

# The Strategies for Evidence-based Pandemic Preparedness Planning

**PANG JUNXIONG, VINCENT *MSc, PhD***

Assistant Professor,  
Director

Centre for Infectious Disease Epidemiology & Research

Saw Swee Hock School of Public Health,

National University of Singapore

# Why Plan?



# Why Plan?

CONTRIBUTOR

CENTENARY OF 1918 INFLUENZA PANDEMIC

## The 1918 influenza pandemic in its time —will we learn for the future?

An account of the social impact of the 1918 influenza pandemic, how it was handled by the political leaders of the time and what it could teach us about how to handle the next one -if only those in power positions pay attention.



John Barry Jan 15, 2018 4 0

<https://naturemicrobiologycommunity.nature.com/channels/1469-centenary-of-1918-influenza-pandemic>

**BUT** how high is the **success rate** when you have a plan?

**50%**

# Why only 50%?

- ✓ High degree of **uncertainty** (Place, Person, Time)
- ✓ High **variability** of influenza viruses (shift > drift)
- ✓ Poor ability to **generalize** patterns of transmission or risk factors for disease observed in seasonal influenza to pandemics at initial stage  
(Inconsistencies in disease recognition and reporting)

How can we try to achieve the full **50%**?



# An “Unchallenged” Plan

**Table 3.** Themes and recommendations.

Theme	Recommendations
Governance and decision-making	Need for sustainable influenza funding and development of command structures that must not heavily rely on external funding.
Coordination and advise	Need for efficient and timely decision-making from policymakers in the Ministry of Health in order to offer guidance on public health policy on influenza. Need for plans at the local level that engage local people, families and medical personnel to ensure local services are running smoothly during the pandemic period. Need for private and public partnership to continue providing essential services such as water, energy and safe transport. Need for external research cooperation and reinforce ongoing cooperation.
Politics, science and policy	Responsibilities and actions needs to be defined phase by phase. Need to vaccinate timely (seasonal and pandemic). Need for influenza research focusing on the national and local context in order to manage challenges and problems anticipated during the influenza outbreak. Border control such as screening need to be improved. Need for political intervention to improve pharmaceutical logistics in acquiring vaccines and other drugs.
Key infrastructure for PRPI	Need for effective hospital control policies. Need for strengthening health services operations and making sure non pharmaceutical (hygiene and sanitation) and pharmaceutical products (vaccines and antibiotics) for mitigating influenza are available on time.
Information, education and communication	Need for an effective programme to change public attitudes and perceptions about influenza. Need to strengthen communication by electronic means, phone, and meetings. Need for communicating real time and hypothetical surveillance data. Need for communicating the nature, spread, peak and decline of influenza (seasonal and pandemic).
Prevention, mitigation and containment	Need for Influenza Like Illnesses (ILI) case investigation by interviewing patient cases and carrying out surveys for possible sources and make public aware that ILI is reportable. Need for surveillance working groups and need for reporting absenteeism in work place and schools. Upgrade laboratory networks and diagnostic capacity including active sentinel surveillance through the Integrated Disease Surveillance and Response (IDSR) and other operational structures like FluNet. Need for influenza web reporting systems. Need for rapid test technology in rural areas.

# An “Unchallenged” Plan

**Table 2. Epidemic and Pandemic Respiratory Illness (EPRI) Response Functions of Selected Departments**

Department	Functional responsibilities
Hospital Epidemiology and Infection Control	<ol style="list-style-type: none"> <li>1. Provide status reports at initial briefing, interval updates, and leadership meetings</li> <li>2. Coordinate epidemiologic investigation activities and notify health department of cases</li> <li>3. Appoint a clinical case evaluation lead and response documents coordinator</li> <li>4. Determine and monitor implementation of isolation and cohorting strategies</li> <li>5. Collaborate with pharmacy and antibiotic management to implement and monitor vaccination and/or chemoprophylaxis distribution</li> <li>6. Develop recommendations for prophylaxis and treatment of patients and HCWs in conjunction with antibiotic management and infectious disease divisions</li> </ol>
Medicine and Pediatrics	<ol style="list-style-type: none"> <li>1. Implement management of triage level 4 and 5 febrile respiratory illness cases in specified area</li> <li>2. Set up inpatient respiratory isolation unit or units as needed to care for admitted patients</li> <li>3. Provide resident and attending physicians and nurses to staff emergency overflow area in outpatient medicine and pediatric clinics (for noncontagious patients) and inpatient unit(s)</li> <li>4. Divisions of infectious diseases, adult and pediatric               <ol style="list-style-type: none"> <li>A. Assist with cohorting and isolation strategies as recommended by HEIC</li> <li>B. Arrange for transfer of triage level 4 and 5 patients from EDs to the appropriate clinical area and provide support staffing for level 4 and 5 EPRI clinic to be set up in reallocated space</li> </ol> </li> </ol>
Psychiatry	<ol style="list-style-type: none"> <li>1. Establish services for EPRI-affected psychiatric patients presenting to EDs and outpatient clinics</li> <li>2. Monitor health care team stress levels and implement appropriate intervention</li> <li>3. Establish rest and recuperation areas for staff</li> <li>4. Coordinate community crisis response efforts with faculty and staff counseling services, pastoral care, psychiatry, social work, and psychological first aid via faith communities</li> <li>5. Provide staff emotional support, demobilization, and disaster counseling</li> <li>6. Assist external triage ED area(s) to identify patients requiring only psychiatric care</li> </ol>
Security	<ol style="list-style-type: none"> <li>1. Open, prepare, and secure ICC, as directed</li> <li>2. Implement controlled access to hospitals with closure of unmonitored entrances and tunnel access</li> <li>3. Redirect visitors and staff to respective screening stations</li> <li>4. Secure adult and pediatric EDs and close all hospital entrances not designated as screening areas</li> <li>5. Secure family information center and prophylaxis and vaccination locations</li> <li>6. Provide 2-way radios to ICC and key departments</li> </ol>
Social Work	<ol style="list-style-type: none"> <li>1. Establish and coordinate activities of the family information center</li> <li>2. Establish rest and recuperation areas for staff in coordination with pastoral care and psychiatry</li> <li>3. Facilitate emergency discharge planning with established facilities.</li> <li>4. Along with pastoral care and psychiatry, provide patients and families with disaster counseling</li> </ol>
Emergency Medicine	<ol style="list-style-type: none"> <li>1. During stage 6 or higher, evacuate nonurgent, EPRI-negative patients when possible to ambulatory medical teams located at the designated alternative care areas</li> <li>2. Set up and implement established procedures for level 1, 2, and 3 EPRI and AFRI cases</li> <li>3. Maintain communication with ICC and MIEMSS Emergency Management Response Center</li> </ol>

