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INFECTIOUS Disease Intelligence

Global Health Collaboration

Contents

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Editor's Note

Welcome to another issue of *Infectious Disease Intelligence!* We've chosen "Global Health Collaboration" as the theme for this edition.

The world has witnessed a growing urgency amongst public health stakeholders to focus on gearing up for the future – on the aspects of preparedness and sustainability, ensuring health security and strengthening health systems. The three articles in our cover story are testament to such efforts in this region. With global Disease X seen as inevitable, the prospect of urban health emergencies is not over despite advancements made during COVID-19. It is therefore crucial that we continue to raise awareness of the important roles played in detecting and responding to emergent threats. Pandemic concerns are also highlighted in the scientific contribution by colleagues from the National Parks Board and they have brought insights into the work of public health.

Now is the time to build upon the opportunities that the pandemic has brought for field epidemiologists to strengthen regional partnerships to build our skillsets as public health detectives and to envision how we want to shape the future. Our training room article shares about how Singapore is pleased to support global health collaboration through its NextGen field epidemiology training as an option for the world's consideration. With serious looming challenges come opportunities, and it is our responsibility to convert those opportunities into realities. We are dedicated to growing the global health network with key partners, strengthening regional and national health systems, and promoting professional education.

In anticipation of the new Communicable Diseases Agency, *Infectious Disease Intelligence* shall be taking a necessary hiatus from publication next year. Have a merry Christmas and happy new year!

Steven

Advancing Collaborative Regional Health Through ASEAN

By **Dr Muhammad Ali Rosledzana**, Medical Officer, Ministry of Health, Brunei, and Trainee (Field Epidemiology), National Centre for Infectious Diseases, and **Dr Justin Wong**, Consultant and Head (Disease Control), Ministry of Health, Brunei, and **Assoc Prof Steven Ooi**, Senior Consultant and Field Epidemiology Training Programme Director, National Centre for Infectious Diseases, and International TEPHINET Advisory Board Member

The ASEAN Plus Three (APT) Field Epidemiology Training Network is an active driver of collaborative disease intelligence and regional public health. This work requires understanding complexities at the human-animal-ecosystem interface (i.e. One Health approach) and increasingly, modern lifestyles and urban epidemiology practice. APT consists of the 10 ASEAN Member States (AMS), the People's Republic of China, Japan and the Republic of Korea. Collaborative processes began in December 1997 and it has since evolved to be a major vehicle promoting East Asian Cooperation towards the long-term goal of building a healthy East Asian Community, with ASEAN as the driving force.

Coming out of the COVID-19 pandemic, the world faces many challenges in health literacy and growing fatigue with misinformation. Finding public health solutions involves professionals of various disciplines coming together in a concerted effort. Through collaborative practices, we address the social and environmental determinants of health, and use that knowledge to devise effective strategies for preventing, controlling and reducing health risks. Stakeholders include communities, governments, development partners, international organisations, as well as regional groups.

The significance of being prepared for infectious diseases has become increasingly evident following the global impact of the COVID-19 pandemic. Recognising the need for collective action, AMS have united their efforts by leveraging a pre-agreed pandemic fund to bolster the preparedness of each AMS. Through the established infrastructure of ASEAN, these countries are combining their expertise and financial resources. This collaborative approach allows for many actions (e.g. procurement of vaccines) that individual nations may have been unable to secure independently, or would have risked wasting large amounts of funding. Three successful initiatives in our experience are reported herein.

Case Study of Bilateral Cooperation

Brunei encountered its first case of COVID-19 on 9 March 2020, which was linked to a religious gathering in Kuala Lumpur, Malaysia. This gathering had more than 16,000 international participants.[1] Out of the 135 confirmed cases reported in Brunei by the first week of April, 71 (52.6 per cent) were found to have an epidemiological link to that event. Similarly, in Malaysia, between 28 February and 14 March 2020, more than 35 per cent of the over 4,000 COVID-19 cases were directly linked to the gathering.[2]

Both nations share strong interconnectivity and longstanding collaboration and friendship, which are instrumental in effectively dealing with this particular superspreading cluster. Through the swift sharing of crucial information, Brunei and Malaysia worked together and addressed the situation. When Brunei detected its first case, it promptly shared vital information with Malaysia, enabling them to effectively implement their own outbreak management measures. This exchange of information also proved beneficial for Brunei's contact tracing efforts.

