

# Advancing Multi-Source Collaborative Surveillance in the Asia Pacific

10 September 2024

South & Southeast Asia Pathogen Genomics Prioritization and Implementation Workshop

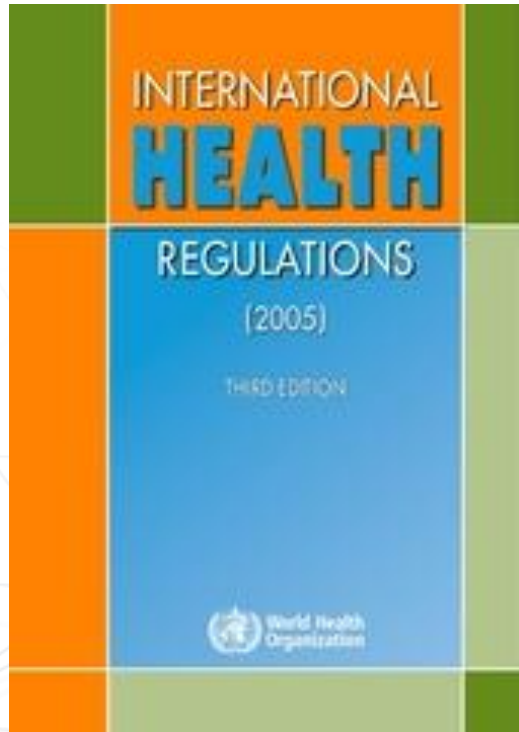
**Masaya Kato and May Chiew**

Health Emergency Information and Risk Assessment

WHO Health Emergencies Programme, WHO SEARO & WPRO



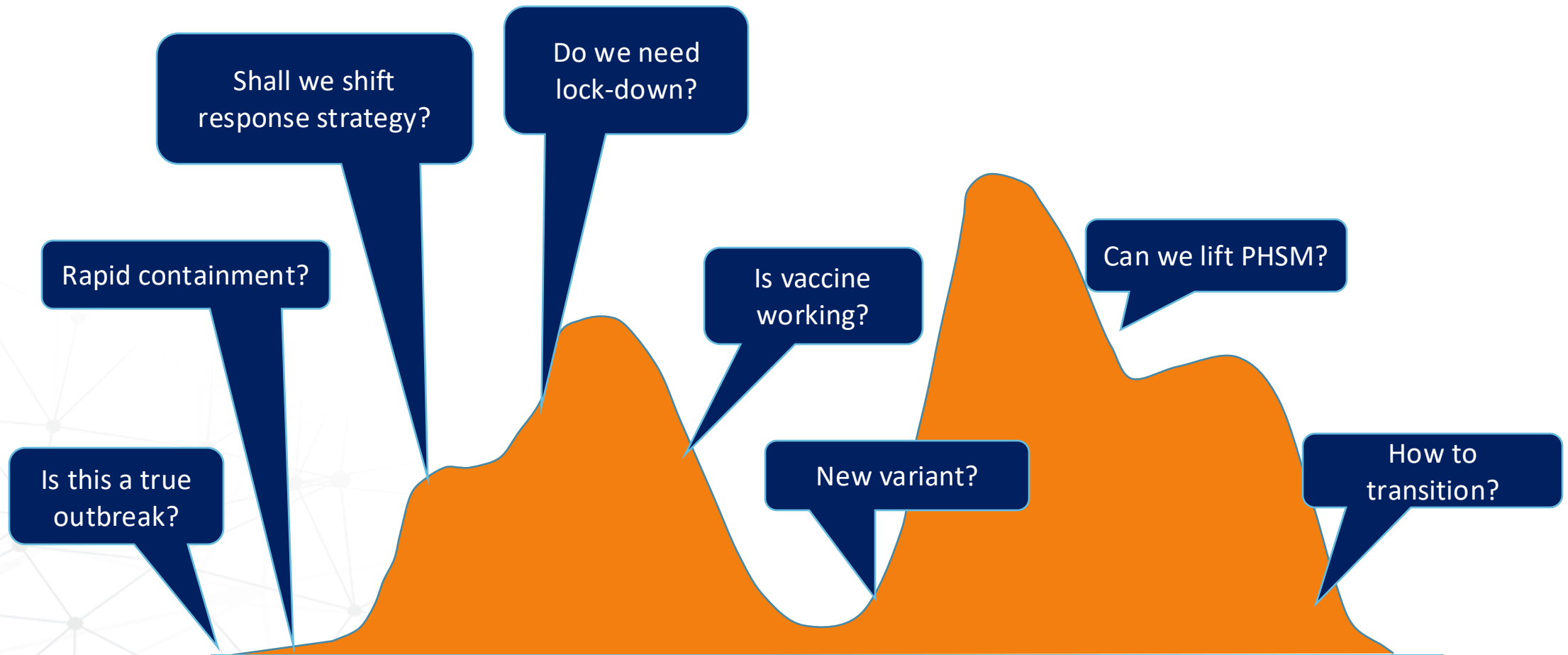
# International Health Regulations (2005)