....is also planning to fail.



# 1<sup>st</sup> Strategy: Exercise the plan

Dausey and Moore *BMC Research Notes* 2014, **7**:474  
<http://www.biomedcentral.com/1756-0500/7/474>



RESEARCH ARTICLE

Open Access

## Using exercises to improve public health preparedness in Asia, the Middle East and Africa

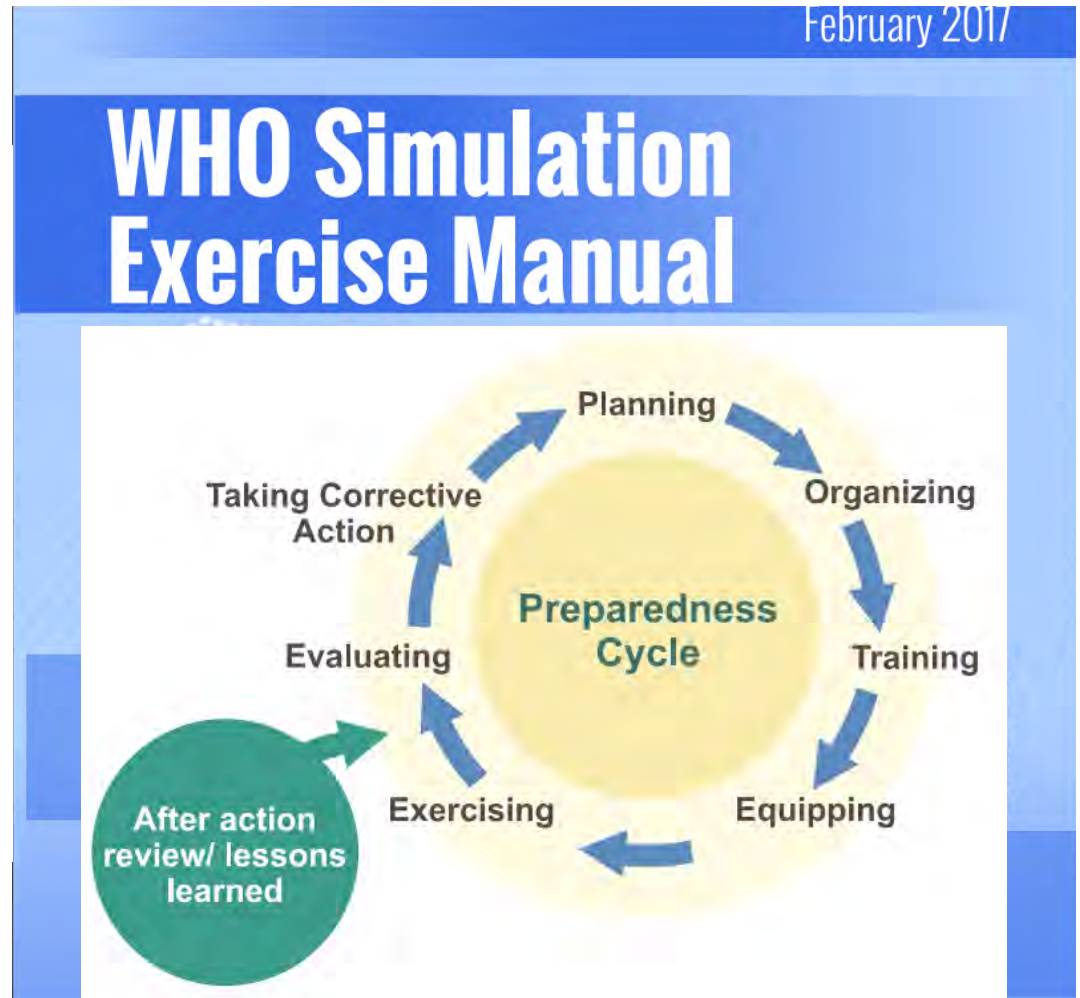
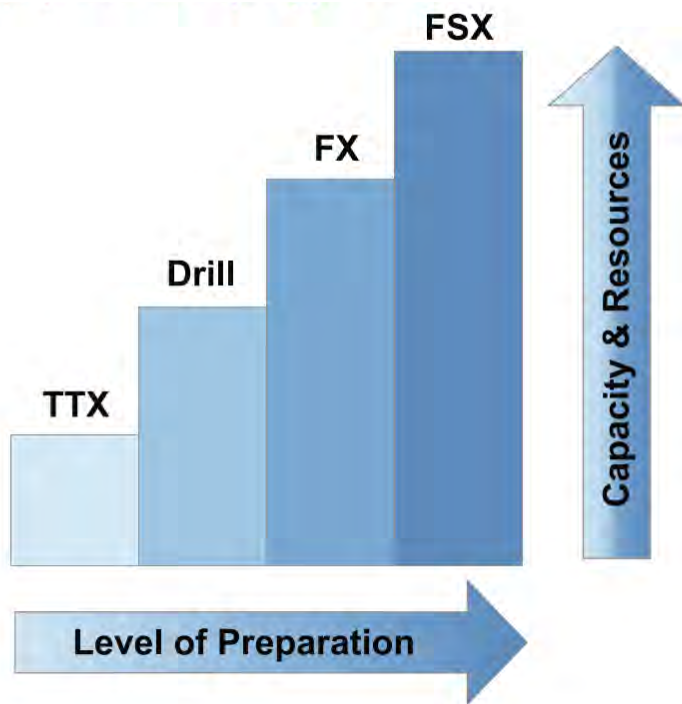
**Table 3 Participant likert scale ratings of exercises**