This scenario exemplifies the potential benefits of bilateral cooperation, and when extrapolated to a regional level, the advantages would undoubtedly be increased. Implementing international frameworks, namely the International Health Regulations (IHR), can effectively facilitate and guide this cooperative approach within a region.[3] However, challenges may arise in the form of politicisation of information and as such, personal trust among healthcare leaders is crucial. When information flows freely, it enables a quicker response to health crises.[4]

Sharing Brunei's Pandemic Management System

Due to its small population of less than half a million, Brunei Darussalam faces challenges in terms of limited manpower and expertise.[5] To address these challenges, it recognised the importance of leveraging technology to support its COVID-19 response. In May 2020, it developed a comprehensive Digital Pandemic Management System (DPMS). This system involved a digital workstation that integrated the centralised national electronic patient records database known as 'BruHIMS', along with patient geo-location data and other socio-demographic information about cases and contacts.

Following the success of its DPMS, Brunei recognised the importance of investing heavily in pandemic preparedness. As part of this effort, Brunei rapidly invested and developed its Disease X management system, which includes a regional collaboration tool. This tool allows health authorities in the region to access Brunei's data and identify cases that present epidemiological links to their own countries. Through the authorisation and agreement of these participating countries, Brunei can then share information on their cases and highlight epidemiological links between the participating nations. Furthermore, the system also serves to extract information from publicly accessible websites, which helps fill in gaps in case counting.

To engage the public and enhance their involvement in pandemic management efforts, Brunei also introduced a front-facing mobile application called 'BruHealth'. This application allowed users to access important information and services related to COVID-19. The successful implementation of this digital concept served as a stepping stone for further digitalisation in infectious disease management in Brunei. It highlighted the potential and effectiveness of utilising technology to strengthen regional response and management strategies in the face of health crises.

Collaboration Beyond COVID-19

Nationalistic-focused ideals of health security are not equipped to give full consideration to the potential risk concerns involved with public health security on a pandemic scale. [6] A regional response should supplement and optimise responses to tackle such issues. ASEAN is a prime example, showcasing an effective collaborative response during the SARS outbreak which was lauded by the World Health Organization. [7] Through the seamless sharing of real-time data which enables prompt action, and by implementing a comprehensive management system, Brunei aims to enhance regional health collaboration and enable efficient sharing of information for effective response and management of infectious diseases. Effective communication channels that allow for information sharing for the prevention and control of infectious diseases between regional health authorities where neighbouring countries face shared health threats are of known importance.[8] Decision makers and health authorities have long acknowledged this, and investing in the infrastructure is crucial to facilitate this endeavour. [9]

ASEAN continued such collaborations through the COVID-19 pandemic in providing equitable access to vaccines between AMS for mpox as well. The emergence of mpox as a Public Health Emergency of International Concern (PHEIC) has introduced a distinct set of challenges that differ from those faced during the COVID-19 pandemic. [10] Acquiring vaccines for primary prevention or post-exposure prophylaxis have proven to be a difficult task, with the limited availability of these vaccines and their associated high manufacturing and storage costs driving their prices beyond the reach of many undeveloped and developing countries. In addition, due to the high costs of these vaccines, health ministries are uncertain about their cost-effectiveness.

Conclusion

By sharing expertise and working together through shared projects in disease intelligence, exchanging knowledge with the wider global health workforce, and supporting regional practitioners to strengthen competencies with field epidemiology tools, we are able to face public health challenges with greater confidence. Much work lies ahead in growing our region's integrated and outward-looking collaborative practices. We aspire to safeguard public health against pandemic threats by taking a whole-of-society and whole-of-region approach towards capacity building.