## *Article 2. Purpose and scope*

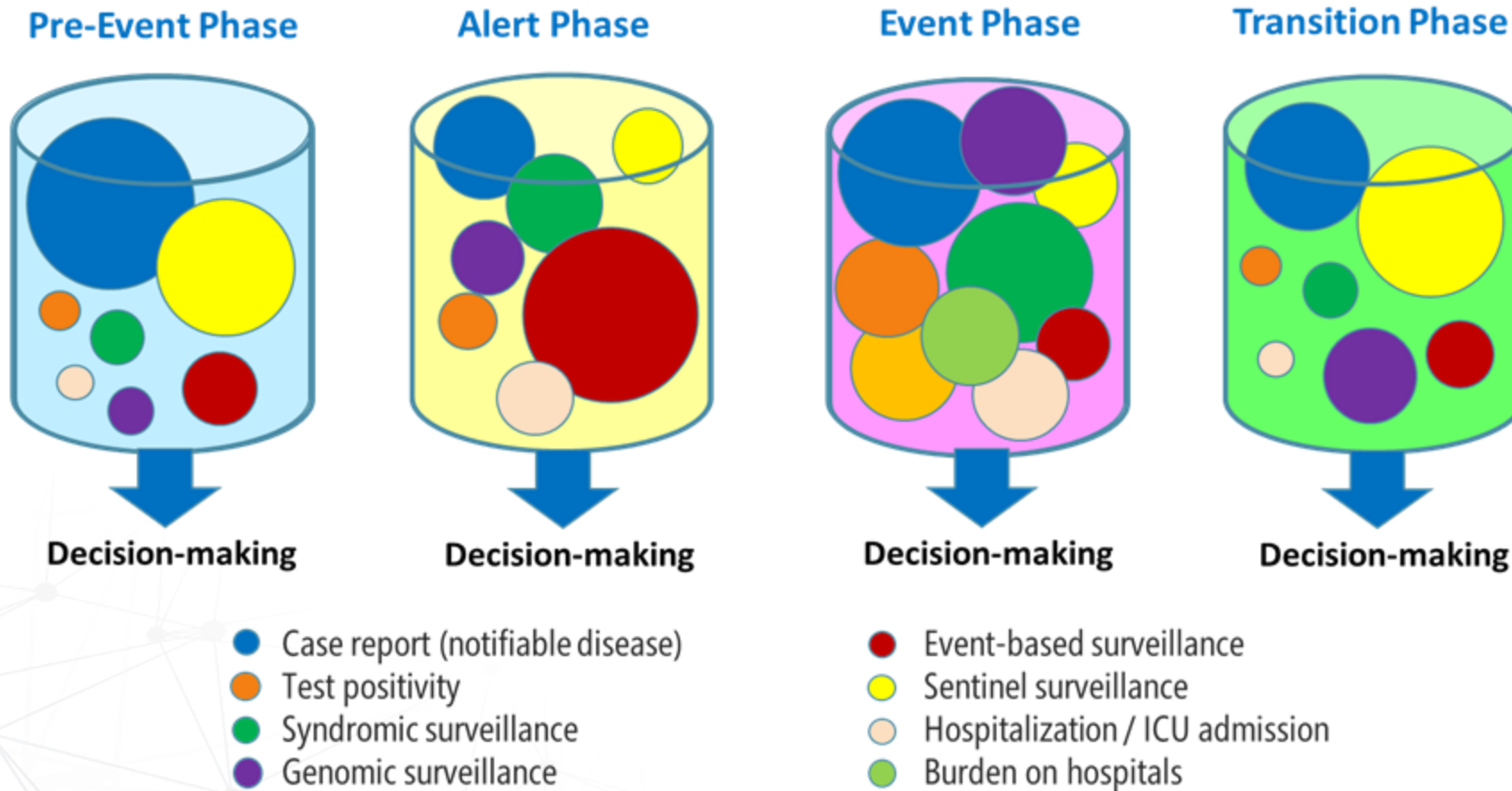
“to prevent, protect against, control and provide a public health response to the international spread of disease **in ways that are commensurate with and restricted to public health risks**, and which avoid unnecessary interference with international traffic and trade”

