SARS ------ 10 years on 2003 to 2013

10th Anniversary of ICAO’s involvement with Public Health Events

Dr. Jarnail Singh
2003: SARS

ISSUES:

• Panic reactions
• No preparedness plans
• No Harmonization
Empty aircraft
SARS: Singapore timeline

Source: Lifewise Mar/Apr 2013
May 2003: Singapore hosts an ICAO meeting — “Anti-SARS” measures developed for the aviation sector.

- Restore confidence in the travelling public
- Exit and Entry screening of passengers

? Pre-empting the IHR ?
2005 ----- H5N1 Avian Influenza

WHO holds global meeting:
• Timing & severity of next pandemic cannot be predicted
• Take threat seriously
• Take appropriate actions & mobilize resources
2005: Expectations

Spread to rest of world

Start of Pandemic

H5N1
ICAO: For The Aviation Sector:
Proactive approach to develop Aviation Pandemic Preparedness Plan

Singapore hosts meetings at Changi Airport 2006:
Output – “Preparedness Planning Guidelines (Aviation Aspects) for a Communicable Disease of Public Health Concern” – Applicable to any communicable disease (not just avian influenza)
Cooperative Arrangement for the Prevention of Spread of Communicable disease through Air travel

1. Implementation of ICAO Guidelines (State, Airport & Airline Guidelines)
2. Assistance visits to international airports
3. Training of personnel

Launched Sept. 2006: Singapore Aviation Academy Seminar / Workshop / Table top exercise
International Health Regulations (IHR) (2005)

A global legal framework for public health security

Adopted by the 58th World Health Assembly 2005

*IHR (2005) came into force on 15 June 2007*

Legally binding for the world’s countries that have agreed to follow the same rules to secure international health.
Purpose of the IHR (2005)

“To prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade” – Article 2

Courtesy WHO
A Paradigm Shift

From diseases list to all public health threats

From control of borders to containment at source

From preset measures to adapted responses

Courtesy WHO
Basis for Action - health

Article 14, International Convention on Civil Aviation:

‘Each contracting State agrees to take effective measures to prevent the spread by means of air navigation of cholera, typhus (epidemic), smallpox, yellow fever, plague, and such other communicable diseases as the contracting States shall from time to time decide to designate….'
Basis for Action - health

Article 14, International Convention on Civil Aviation:

….and to that end contracting States will keep in close consultation with the agencies concerned with international regulations relating to sanitary measures applicable to aircraft.’
Changes to SARPs 2007 & 2009

- Annex 9 – Facilitation
- Annex 6 – Operation of Aircraft
- Annex 11 – Air Traffic Services
- PANS – ATM
- Annex 14 - Aerodromes
- Annex 18 – Dangerous Goods
AVIATION PANDEMIC PREPAREDNESS PLAN

WHO Pandemic Preparedness Guidelines

ICAO Annex 9 Annexes 6, 11, 14, 18

ACI, IATA, CDC & Other expert agencies

WHO Rapid Containment Strategy

States

National Pandemic

Aviation Pandemic Preparedness Plan

Preparedness Plan

Joint WHO-ICAO-IATA-ACI Guidelines

CAPSCA Guidelines Development

PANDEMIC PREPAREDNESS
Guidance Material

Distilled into.....

State Guidelines : ICAO

Airline Guidelines : IATA

Airport Guidelines : ACI
2009: What Actually Happened

Start of Pandemic

“Swine” flu

Spread to rest of world

There is no evidence of increased illness in the pig population.
CHOLERA OUTBREAK

Expert: UN Brought Cholera to Haiti
Dec 8, 2010 1:40 AM CST
Other Public Health Emergencies?

Fukushima Dai-ichi Nuclear Plant 12 March 2011
What if:
• An aircraft flies through the plume?
• An aircraft is parked overnight downwind?
• An exposed individual wants to fly for treatment?

• Should Japan be screening departures?
  ➢ Cargo?
  ➢ People?

• Should other countries be screening for arrivals?
  ➢ Cargo?
  ➢ People?

• What levels are acceptable?

• What equipment/training/PPE is needed?