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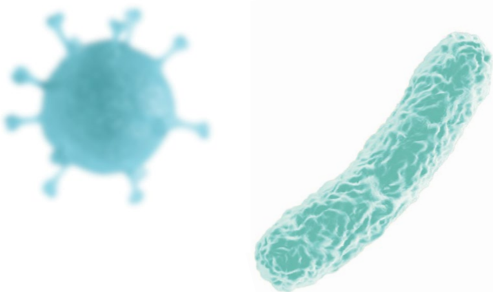

Genomic Surveillance for Collaborative One Health Practice

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Collaborative surveillance is a new field that refers to the systematic strengthening of capacity and collaboration among diverse stakeholders, including One Health networks within and beyond the health sector, with the ultimate goal of enhancing disease intelligence and improving evidence for decision making. Part of this involves genomics in molecular and genetic epidemiology. Genomic surveillance in the form of Whole Genome Sequencing (WGS) of human pathogens is revolutionising how public health agencies conduct surveillance and investigate outbreaks of emerging infections.

Photo Credit: Dr Constance Chen, Registrar, Department of Laboratory, Tan Tock Seng Hospital

Having been introduced to public health laboratories progressively from about 2010, sequencing the entire genome of bacteria, viruses and parasites is not new.[1] However, the costs associated with sequencing are decreasing and it is now becoming more feasible through the use of smaller and simpler machines, even in low-resource settings.

For most organisms, WGS relies on sequencing deoxyribonucleic acid (DNA) from pure cultures of the organism after being isolated from human specimens. The DNA is broken down into small parts called 'contigs' that comprise of strings of amino acids. These contigs must be reassembled using complex computing programmes or 'bioinformatics pipelines'. There are many different ways to analyse and visualise WGS data of pathogens. Two important aspects are that much of the data are stored in public domain databases and that they are often available for reanalysis. This means that the genetic diversity of pathogens detected in different places can be compared, which can give us vital clues about transmission and facilitate disease control.

In this short report, we discuss how WGS has become essential for national and global health security due to the benefits reaped for public health surveillance and outbreak control.

Surveillance

The role of WGS for public health surveillance was clearly highlighted in the COVID-19 pandemic. Many countries attempted to sequence all strains of SARS-CoV-2 to identify transmission chains and new outbreaks, particularly where they were seeking to suppress transmission early in the pandemic. Effective surveillance requires sequencing a known sample of pathogens responsible for infections that are reported to a health department as part of surveillance.

A key benefit of WGS for surveillance is in the One Health context, where culture isolates from humans, animals and foods are sequenced, giving novel insights into animal-based food sources of infection. However, this requires close working relationships between those responsible for animal health and human health. Another key benefit of WGS is that it allows for surveillance of key virulence factors or markers of antimicrobial resistance without any additional testing. As these are detecting the genes of pathogens that have infected humans and animals, it may not indicate if the organism is actually expressing the gene making it more virulent or resistant. However, for many pathogens there is a high correlation between the presence of a gene and an expression of phenotypic resistance.

Collaboration between industries, the government, and laboratories is essential for optimising the surveillance of One Health pathogens. Collective efforts aim to develop a comprehensive dataset encompassing epidemiological metadata and genomics, which will serve as a reference system to enhance the understanding of genetic variability, detect outbreaks and clusters, and monitor trends over time and geographical distances.

For example, the 'Understanding the Sources of Campylobacter in Australia' study, also known as CampySource, serves as an example of this collaborative approach. It integrated food and human samplings with an epidemiological case-control study and WGS data to provide a holistic overview of Campylobacter infections in Australia. WGS played a pivotal role in this study by enabling the characterisation of sample isolates which helped identify the predominant sequence types within the population and genomic determinants across food, animal, and human isolates (Figure 1). For example, the study detected multidrug resistance (i.e. resistance to three or more antimicrobial drug classes) in only 4.3 per cent (7 out of 164) of humans isolates and found high agreement between resistance genotypes and phenotypic testing results. [2] Furthermore, the collection of isolates facilitated mathematical source attribution modelling that showed that over 80 per cent of infections were of poultry origin. [3] This complemented the case-control study that estimated approximately 42 per cent of campylobacteriosis cases were from consuming contaminated chicken meat. [4]

In addition to its domestic applications, large international collections of genomic and epidemiological data are vitally important for multinational spread of infectious pathogens. For example, a public health laboratory in Australia uploaded a sequence from a listeriosis patient to the GenomeTrakr database managed by the US Food and Drug Administration. The strain was indistinguishable from that of *Listeria monocytogenes* isolated from stone fruit in the United States, which was imported into Australia. This connected an otherwise sporadic case with a known overseas outbreak and underscored the importance of sequence-referenced datasets coupled with epidemiological metadata.[5] Such international data sharing is critical for strengthening pathogen surveillance efforts worldwide and forms the basis of the World Health Organization's newly formed Pathogen Surveillance Network. [6]

Outbreak Control

Investigating outbreaks is where WGS has proven to be most useful for public health, as it enables public health officials to rule in or out cases from an outbreak. WGS enables investigators to identify clusters of cases caused by genetically-related pathogens.