Question	China	Lao PDR	Myanmar	Jordan – National*	Palestine	Middle East*
Overall quality of exercise (% good or excellent)	88	94	91	86	100	59
Quality of information exchanged (% good or excellent)	93	89	68	–	100	73
Key gaps identified (% agree or strongly agree)	50	77	73	66	68	–
Better understanding of roles (% agree or strongly agree)	76	100	91	–	94	91
Plan to use knowledge gained (% agree or strongly agree)	88	100	100	100	100	82

\*Missing data (—) for the Jordan-National exercise and the Middle East exercise are due to the fact that these questions were not asked of exercise participants in those exercises.

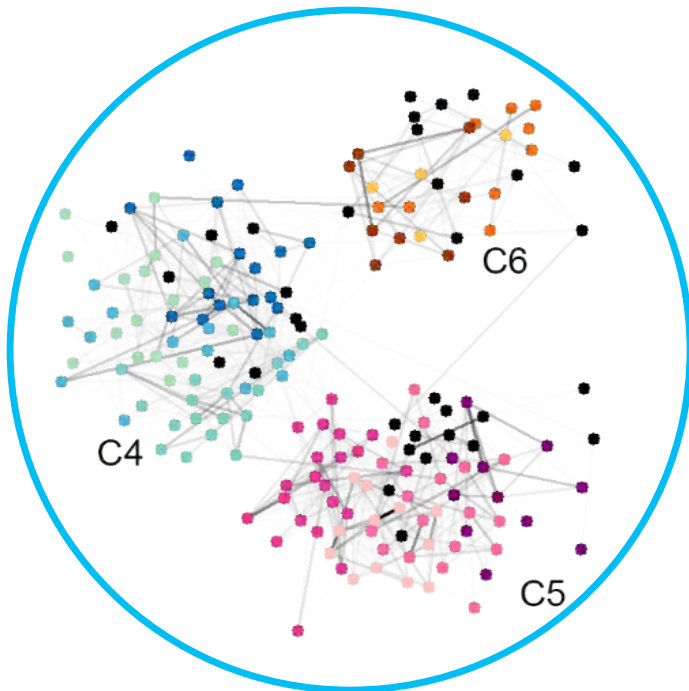
11) from 14 countries. Participants consistently rated the overall quality of the exercises as very good or excellent. They rated the exercises lowest on their ability to identifying key gaps in performance. The vast majority of participants noted that they would use the information they gained at the exercise to improve their organization's preparedness to respond to an influenza pandemic. Participants felt the exercises were particularly good at raising awareness and understanding about public health threats, assisting in evaluating plans and identifying priorities for improvement, and building relationships that strengthen preparedness and response across sectors and across countries. Participants left the exercises with specific ideas about the most important actions that they should engage in after the exercise such as improved planning coordination across sectors and countries and better training of health workers and