# Decision Makers Continuously Face Questions during Emergencies



**No single surveillance system will be able to respond to all the information needs of decision makers**

# Multiple Information Sources Contributes to Decision Making in Different Phases



Information Needs Evolves across the Emergency Phases

<https://www.who.int/publications/i/item/9789290210030>



# WHO Guidance Recommending Multi-source Collaborative Surveillance



Regional Strategic Roadmap  
for Health Security & Health  
System Resilience (2022)



Strategic Action  
Framework for  
Surveillance, Risk  
Assessment & Field  
Epidemiology in SEAR



Asia Pacific Health  
Security Action  
Framework (2024)



Crafting the  
mosaic(2023)



Defining  
Collaborative  
surveillance  
(2023)

**Common key message:** Multi-source information needed to address complex decision making

<https://www.who.int/publications/i/item/9789290209959>

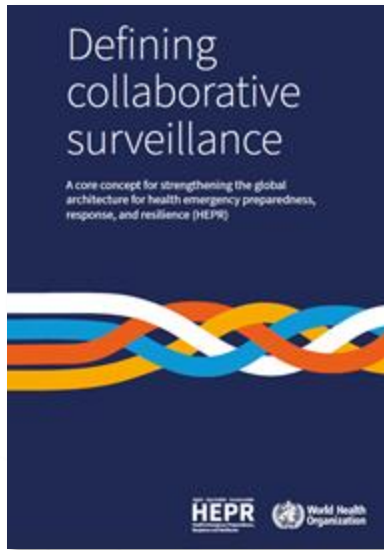
<https://www.who.int/publications/i/item/9789290210030>

<https://www.who.int/publications/i/item/9789290620396>

<https://www.who.int/publications/i/item/9789240074064>

<https://www.who.int/publications/i/item/9789240070288>

# Collaborative Efforts for Better Decision Making



The systematic **strengthening of capacity and collaboration** among diverse stakeholders, both within and beyond the health sector, with the ultimate goal of enhancing public health intelligence and improving **evidence for decision making**.

[https://cdn.who.int/media/docs/default-source/emergency-preparedness/who\\_hepr\\_june30draftforconsult.pdf?sfvrsn=e6117d2c\\_4&download=true](https://cdn.who.int/media/docs/default-source/emergency-preparedness/who_hepr_june30draftforconsult.pdf?sfvrsn=e6117d2c_4&download=true)  
<https://www.who.int/publications/i/item/9789240074064>



Synthesizing multiple sources of information for surveillance and risk assessment requires **collaborative arrangement** of various systems, **stakeholders, sectors & administrative levels.**

<https://iris.who.int/bitstream/handle/10665/374371/9789240074064-eng.pdf?sequence=1>