When combined with traditional contact tracing and investigative methods, WGS can help illuminate disease transmission chains and identify the likely originating (or 'index') case responsible for the outbreak. However, WGS can also help identify related cases where contact tracing is less likely to be effective, particularly when investigating outbreaks among highly transient populations like prisoners or the homeless. In the investigation of a Tuberculosis (TB) outbreak in an American prison, WGS was able to elicit such links and helped identify the likely route by which TB was introduced into the prison through transmission from foreign-born to US-born persons in the community, and subsequent introduction into the prison population following incarceration of the latter cases. [7] WGS can also help exclude putative transmission links identified through contact tracing or older genotyping techniques with lower resolution, thereby saving time and resources when investigating potential outbreaks. [8,9]

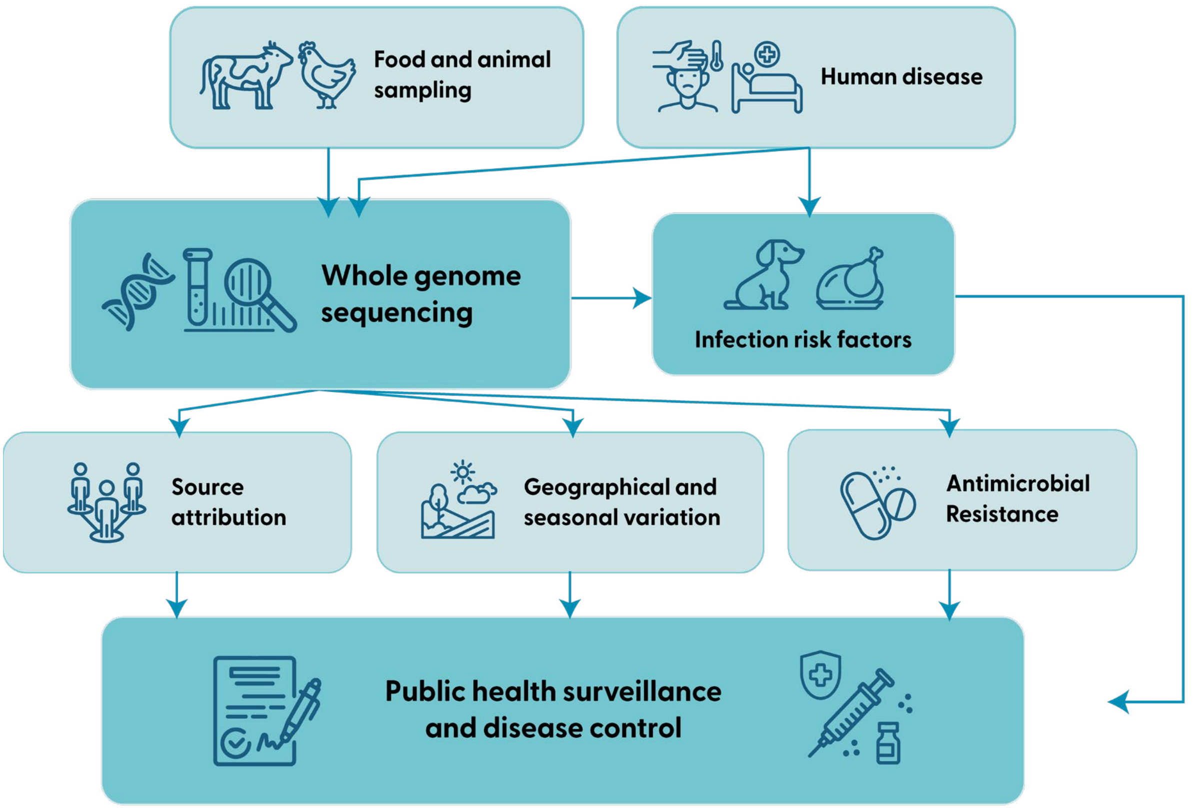

Figure 1. The central role of WGS taken from the Australian CampySource study [4]