# 1<sup>st</sup> Strategy: Exercise the plan

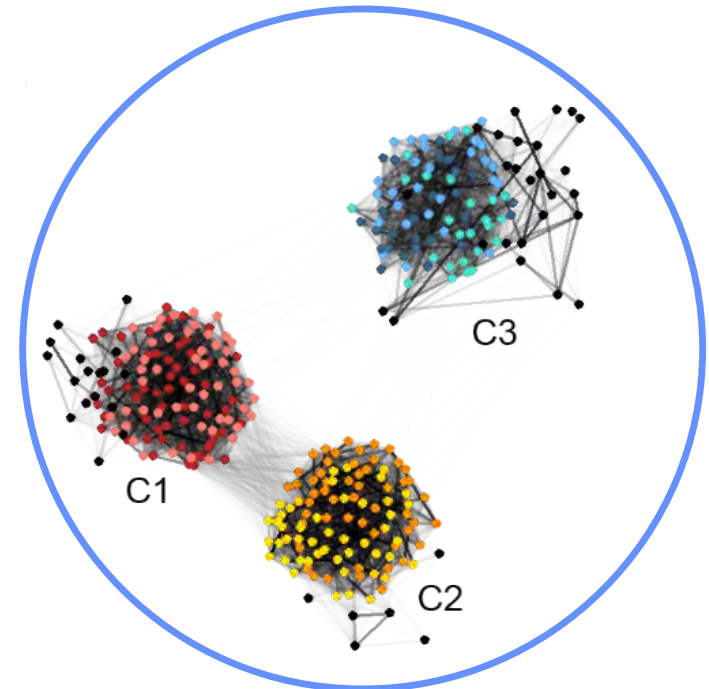




# Which non-pharmaceutical interventions will work better?



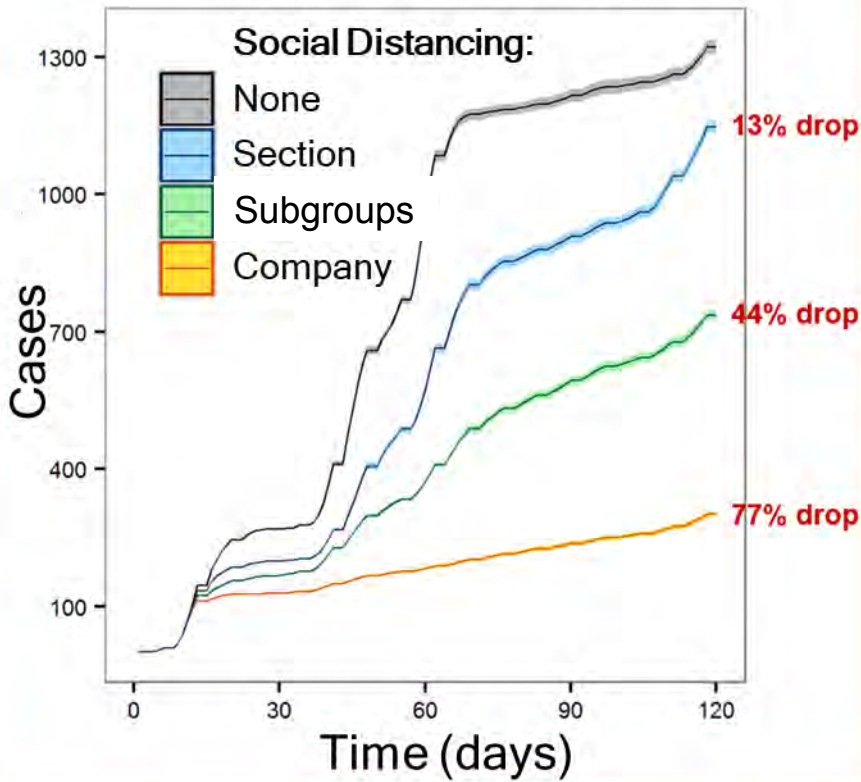
Rural areas, office environment, hospitals



Urban areas, mass gathering, schools, training camp

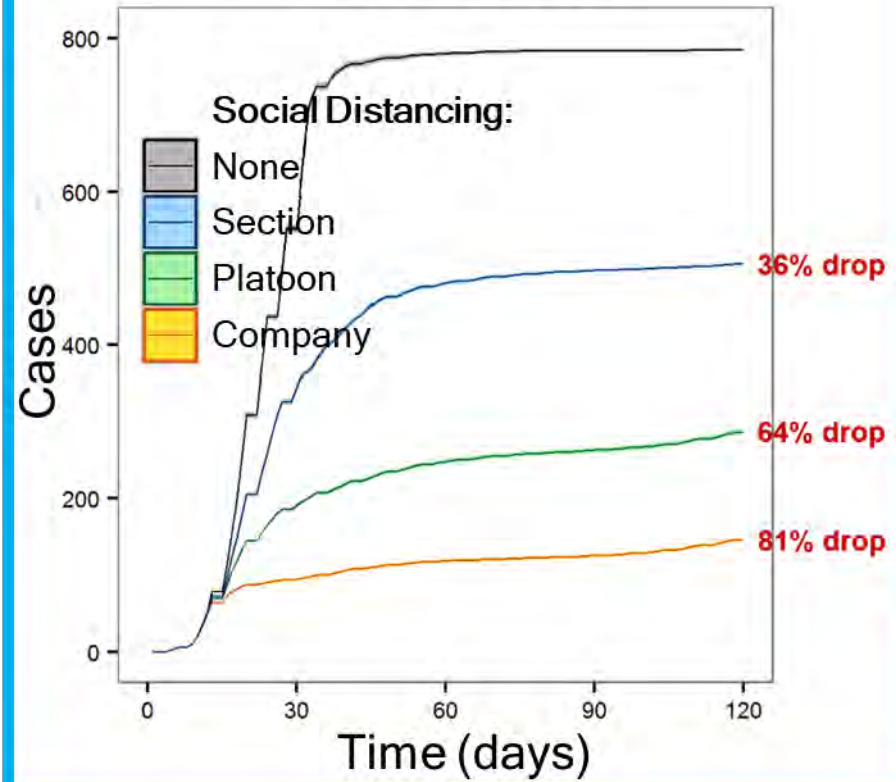
# 2<sup>nd</sup> Strategy: Modeling Impact