Acknowledgement: Dr Anthony Evans ICAO
Concern about levels in food and water
Europe's food poisoning outbreak has sickened more than 2,400 people and killed 24. Weeks after the outbreak began on May 2, German officials are still searching for the source of the contamination.

E. coli outbreak cases by country

Now Sprouts Probably Not to Blame for E. Coli

Jun 8, 2011 10:40 AM CDT

Germany on E. Coli Source: It Was the Bean Sprouts

Jun 10, 2011 6:25 AM CDT
QUARANTINE

SCARLET FEVER

All persons are forbidden to enter or leave these premises without the permission of the HEALTH OFFICER under PENALTY OF THE LAW.

This notice is posted in compliance with the SANITARY CODE OF CONNECTICUT and must not be removed without permission of the HEALTH OFFICER.

_______________________________ Health Officer.
MYSTERY DISEASE

At least 52 children in Cambodia have died from an undiagnosed syndrome since mid-April.
Hand, foot and mouth disease that is caused by enterovirus 71 (#EV71) can cause serious complications and lead to death
#HFMD
7 minutes ago

Hand, foot and mouth disease is not a new disease in Cambodia and is seen in many countries across the world #HFMD #EV71
37 minutes ago

UPDATE: Illness in Cambodia: Steroid use has been shown to worsen condition of patient w/ hand, foot and mouth disease caused by #EV71 #HFMD
about one hour ago

UPDATE: Illness in Cambodia: Investigation concludes illness & deaths in majority cases due to severe form of hand, foot and mouth disease
about one hour ago
Novel Coronavirus infection in the United Kingdom

23 September 2012 - On 22 September 2012, the United Kingdom (UK) informed WHO of a case of acute respiratory syndrome with renal failure with travel history to the Kingdom of Saudi Arabia (KSA) and Qatar.

The case is a previously healthy, 49 year old male Qatari national that presented with symptoms on 3 September 2012 with travel history to the KSA prior to onset of illness. On 7 September he was admitted to an intensive care unit (ICU) in Doha, Qatar. On 11 September, he was transferred to the UK by air ambulance from Qatar. The Health Protection Agency of the UK (HPA) conducted laboratory testing and has confirmed the presence of a novel coronavirus.

The HPA has compared the sequencing of the virus isolate from the 49 year old Qatari national with that of a virus sequenced previously by the Erasmus University Medical Centre, Netherlands. This latter isolate was obtained from lung tissue of a fatal case earlier this year in a 60 year-old Saudi national. This comparison indicated 99.5% identity, with one nucleotide mismatch over the regions compared.

Coronaviruses are a large family of viruses which includes viruses that cause the common cold and SARS. Given that this is a novel coronavirus, WHO is currently in the process of obtaining further information to determine the public health implications of these two confirmed cases.

With respect to these findings, WHO does not recommend any travel restrictions.
Novel coronavirus infection - update - revised interim case definition

29 September 2012 - WHO has continued to monitor the situation. No additional confirmed cases have been reported and there is no evidence so far of person to person transmission of the novel coronavirus.

In order to ensure an appropriate and effective identification and investigation of patients who may be infected with the virus, without overburdening health care systems with unnecessary testing, a revised interim case definition has been issued by WHO (see related links to right of this page). It should be noted that this case definition was developed based on data from two confirmed cases and as such some degree of clinical judgment is required where individual cases are concerned.

WHO has been cooperating closely with the laboratories which were responsible for the confirmation of the presence of the novel coronavirus in the two confirmed cases. These laboratories have been working on the development of diagnostic reagents and protocols which can be provided to laboratories that are not in a position to develop their own, and these are now available. WHO is now seeking to broaden the number of laboratories that will be able to assist Member States with the detection or confirmation of this novel virus.

WHO has received offers of support from a number of major public health institutions around the world to assist with testing, should the need arise. The complete nucleic acid sequence of the virus has been uploaded to Genbank and the testing protocol, utilizing real-time PCR, has been published.

WHO does not advise special screening at points of entry with regard to this event nor does it recommend that any travel or trade restrictions are applied.

