- ✦ What is the effectiveness and supply of therapeutic agents?

Parameters

Epidemiologic

- ✦ Incubation period
- ✦ Infectious period
- ✦ Mode of transmission
- ✦ Symptoms
- ✦ Age distribution
- ✦ Reproductive rate
- ✦ Intergeneration time

Social

- ✦ Mixing patterns
- ✦ Mobility
- ✦ Acceptability of collective actions
- ✦ Acceptability of imposed restrictions
- ✦ Expectations
- ✦ Affordability
- ✦ Resiliency

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✦ R0 = 1.0

- Each case reproduces itself**
- Number of cases stays steady, neither growing nor shrinking**

✦ R0 > 1.0

- More transmissible the disease and the more broadly it can spread in the population**

✦ Measles: R0 = ~ 10

✦ Influenza -- various estimates ~ 1.5 to 3 or just below 4

R0

- ✦ **Length of incubation period**
- ✦ **Contacts an infected individual makes in a period of time**
- ✦ **Probability of transmission with contact**
- ✦ **Probability that someone who gets infected is themselves infectious**

Transmission of H5N1 AIV to Humans (229 cases, 131 deaths, 10 countries, 4 July)

- ✦ Contact with sick or dead poultry (butchery)
- ✦ Live bird markets (Hong Kong)
- ✦ Consumption of fresh duck blood suspected



- ✦ Human to human small number of cases (household clusters; relatives; intimate contact)

Stages of a Pandemic

✦ Interpandemic period

- Phase 1: No new subtypes detected in humans, risk of human infection or disease from animal circulating viruses low
- Phase 2: No new subtypes detected in humans, risk of human infection from circulating animal influenza viruses substantial

✦ Pandemic alert period

- Phase 3: Human infection(s) with a new subtype but no human-to-human spread, rare spread to close contact
- Phase 4: Small cluster(s) with limited human-to-human transmission- spread is highly localized
- Phase 5: Larger cluster(s) but human to human spread still localized- virus becoming better adapted to humans

✦ Pandemic period

- Phase 6: Pandemic– increased and sustained transmission in general

Definitions

✦ Isolation

- Separation of ill persons with contagious diseases
- For ill people
- Usually in hospital, but can be at home or in a dedicated isolation facility

✦ Quarantine

- Separation or restriction of movement select person(s)
- For people exposed but not ill
- Home, institutional, or other forms (“work quarantine”)
- Voluntary vs. compulsory

Social Distancing and Infection Control

- ✦ Social Distancing (Contact Interventions)
 - School closure – continuity in education
 - Work closure (telecommuting) – will affect hours
 - Cancellation of public gatherings
- ✦ Infection Control (Transmission Interventions)
 - Facemasks
 - Cough etiquette
 - Hand hygiene