In addition, WGS has an important role in the investigation of foodborne outbreaks, including traceback investigations to identify the farm or production facility from which the outbreak originated. By comparing WGS findings from disease-causing pathogens isolated from affected patients, food, and environments, investigators can trace the path by which the responsible pathogen entered the food system, permitting faster and more focused efforts to interrupt further transmission. WGS has found wide applicability in the investigation of foodborne infections, from an outbreak of *Salmonella* associated with sushi to transmission of *bovine TB* from cattle to humans via contaminated cheese.[10,11] As sequencing technologies become more affordable and widespread, more countries will look to take advantage of WGS given its promise in facilitating faster and more efficient outbreak investigations.

Comments

There are challenges with the implementation of WGS in a public health context. The first of these is the complexity of information resulting from sequencing. It can be challenging to visualise and report results from sequencing due to the fine-grained nature of data. [12] A solution to this is to report data in a more convenient form, such as internationally recognised multi-locus strain typing schemes. WGS data are also IT intensive, requiring large secure computer servers for storage and analysis. Often, the data requires dedicated bioinformatics specialists to manage and analyse data, although more and more free-of-cost softwares are available to analyse these data.[13,14] Finally, the cost of sequencing can be an impediment to countries implementing WGS as a surveillance tool.[15] It is vital that animal health, public health and food and environmental sectors work together to overcome these challenges, as WGS leads to much improved disease control efforts.

So far, we have shown some uses of WGS for surveillance and outbreak investigation, and how it is essential for health security. It is vital to ensure that WGS data are paired with epidemiological information in a timely fashion. WGS has an important role in One Health applications where there is a need to understand transmission between animals, humans and food or environments. Public health agencies need to work in partnership with laboratories to overcome challenges to incorporate WGS into surveillance.

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Managing Infectious Disease Risk and Outbreak Threats

By **Pang Qing Yuan**, Consultant (Surveillance), World Health Organization, Cambodia Office, and **Assoc Prof Steven Ooi**, Senior Consultant and Field Epidemiology Training Programme Director, National Centre for Infectious Diseases, and International TEPHINET Advisory Board Member

Epidemiologists play an integral role in preparing for and responding to health emergencies of humans and animals. Epidemic intelligence prepares the world better for future threats, and requires competencies in early detection of threats, performing of risk assessments, policy development, adaptation and implementation, cross-sectoral coordination and incident command, and risk communication. In addition, some countries may choose to include training leadership roles for pandemic preparedness and response, humanitarian crises/ natural disasters, or chemical, biological, radiological and nuclear threats.

The Emerging Infectious Diseases (EIDs) of public health importance have caused outbreaks throughout the world, and demonstrated significant threats at the human-animal-environment interface. Most obvious are the zoonotic EID links which comprise:

- Novel contagion with pandemic potential (e.g. Avian Influenza, Nipah virus infection, SARS, MERS and COVID-19)
- Mosquito-borne diseases (e.g. Japanese Encephalitis (JE) and Zika virus infection)
- Mammalian vectors (e.g. Hantavirus infection, Leptospirosis and Rabies)
- Food safety and security issues (e.g. E Coli O157 and Group B Streptococcal infection)
- Abuse of antibiotics, especially with livestock and fish farming, which develop antimicrobial resistance and give rise to the emergence of multidrug-resistant organisms

More than 60 per cent of global EIDs are zoonotic in origin. These EID events will continue to challenge public health systems in our countries for years to come. Global hotspot maps of spatial variation in zoonotic risk index have shown that the East Asia and ASEAN region houses locations with high estimated EID risks. It is therefore of no coincidence that the region is at the centre of global attention regarding EIDs, after the emergence of COVID-19, SARS, Nipah virus, and recurring emergence of new recombinants of the Influenza virus, the pathogen which causes the Avian and Swine flus.

Ecosystems maintain healthy populations, but when mismanaged or rapidly altered by humans, they end up being associated with zoonotic EIDs. The public health (and economic) challenges of such EIDs in our region include potential outbreaks of Avian Influenza, Hantavirus, JE, Leptospirosis, Nipah virus, Rabies and Coronavirus infections. They underscore an urgent need at the human-animal-environment interface to engage various stakeholders on preventive measures, and to improve risk management and communication.