WHO continues to inform its Member States through the designated National Focal Points under the International Health Regulations (2005).
A novel coronavirus capable of lethal human infections: an emerging picture

Summary
In September 2012, a novel coronavirus was isolated from a patient in Saudi Arabia who had died of an acute respiratory illness and renal failure. The clinical presentation was reminiscent of the outbreak caused by the SARS-coronavirus (SARS-CoV) exactly ten years ago that resulted in over 8000 cases. Sequence analysis of the new virus revealed that it was indeed a member of the same genus as SARS-CoV. By mid-February 2013, 12 laboratory confirmed cases had been reported with 6 fatalities. The first 9 cases were in individuals resident in the Middle East, while the most recent 3 cases were in family members resident in the UK. The index case in the UK family cluster had travel history to Pakistan and Saudi Arabia. Although the current evidence suggests that this virus is not highly transmissible among humans, there is a real danger that it may spread to other parts of the world. Here, a brief review of the events is provided to summarize the rapidly emerging picture of this new virus.

Virology Journal 2013, 10:66
doi:10.1186/1743-422X-10-66
Gulfaraz Khan (g_khan@uae.ac.ae)
As of March 7, 2013, a total of 13 confirmed cases of infection with a novel coronavirus have been reported to the World Health Organization, with seven deaths. Illness onsets have occurred from April 2012 through February 2013. To date, no cases have been reported in the United States. This report provides an update on the global public health risk posed by this novel coronavirus.

CDC does not recommend that anyone change their travel plans because of these cases of the novel coronavirus. CDC recommends that US travelers to countries in or near the Arabian Peninsula monitor their health and see a doctor right away if they develop fever and symptoms of lower respiratory illness, such as cough or shortness of breath. They should tell the doctor about their recent travel.
And now........
2013: Avian Influenza H7N9 ---- Here we go again !!
Culling pigeons
Investigating the outbreak
Measures at various airports in the region

Vietnam

Seoul, Korea
Staying alert to the influenza threat

Compared with the H5N1 and H1N1 outbreaks, there are few signs of panic over the newest H7N9 influenza strain that originated in China last month.

Slow spread could be one reason, but confidence has also grown with the country's better management of public health protocols in the decade since the SARS epidemic.

The fact that the original cluster has spread to northern and central China has put health authorities on heightened alert. Governments cannot take chances while waiting for a vaccine, which could take a year or longer to create.

A pandemic could have taken hold by then. Just as theoretically possible is that H7N9 could turn out to be short-lived.

Why risk it? Border surveillance as a pre-emptive response should be considered, with or without an advisory from the WHO.
WHO does not advise special screening at points of entry with regard to this event, nor does it recommend that any travel or trade restrictions be applied.
Airport disease screening rarely worthwhile, study suggests

The Canadian Press; 10 Apr 2013 10:11 EDT

Helen Branswell, The Canadian Press
TORONTO -- A new study suggest airport screening for disease control rarely makes sense, but if it's undertaken, it should be done at the source of the outbreak.

The researchers say the screening of passengers leaving via a few key airports near the epicentre of an outbreak is a better approach than having hundreds of airports around the world screen arriving passengers.

The research is based on a study of air travellers departing from Mexico in the early days of the 2009 H1N1 flu pandemic.

And it holds particular resonance right now because the world is watching China to see if a new bird flu virus infecting people there will trigger a pandemic. The new H7N9 virus has sickened 33 people to date, killing nine of them -- but so far no cases have been found outside China.

Study author Dr. Kamran Khan says airport screening generally is a poor use of resources. Khan's research uses anonymous flight manifests to track global travel patterns as a tool to predict and interpret spread of diseases.
Many countries used health screening of international passengers during SARS, trying to prevent new cases of the disease from entering their borders. But studies done after the fact suggested thermal screening systems and self-reported health status declarations were not really effective.

It's not really surprising. Many diseases -- influenza is a prime example -- have a period after infection and before onset of symptoms when people who are becoming sick are actually infectious. So before people develop fever, before they starts to feel ill, they can spread their sickness to others. Screening systems cannot catch those types of people.