# However, Multisource Collaborative Surveillance is not easy...

## Example of challenges

Access to  
data / data  
ownership

Lack of  
agreed  
procedures  
for timely  
information  
sharing

Workforce

Insufficient  
coordination  
/ fragmented  
systems

Lack of  
common  
platform or  
interoperable  
systems

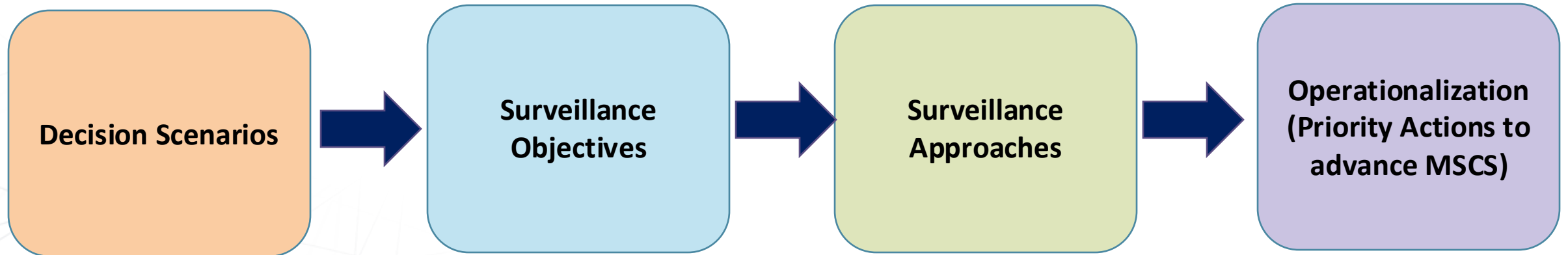
# Six Steps to Strengthen MSCS in Countries



| Phases                        | Steps  |
|-------------------------------|--|
| <b>Preparation</b>            | 1. Select a few hazards  |
|                               | 2. Map surveillance systems and stakeholders, and identify decision scenarios              |
| <b>Stakeholder engagement</b> | 3. A stakeholder workshop – Review and clarify surveillance objectives for decision-making |
|                               | 4. A stakeholder workshop – Identify priority actions to strengthen MSCS                   |
| <b>Action and review</b>      | 5. Implement prioritized actions to strengthen MSCS  |
|                               | 6. Review the implementation to monitor the progress and draw lessons                      |



# Core process of MSCS strengthening



Thinking backward from decision scenario to surveillance objectives to surveillance system design

# Reviewing & Streamlining Surveillance Systems guided by Objectives

## Surveillance objectives

Decision making

Early detection  
Early warning

Monitor morbidity &  
mortality

Inform risk analysis

Effectiveness of  
interventions

## Surveillance systems

Genomic data  
(laboratories)

Human health lab  
Animal health lab  
Private sector lab

Epidemiological data  
(surveillance unit)

Ministry of Health  
National public health institute  
Public & private providers  
FETP

Contextual information  
(health/non-health)