## Influenza-like virus



e.g. Office

## Influenza-like virus



e.g. Training Camp

# 2<sup>nd</sup> Strategy: Modeling Impact

Temperature screening at borders

Isolation at National Centre ID

Self-isolation

Quarantine of family

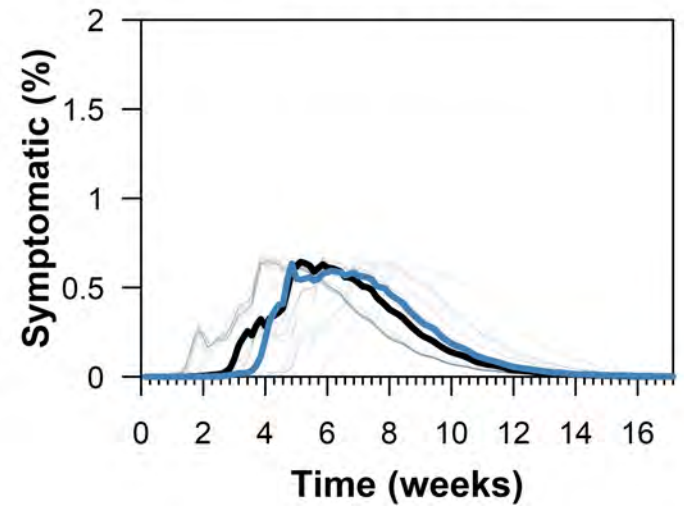
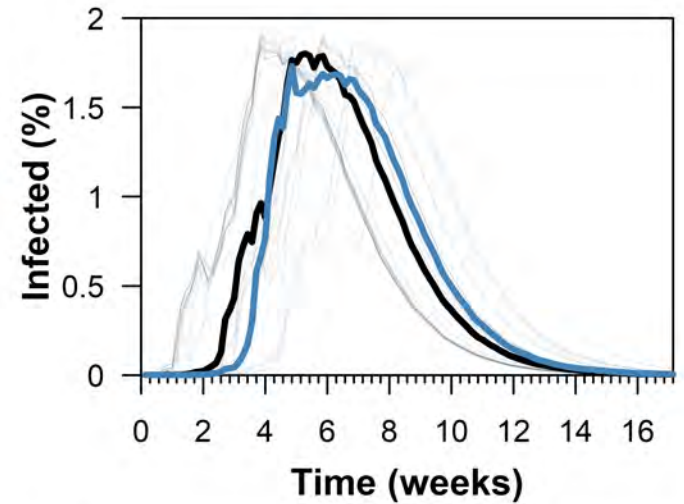
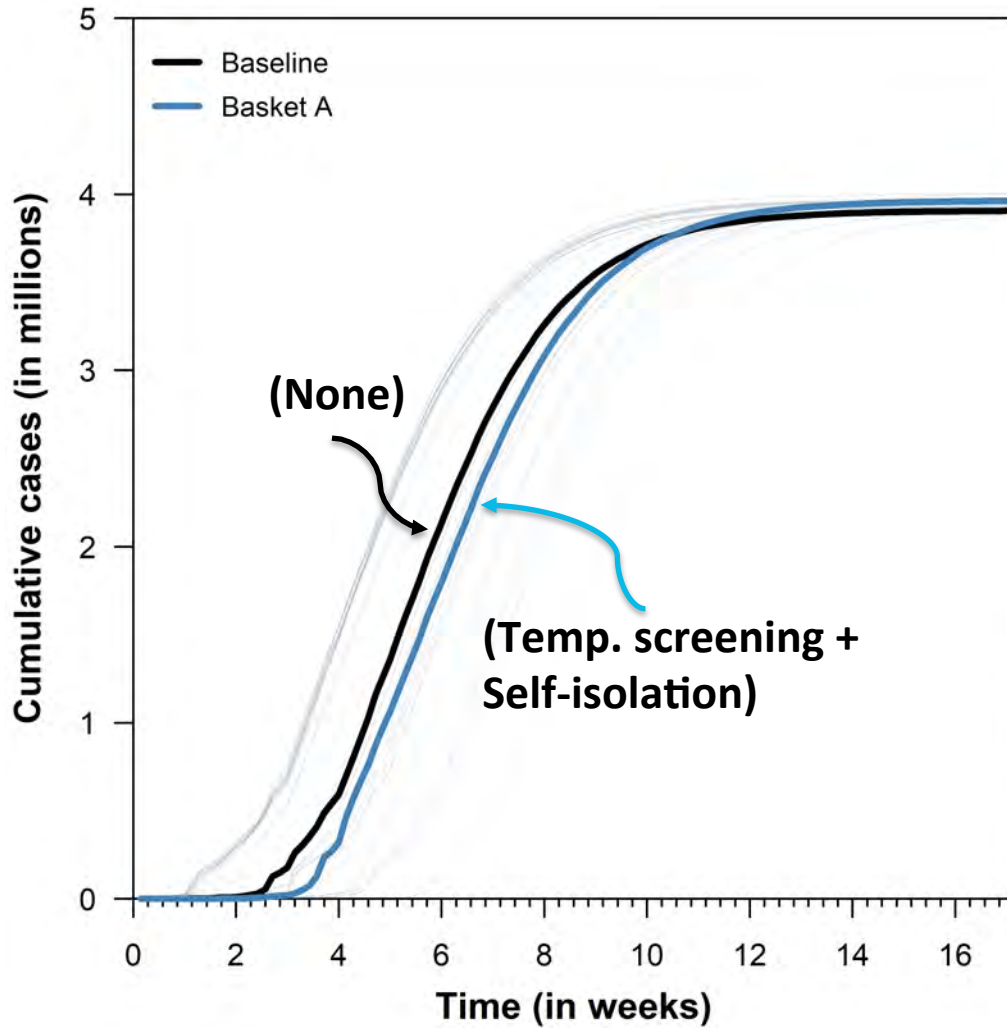
Cancel mass gatherings