And the early stages of infectious disease outbreaks often take place under the radar. In the spring of 2009, the world learned that a new flu virus had emerged from Mexico when cases were found in the United States. The disease had already crossed borders; the horse was out of the barn.
<table>
<thead>
<tr>
<th>Country</th>
<th>No. scanned (millions)</th>
<th>No. febrile by scan (per 100,000)</th>
<th>PPV for fever *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada*</td>
<td>4</td>
<td>31</td>
<td>0.07 (subset)</td>
</tr>
<tr>
<td>Taiwan†</td>
<td>8</td>
<td>275</td>
<td>0.14</td>
</tr>
<tr>
<td>Australia‡</td>
<td>0.18</td>
<td>579</td>
<td>0.12</td>
</tr>
</tbody>
</table>

‡ McBride et al. 2007; Final report (118 pp.).
Some countries may interpret their responsibilities under the IHR as requiring them to take actions like arrival screening during outbreaks.

"Whenever these occur, countries around the world start asking themselves whether or not they should implement measures to screen travellers," Khan says.

"There may be public pressure. There may be political pressure to implement screening. But those decisions are often made on perception of risk and not based on actual measures of risk."

"A lot of times countries are making these decisions and they are highly disruptive to international air travel, they have very important consequences to the world's economy and they are not generating any meaningful public health returns."
? To Screen

? Or Not To Screen
Public Health Measures Available (Theoretically)
- at the international border -

1. Travel and screening (prevention, detection)
   - Health advice and alerts to travellers
   - Health declaration form
   - Temperature screening
   - On-board identification of suspected travellers
   - International travel advisory, restriction, border closure?

2. Management of symptomatic & exposed travellers
   - Symptomatic travellers (isolation & treatment…)
   - Exposed travellers (quarantine?…)

• Public health measures in response to pandemic influenza

• Options for public health intervention at international points of entry (POE)
Decision for option: Key considerations

- International border health measures should be implemented under the framework of the new International Health Regulations
- Decision on public health measures based on assessed risks
- Public health measures should be evidence-based whenever possible
- Countries should **balance the benefits against the costs and potential consequences**
- Desirability of harmonization of interventions at international POE
- Planning, coordination and communication is essential
## Comparative risk of outbreaks

<table>
<thead>
<tr>
<th>Severity of Disease (Morbidity &amp; Mortality)</th>
<th>Low</th>
<th></th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
<td></td>
<td>H7N9</td>
</tr>
<tr>
<td>Low</td>
<td>SARS</td>
<td></td>
<td>1918 Pandemic</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transmissibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
</tr>
<tr>
<td>High</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

- H5N1: Highly transmissible, low severity
- SARS: Low transmissibility, high severity
- H7N9: Low transmissibility, high severity
- 1918 Pandemic: High transmissibility, high severity
- Pandemic (H1N1) 2009: High transmissibility, low severity
- Seasonal Flu: Low transmissibility, low severity
Possible strategies based on risk category

<table>
<thead>
<tr>
<th>transmissibility</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Severity of Disease**

(†Morbidity & Mortality)

- **High**
  - Aiming at preventing disease importation and containing the virus
  - Routine public health measures without additional aggressive interventions
- **Low**
  - Aiming at reducing transmission and mitigating impact with focus on vulnerable population
  - Aiming at rapid containment at the early stage, and mitigating the impacts, if containment not possible
Matching cost and consequences of interventions with risk level (example)

<table>
<thead>
<tr>
<th>Level of Risk</th>
<th>More acceptable interventions</th>
<th>Less acceptable interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1918 pandemic virus or worse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SARS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New H1N1 ???</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seasonal Influenza</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- E.g. Health alert or advice
- E.g. Temperature
- E.g. Border closure
# Options for Interventions: Decision Matrix

<table>
<thead>
<tr>
<th>Options</th>
<th>Benefits</th>
<th>Limitations &amp; consequence</th>
<th>Decision (Yes/No/wait)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature screening</strong></td>
<td>• Increase public awareness</td>
<td>• Lack of evidence to show effectiveness</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>• May be reassuring to the public</td>
<td>• Modelling suggests limited impacts on reducing risks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Serve as “sentinel” points to detect some travelled cases</td>
<td>• Thermal scanning alone will not prevent virus entry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Deterrence to travel</td>
<td>• Unlikely to be cost-effective</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Resource intensive</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• May give a false sense of security</td>
<td></td>
</tr>
</tbody>
</table>

**Comments & guidance:**
Health advice and alerts to travellers
Welcome to Singapore.

The World Health Organisation (WHO)\(^1\) has reported cases of H7N9 influenza in areas of China, and novel Coronavirus in Saudi Arabia, Qatar, Jordan and United Arab Emirates.