Hospitals  
Animal health, Environment  
Food & water safety

Human samples

Animal samples

Waste water & environment  
samples

Indicator-based surveillance

Event-based surveillance

Field epidemiology studies

Health care system capacities

People's mobility/population  
density/social mixing/behaviors

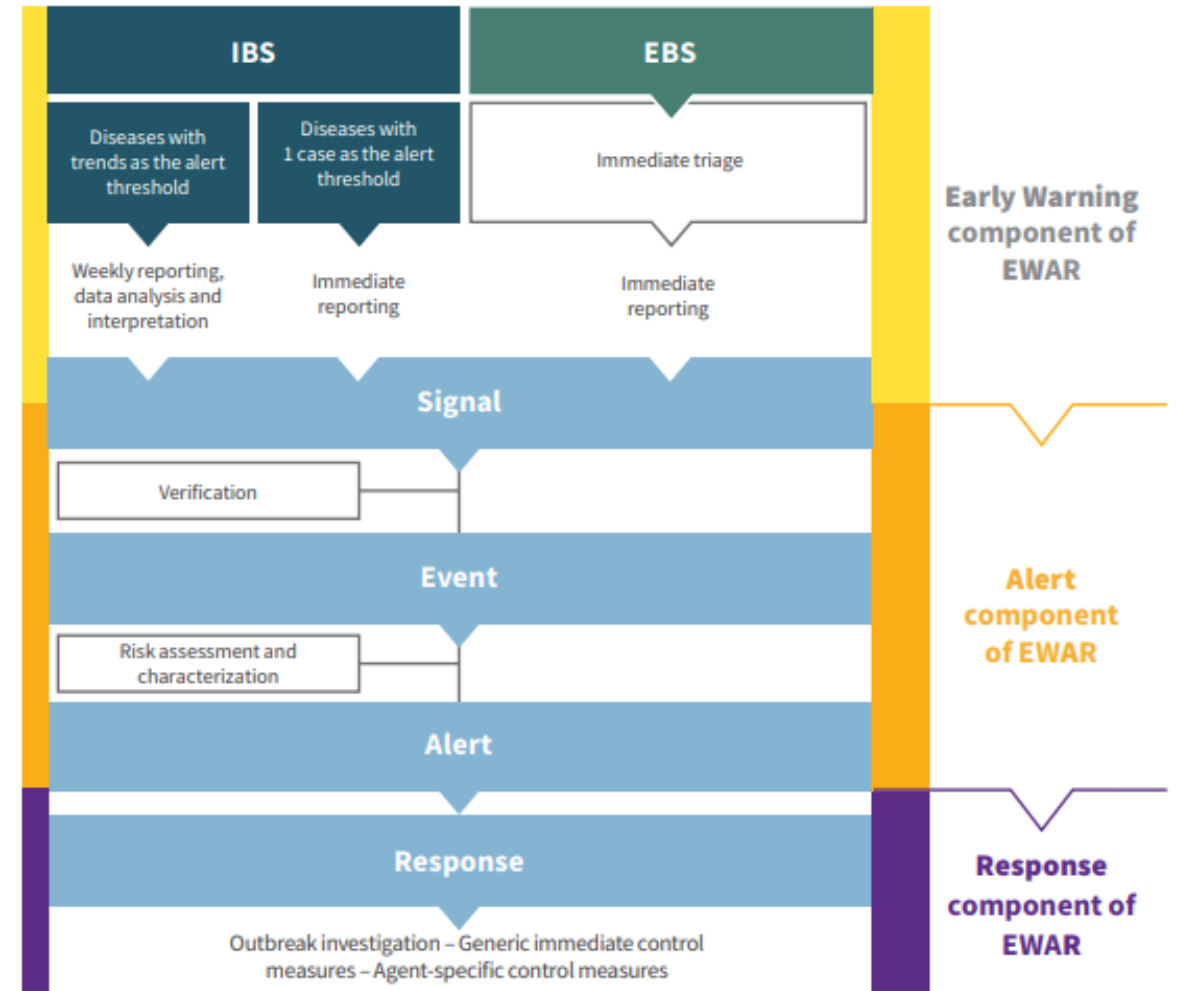
Human-animal interaction

Climate/water/food

# Early Detection, Early Warning

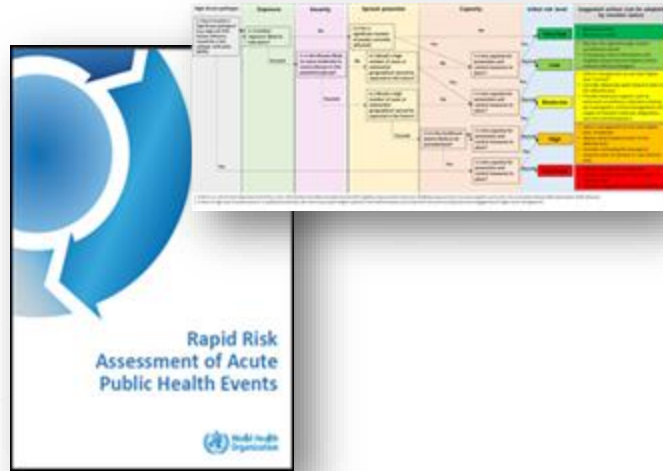
- Signal detection through:
  - Event-based surveillance
  - Indicator-based surveillance
- Verification through:
  - Involving the local team
  - Field investigation
- Contribution of genomic surveillance
  - Virus/pathogen evolution in humans, animals and environment (wastewater) samples

Fig. 2. Components of EWAR



<https://www.who.int/publications/i/item/9789240063587>

# Informing Risk Analysis



## Generic all hazard approach for acute public health events

- ▶ Initial risk assessment
- ▶ Rapid risk assessment



## Pathogen specific approach

Example: Evaluation of risk element for SARS-CoV-2 variants

- A. Growth advantage
- B. Immune escape
- C. Clinical severity
- D. Failure of diagnostics and therapeutics