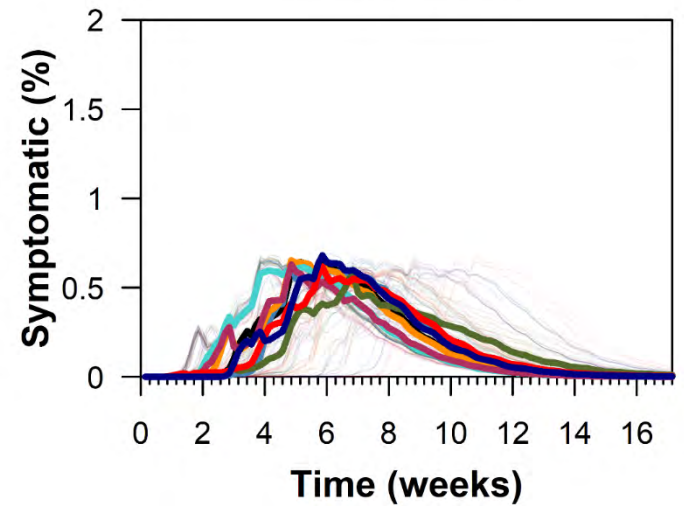
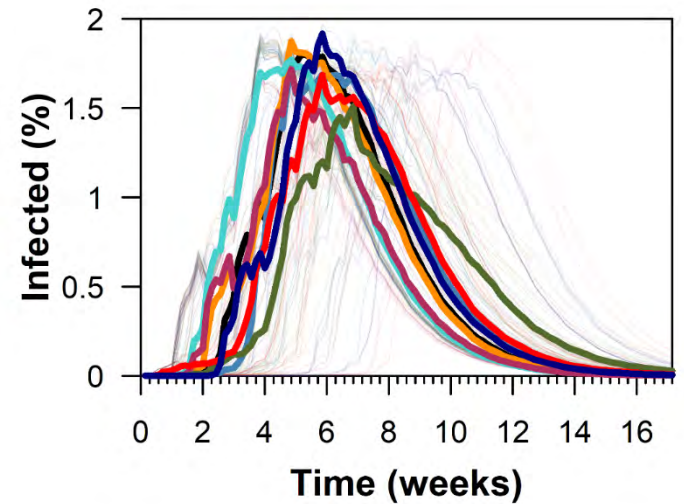
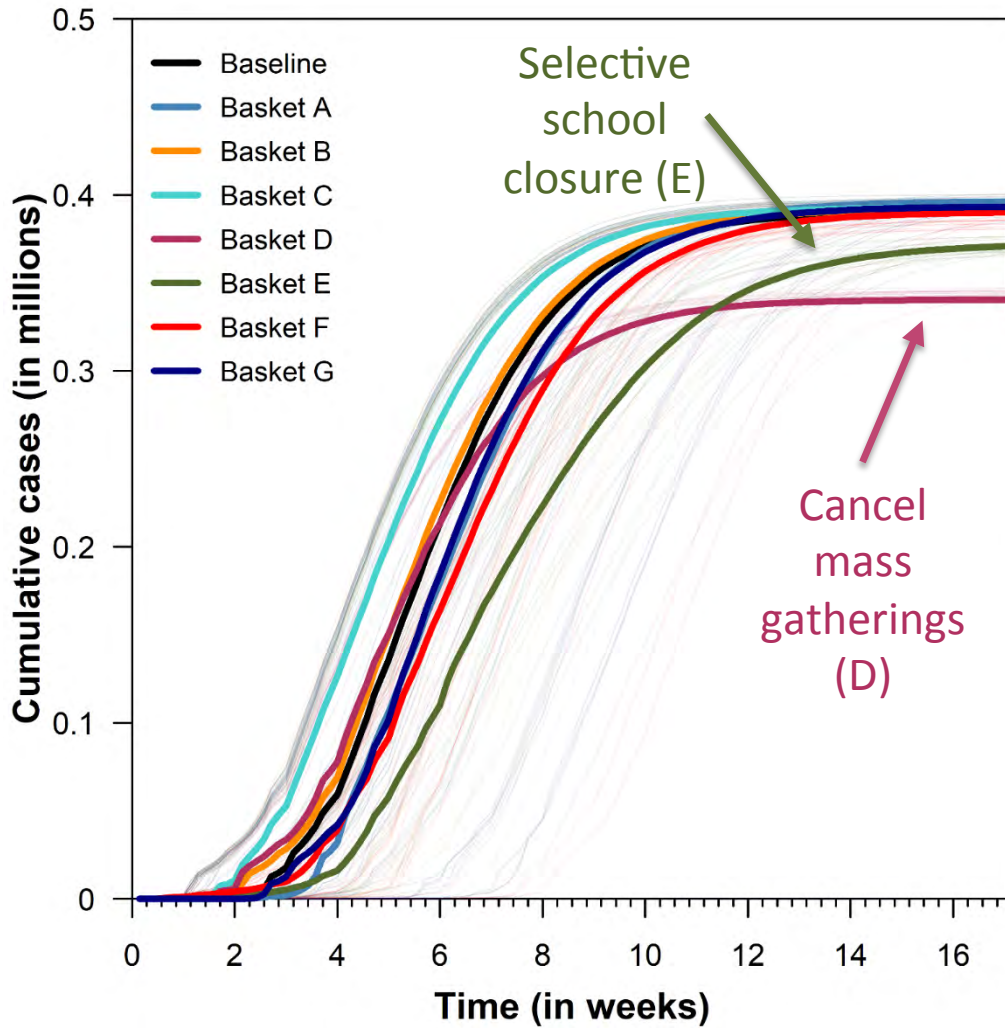
School closure (affected only)