If you become unwell with fever and cough within 10 days of being in any of these areas, the Ministry of Health (MOH) would like to advise you to see a doctor early at any medical clinic in Singapore. It is important for you to inform the doctor of where you have been.


\(^1\) For the latest update, please refer to WHO’s website at [www.who.int](http://www.who.int).
POSTERS

MINISTRY OF HEALTH (SINGAPORE)

Health Advisory

Welcome to Singapore.

The World Health Organization (WHO) has reported cases of H1N1 influenza in areas of China, and novel Coronavirus in Qatar, Jordan and United Arab Emirates.

If you become unwell with fever and cough within 10 days of being in any of these areas, the Ministry of Health (MOH) would like to advise you to seek medical advice at any medical clinic in Singapore. It is important for you to inform the doctor of where you have been.

For the latest update on the Health Advisory, please check: www.moh.gov.sg

* For the latest update, please refer to WHO’s website at www.who.int

MINISTRY OF HEALTH (SINGAPORE)
(Updated 15 April 2010)

製品安全衛生部

卫生公告

歡迎到新加坡！

世界衛生組織（WHO）報告，目前中國等地區已出現首例H1N1型流感病例。在沙特阿拉伯、伊拉克、尼日利亞和阿拉伯聯合酋長國等地亦發現了首例流感病例。

如果自入境日起出現發熱和咳嗽等症狀，請立即到新加坡各醫療機構就診，並及時報告病情。

有關最新健康公告，請瀏覽 www.moh.gov.sg

* 約束了解最新健康公告，請訪問世界衛生組織的網站 www.who.int

スパイク健康注意

Health Advisory

欢迎来到新加坡。

世界卫生组织（WHO）已报告中国等地区出现了首例H1N1型流感病例。在沙特阿拉伯、伊拉克、尼日利亚和阿拉伯联合酋长国等地也发现了首例流感病例。

如果你在入境后10天内出现发热和咳嗽等症状，请立即到新加坡的医疗机构就诊，并及时报告病情。

欲了解最新健康公告，请浏览 www.moh.gov.sg

*欲了解最新健康公告，请访问世界卫生组织的网站 www.who.int
Health Alert Notice (HAN)
From 20 April 2013
Situation in China: Spread to another Province

The health ministry said a 36-year-old man living in Shandong's Zaozhuang city was confirmed to have the virus, according to a statement on its website. That case brings the total number of confirmed infections to 105, according to official figures.

World Health Organisation (WHO) said Monday there was still no evidence H7N9 was spreading in a "sustained" way between people in China, though it was possible some family members may have infected one another.

"Right now we do not see evidence of sustained human-to-human transmission", said Keiji Fukuda, a top WHO influenza expert in a team visiting China to study H7N9.

Health experts differentiate between "sustained" human-to-human transmission and limited transmission, in which family members or medical personnel caring for the ill become infected.
What if a arriving passenger comes in with suspect H7N9 infection ???
USOAP : Continuous Monitoring Approach (CMA)

- Audit questions

Applicable May 2013
The Asia-Pacific region remains very sensitive to possible emergence of Novel Infectious agents
What's Next??

22nd April 2013: Bird Flu reported in Germany ------ H5N1
What is going to hit us next?

Pandemic H??N??, Nuclear?
The next pandemic, NBC emergency?

- Causative organism......
  H?N?, Variant ?, ? Others
- When
- How widespread
- Where will it start

- Aviation sector may again be hit badly
- Preparedness planning is our only protection
- A harmonized preparedness plan will inspire confidence in the travelling public
From the Asia Pacific region .........
Global CAPSCA
Thank you for your kind attention!

Jarnail Singh