Understanding What EID Risk Entails

Based on the definition of 'risk', we come to understand that the word tends to have a negative connotation. However, in the Oriental context, it is depicted as a double-edged sword. The origin of the word 'risk' or "风险 (fēng xiǎn)" remains largely unknown but it had likely originated from fishing villages. Fishermen in the past would pray for calm sailing winds and a bountiful catch, yet bearing in mind the perils of sailing out far into the sea to achieve the outcome. The prospect of seizing a bountiful catch despite the perils and dangers involved presents an exciting window of opportunity. Likewise, for us in public health, risk is not just something bad that we need to deal with, but it also poses as an opportunity where we can explore how to further improve things.

In order to better understand what risk is about, we need to first elucidate the following terms: 'Risk Assessment', 'Risk Management' and 'Risk Communication'. Although these three terms are commonly used, they also tend to be misunderstood. All three overlap in their outputs and contributions to each other but they each serve distinct purposes. Risk assessment involving surveillance and epidemiologic investigation provides evidence for decisions on risk management and risk communication. Risk assessments surface the results directly to management for their decision-making. Thus, risk assessment processes function best within governmental structures that support risk management and risk communication, by engaging decision-makers and policy-makers from relevant sectors. There are many helpful ways to distinguish these three terms from each other. Figure 1 illustrates how these terms are interconnected. In essence, we are simply referring to the study and understanding of the risks involved, applying the appropriate measures or actions to prepare for and mitigate the consequences of the risks while observing the need to communicate so that the benefits of the measures or actions can be amplified through actions by the masses.