<https://www.who.int/publications/i/item/WHO-2019-nCoV-Variants-Risk-assessment-2023.1>



# SARS-CoV-2 Variant Characterization: Combining Lab and Epi evidence

| Domain                      | Characteristics   | Surveillance<br>Epidemiology evidence                         | In vitro Evidence   | Field epidemiology studies  |
|-----------------------------|---|---|---|---|
| Transmissibility            | Risk of infection   | Increased Ro<br>Contact tracing : time from exposure to onset | Binding (ACE etc)   | Household transmission studies,<br>contact tracing : secondary infection rates                            |
|                             | Disease course (incubation, onset, virus shedding, recovery, symptomatic vs asymptomatic) |   | Antibodies testing<br>PCR testing for virus presence<br>Virus culture   | First few cases :<br>clinical follow up, cohort studies   |
| Clinical features           | Case definition : signs and symptoms  | Test positivity rate decreasing                               |   | First few cases : signs and symptoms,<br>PCR screening : positive and negative cases for Sens/Spe studies |
|                             | Severity  | Age disaggregated mortality ratios<br>Hospitalization ratios  |   | First few cases follow up :<br>Hospitalization, CFR   |
| Laboratory diagnostics      | Diagnostics detection   | Test positivity rate vs number of tests                       | PCR target failure (wild virus and variant PCR)<br>Antigenic rapid test | Sampling PCR target failure   |
| Immunity/<br>Neutralization | Neutralization in treatments  |   | Antibody cocktails<br>MoAB neutralization                               |   |
|                             | Natural immunity<br>Vaccine immunity  | Increase in Reinfections                                      | Convalescent Sera<br>Vaccinated Sera                                    | Cohort studies<br>VE studies Test Negative studies  |
|                             | Length of immunity  | Increase in Reinfections                                      |   | First few cases follow up<br>Serological studies  |

# Rapid Assessment of Transmissibility, Severity & Impact (TSI)

- Practical approach to assess TSI of emerging SARS-CoV-2 variants & emerging diseases
- Field epidemiologists play the central roles

## Training workshop on rapid assessment of TSI in countries



Malaysia



Viet Nam



India

# What is a TSI assessment?

Epidemiological Package to rapidly characterize the behavior of a pathogen in the field:

- **Transmissibility:** How easily does it spread
  - Household Secondary Attack rate
  - Serial interval
- **Severity:** How many patients get severely ill
  - Risk of severe disease
  - Case fatality Rate
- **Impact on countermeasures:** How does it affect the available response countermeasures, i.e.:
  - Vaccines/Immunity
  - Treatment
  - Diagnostics

TSI assessments help **quantify unusual events** (potential new emerging pathogens or changes in viruses) .

## TSI in practice: an example from a Member State

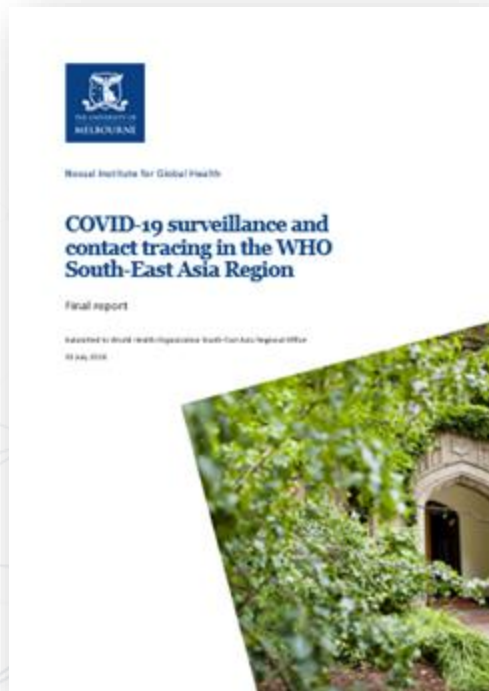
In 2023, a cluster of undiagnosed respiratory disease (later SARS-CoV-2 positive) was reported in an aged care setting with additional information collection during case investigation

| Secondary attack rate                        | 35%    |
|--|--------|
| Average serial interval                      | 4 days |
| Risk of severe disease                       | 33%    |
| Case fatality rate                           | 22%    |
| Vaccine effectiveness against infection      | 65%    |
| Vaccine effectiveness against severe disease | 100%   |