School closure (all schools)

	A	B	C	D	E	F	G
Temperature screening at borders	Dark Red	White	White	White	White	White	Dark Red
Isolation at National Centre ID	White	Dark Red	Dark Red	White	White	White	Dark Red
<u>Self-isolation</u>	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red
Quarantine of family	White	White	Dark Red	White	White	White	Dark Red
Cancel mass gatherings	White	White	White	Dark Red	White	White	White
School closure (affected only)	White	White	White	White	Dark Red	White	White
School closure (all schools)	White	White	White	White	White	Dark Red	White







# A “Whole-of-Society” Plan?



How much do we **know** about our society's **perception, motivation, and concerns?**



# 3<sup>rd</sup> Strategy: Whole-of-Society Approach

Table 2: Public attitudes toward quarantine (Qx) by factor

	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
<b>Justification</b>					
Public Health should have the power to order people into Qx during outbreaks	77%	18%	3%	1%	0%
Qx is a good way to stop the spread of infectious disease outbreaks	76%	18%	3%	3%	0%
If someone is given a Qx order by Public Health, they should follow it no matter what else is going on in their life at work or home	70%	22%	5%	2%	1%
If I go into Qx, my family/friends/community will be protected from becoming sick	66%	22%	4%	5%	3%
<b>Sanctions</b>					
People who break Qx orders on purpose should face legal penalties like a fine or jail	53%	25%	14%	4%	3%
Public Health should be able to lock people up if they fail to obey Qx orders	28%	30%	19%	11%	12%
Public Health should use electronic bracelets and in-home surveillance cameras for people who disobey Qx orders	27%	23%	20%	12%	18%
<b>Burdens</b>					
Public Health needs to explain to everyone why they should be allowed to use Qx	84%	13%	2%	0%	1%
Government should pay for nurses and counselors to help people who are in Qx	77%	16%	4%	2%	1%
Public Health should ensure that people have food and shelter while in Qx, and pay for it with public money if need be	68%	19%	7%	4%	3%
Government should pay for counselors and support groups so that people coming out of Qx have someone to talk to about it	43%	29%	14%	9%	6%
People in Qx should get money from the government to pay for missed time at work	43%	26%	17%	9%	6%

Voluntary  
Quarantine  
vs  
Quarantine  
Order??

# 3<sup>rd</sup> Strategy: Whole-of-Society Approach

## EXHIBIT 6

### Trusted Sources Of Information During An Infectious Disease Outbreak, Four Countries, 2004

	U.S.	Hong Kong	Singapore	Taiwan
Trust “a lot” as a source of useful and accurate information about an outbreak				
Your doctor or other health care professional	78%	79%	82%	81%
Government public health authorities	40 <sup>a,b,c</sup>	68 <sup>b,c</sup>	77 <sup>c</sup>	54
Newspapers, magazines, TV, or radio	27 <sup>a,b</sup>	52 <sup>c</sup>	56 <sup>c</sup>	27
Your employer	30	22	27	30
A family member or friend	52 <sup>a,b,c</sup>	33	36	31