Social Distancing

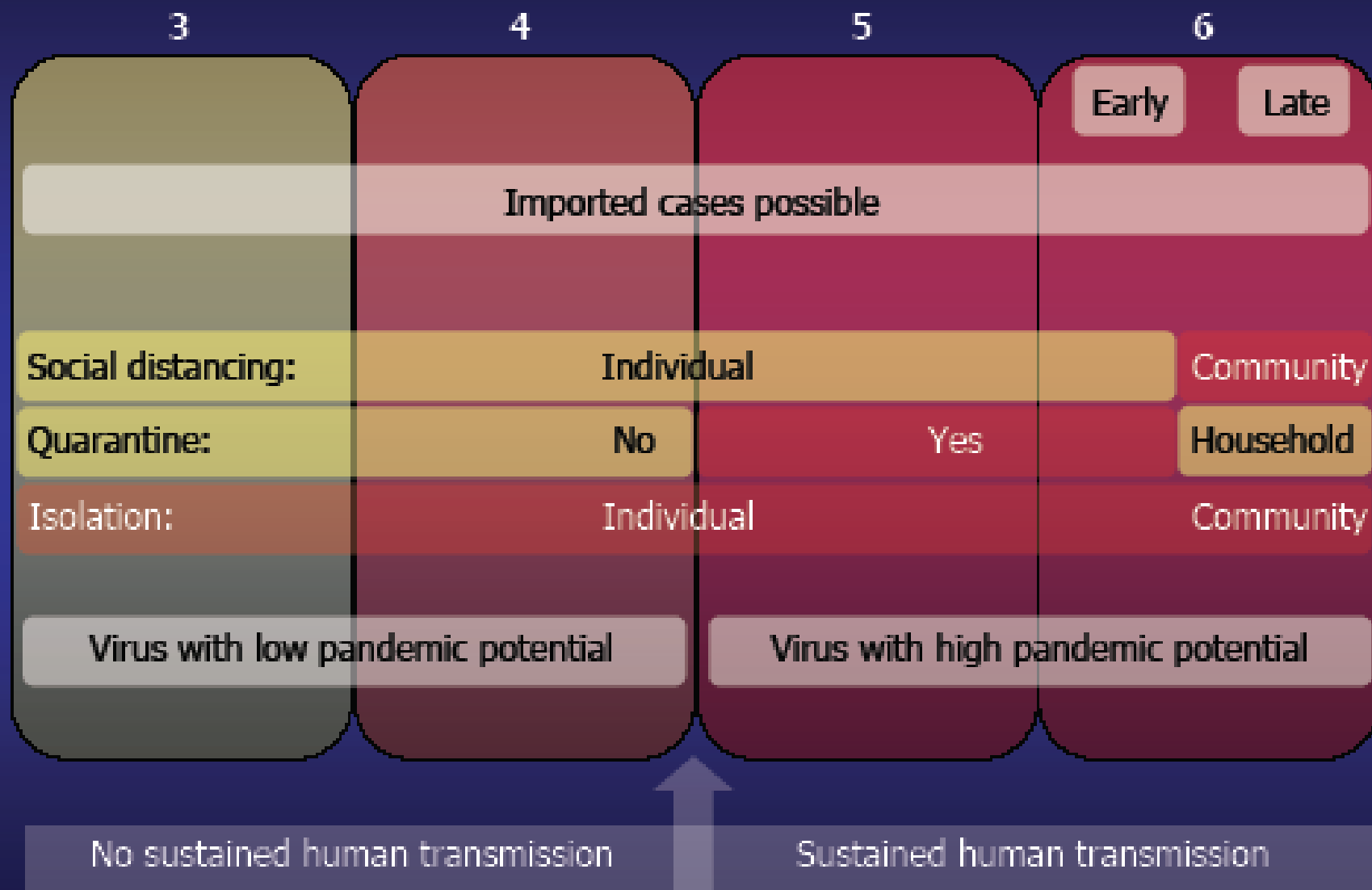
- ✦ Increase space between people
- ✦ Decrease opportunities for transmission when current illness or previous exposure is unknown
- ✦ Reduces but does not eliminate risk
- ✦ May buy time until vaccine can be produced and delivered

Individual Social Distancing (from the web– Data??)

- ✦ **Avoid handshakes**
- ✦ **Avoid lunchroom rush**
- ✦ **Use telemeetings in lieu of face-to-face**
- ✦ **Use larger conference rooms**
- ✦ **Avoid using public pens/whiteboard markers– carry your own**
- ✦ **Avoid commuter rush periods**

WHO Pandemic Influenza Phase

Proposed U.S. public health response in relationship to WHO Phases



Intervention	Intervention Sub-Type	1918 Experience	SARS	General
Isolation of Patients and Quarantine of Contacts	Forced home isolation	Did not stop virus transmission; impractical		
	Closed Settings Supplemented by travel restrictions to and from surrounding community	Early ID and isolation of patients failed to stop virus transmission Decreased attack rates	Early dz ID, self Isolation helped	Short incubation period, mild cases, transmission without symptoms, earlier peak activity could mean less success
Social Distancing	Avoiding Crowding	1918, 1957: Evidence that attack rates in group settings increased Reduced incidence rural areas		Modeling: > 90% chance of containing epidemic with Ro 1.7 with antiviral prophyl.
	Closing Schools, Swimming Pools, and Childcare Centers			
Personal Protection and Hygiene Measures	Wearing Masks in Open Wearing Masks HCWs Respiratory hygiene/cough etiquette Handwashing	Did not work	Worked	
		Worked	Protective	Reduces URI
Isolation of Cities/Towns		Did not work		

Non-pharmaceutical interventions

- ✦ Knowledge base is limited
- ✦ Very few to no controlled studies
- ✦ A few mathematical models
- ✦ Historical and contemporary observations
- ✦ More research is needed