The initial assessment was conducted whilst awaiting WGS results and was assessed to be likely Delta or Omicron



# Utility and challenges of genomic surveillance data for decision-making

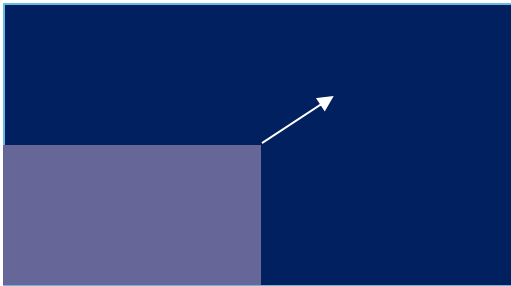


## Review of COVID-19 Surveillance and Contact Tracing in WHO South-Asia Region (by the University of Melbourne) – Key findings on genomic surveillance

- Genomic surveillance **capacities substantially increased** throughout the region during the COVID-19 pandemic.
- Genomic surveillance was **useful** for variant surveillance and cluster investigations if results were available in timely manner.
- In many countries, genomic surveillance did not contribute to variant surveillance in practice due to:
  - ▶ the **substantial time lags** in obtaining sequencing results and
  - ▶ **limited and non-representative sampling**,
  - ▶ which in turn were caused in part by **funding and supply chain constraints**.
- **Lack of meta-data** on patient demographics or clinical outcomes accompanying sequencing results constrained interpretation of genomic surveillance.

# How do we advance MSCS? – Capacities and collaboration

## Increasing capacity



**Increasing the coverage and quality of surveillance**

increasing workforce, systems' capacity and tools, adding new data sources, or improving technology

## Strengthening collaboration



**Building intentional collaboration across 4 dimensions**

connecting surveillance stakeholders across systems, platforms, tools, networks, and skill sets

# MSCS Stakeholder Workshop



## MSCS workshop in Indonesia

Focusing on dengue  
10 – 12 July 2024



## MSCS workshop in Nepal

Focusing on Water-borne  
& Food-borne diseases  
21 – 23 August 2024

Surveillance stakeholders from different departments, institutions, and sectors came together to identify priority actions to enhance MSCS – system capacities and collaboration

# Key Messages

1. Multisource collaborative surveillance (MSCS) aims to **improve decision-making** to manage emergencies using multiple sources of information.
  - Genomic surveillance make increasingly important contributions.
2. MSCS requires continued strengthening of **system capacities**, and **collaboration** of various systems, stakeholders and sectors – guided by surveillance objectives.
  1. MSCS process **promotes the values of surveillance information** for decision makers, and provides foundation to call for investment in surveillance systems.





Coming  
together  
is a  
beginning;

keeping  
together  
is  
progress;

working  
together  
is  
success.

Henry Ford



# Thank You !

## Acknowledgements

Dr Tamano Matsui

Dr Dhamari Naidoo

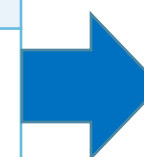
Dr Brett Archer

Dr Manilay Phengxay

# Additional Slides

# Identifying Priority Actions to Strengthen MSCS (Examples)

| Work area                            | Category and Purpose   |
|--------------------------------------|--|
| <b>System design and performance</b> | <b>Surveillance approaches</b> streamlined, guided by surveillance objectives.   |
|                                      | <b>Standardized procedures</b> and harmonized tools. Integrated platform.  |
|                                      | <b>Information systems</b> with enhanced digitalization and interoperability   |
| <b>Governance and coordination</b>   | <b>Inter-agency &amp; inter-sectoral mechanism</b> for coordination and information sharing  |
|                                      | <b>Institutional arrangements</b> , supported by legislation where appropriate   |
|                                      | <b>Sustainable and predictable funding</b> to support surveillance efforts   |
| <b>Workforce capacities</b>          | <b>Technical capacities</b> for collecting, reporting, triangulating, interpreting and communicating MSCS data and conducting risk analysis. |
|                                      | Capacities for coordinating with various surveillance stakeholders.  |



**Enhanced  
Capacities  
&  
Collaboration**