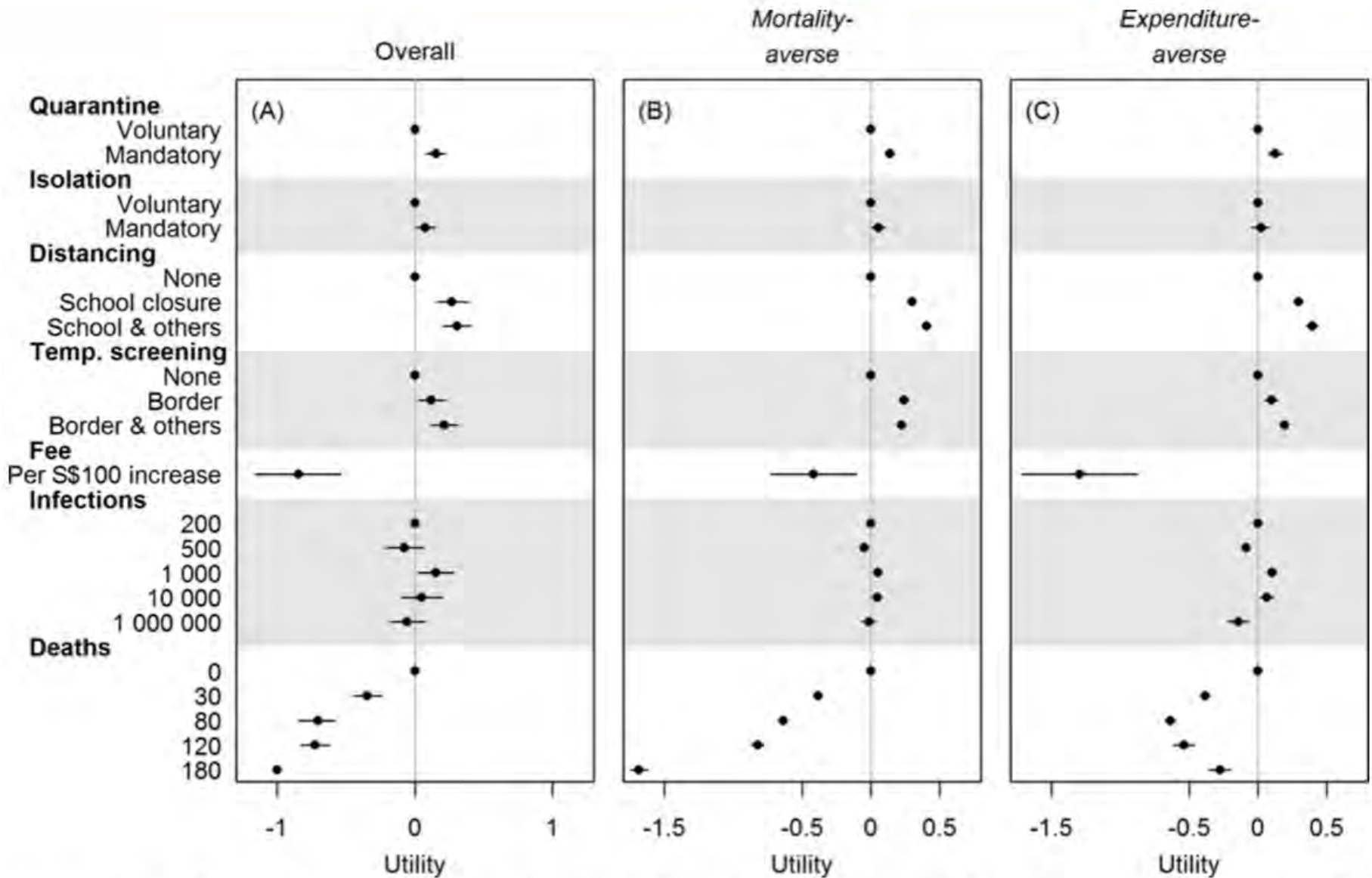
**SOURCE:** Harvard School of Public Health/TNS Survey in Four Regions, 18 November–16 December 2004.

<sup>a</sup> Significantly different from Hong Kong;  $p \leq .05$ .

<sup>b</sup> Significantly different from Singapore;  $p \leq .05$ .

<sup>c</sup> Significantly different from Taiwan;  $p \leq .05$ .

# 3<sup>rd</sup> Strategy: Whole-of-Society Approach





# 3<sup>rd</sup> Strategy: Whole-of-Society Approach

Attribute	Level	WTP (95% CrI)	Level
Quarantine of potential cases	Voluntary	S\$15 (S\$8, S\$24)	Mandatory
		—————→	
Isolation of actual cases	Voluntary	S\$8 (S\$1, \$16)	Mandatory
		—————→	
Cancellation of mass gatherings	None	S\$27 (S\$14, S\$48)	School closure
		—————→	
	None	S\$30 (S\$17, S\$51)	School closure and other mass gatherings
		—————→	
Temperature screening	None	S\$12 (S\$2, S\$26)	At border
		—————→	
	None	S\$21 (S\$11, S\$36)	At border and other sites
		—————→	
Number of infections	200	N.S.	500
	200	S\$15 (S\$4, S\$29)	1000
		—————→	
	200	N.S.	10 000
	200	N.S.	1 000 000
Number of deaths	0	S\$34 (S\$19, S\$58)	30
		←————	
	0	S\$70 (S\$45, S\$112)	80
		←————	
	0	S\$71 (S\$49, S\$109)	120
		←————	
	0	S\$98 (S\$69, S\$148)	180
		←————	

N.S. as S\$0 included in the 95% CrI.

CrI, credible interval; N.S., not significant; WTP, willingness to pay.

# Strategies Towards Evidence-Based Planning

- Model Impact
- Whole-of-Society Approach



Adapted from WHO Simulation Exercise Manual Feb 2017

# Is Evidence-Based Planning Foolproof?

## 1. Exercises reduce uncertainty, but to only some extent

- ★ Early responses limit transmission and reduce burden.
- ★ But it is highly dependent on early detection through a robust surveillance system.
- ★ Sustainability of process and motivation of staffs over a prolong period remain questionable.

## 2. Models are as good as our assumptions & estimates

- ★ Decision-making process is ideally supported with clear evidence
- ★ But in a real outbreak of novel pathogen, scientific evidence will be very limited.

## 3. Community's perception & motivation can be dynamic during outbreak

- ★ Anxiety and stress can change behavior and perception.
- ★ Compliance rate to pharmaceutical and non-pharmaceutical interventions will be affected
- ★ Risk communication platforms/preference may change.



Saw Swee Hock  
School of Public Health



Thank you.

PANG JUNXIONG, VINCENT  
ephpjv@nus.edu.sg