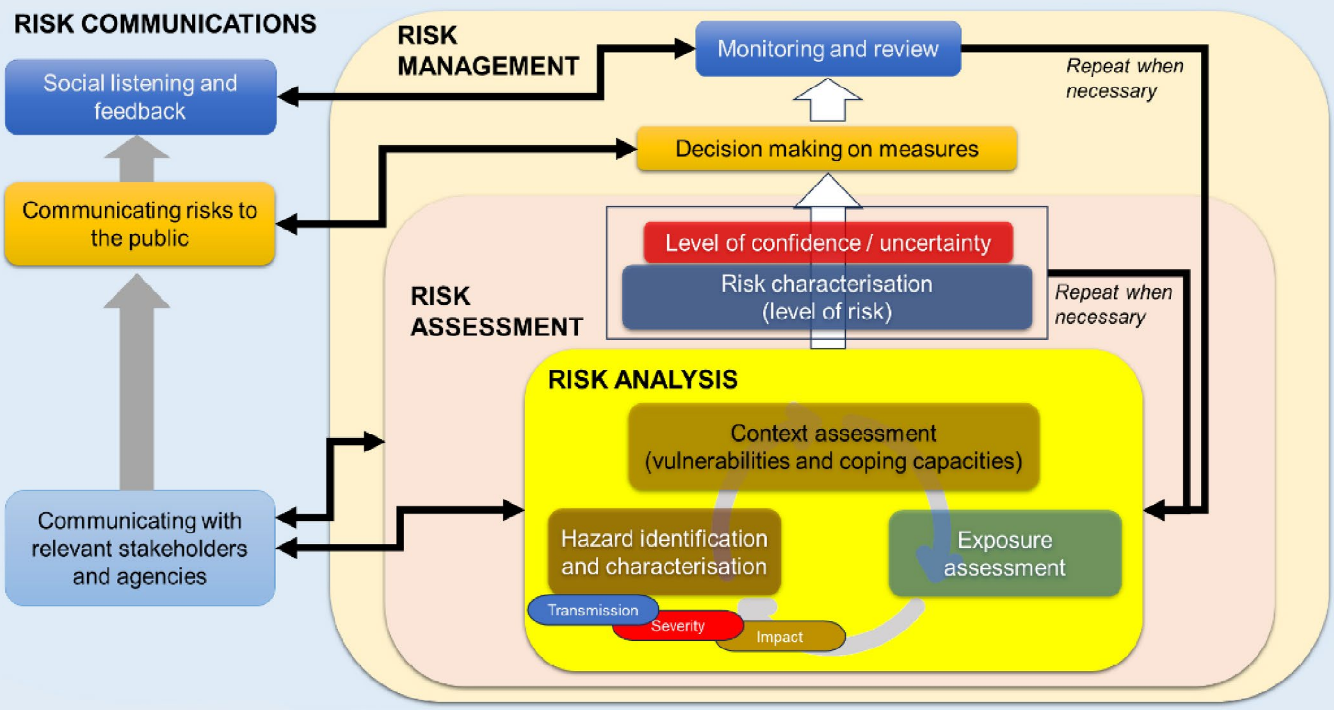

Figure 1: Conceptual framework in field epidemiology to understand risk management and communication

Most practitioners define 'risk' as the likelihood of the occurrence and the likely magnitude of the consequences (i.e. impact) of an adverse event during a specified period, with each element including a degree of uncertainty. Using the example of the fishermen going out to sea, they would consider the likelihood or probability of stormy seas and bad weather conditions occurring as a hazard. The impact of the hazard on their catch would be disastrous should their boat capsize or suffer damage that reduces the carrying capacity. The fishermen would also have to deal with various uncertainties such as visibility, locating schools of fishes, fish nets or equipment breaking down, even to the aspect of fetching a good price for their catch etc. In order to mitigate the risks involved, an individual fisherman would have to carry out his own risk assessment and management. However, as a group, they may wish to carry out an overall risk management and come up with a sound risk communication strategy to fetch a good price at the market. This is equivalent to risk mitigation involving interventional epidemiology.

Mitigating Public Health Threats

Risk assessments are very subjective in many contexts; based off expert opinions, and relying on currently available knowledge which is usually incomplete or difficult to validate, much so that reports always include an indication of uncertainty about the level of risk in the outcomes.[1,2] Uncertainty depends on the quality and detail of information available at the time of assessment. In the next iteration of the risk assessment, when new information becomes available to inform and improve results, the level of uncertainty decreases. The systematic process of assessing risk allows us to better identify the strengths, weaknesses, opportunities and threats while devising counter-measures to prevent, prepare for, mitigate, and reduce the negative consequences. In situations where we are unable to eliminate the hazard or break the chain of transmission, we can only focus on reducing the vulnerability and exposure, while raising the resilience to reduce the overall risk.[3] In dealing with public health risks, considerations around hazards, vulnerability and exposure are generally referring to the pathogen's transmissibility, severity and its impact on the population, healthcare, diagnostics, treatment and vaccine effectiveness. With the COVID-19 crisis, understanding these elements has become a cornerstone in assessing risks and advising public health social measures for the better part of three years of the pandemic.[4]

At the global level, the World Health Organization recognises the importance of reducing the risks of public health threats and their impact on societies, including under-privileged communities. To this end, advocacy for global-urban health security has been one of the major themes alongside universal health coverage which was outlined in the Asia Pacific Strategy for Emerging Diseases (APSED) and Public Health Emergencies' third iteration.[5] Mitigating risks and public health threats requires more than just enhancing capacities and responding when threats come. It requires a shift in thinking by adopting a systems-based approach. Throughout the pandemic, the need to adopt a multi-faceted, interdisciplinary and whole-of-society approach was imperative as the impact of the risks did not only impact lives but also livelihoods on an unprecedented scale. This impact has led to revisions being made to the State Party Assessment Tool[6] and Joint External Evaluation Tool[7] during the pandemic to reflect the lessons learnt and adopt a more holistic view. This is also in line with the development of a new

Health Security Action Framework that does not only focus on public health security threats and risks, but also takes on other dimensions of the risks posed by climate change, One Health and antimicrobial resistance. The growing potential of the complexity of threats to health security and the risks it brings requires us to adopt multisectoral perspectives when assessing the situation so as to adapt and mitigate the potential consequences.

Discussion

In general, any situation which leads to increased contact between humans, livestock and previously separated wildlife species, is a potential zoonotic risk situation. Contributing factors are changing demographics, land use, economics and lifestyles, and global developments such as climate change and microbial adaptation. In the last few decades, large scale changes in our ecology, including human encroachment on wildlife habitats and an increase in wildlife trade, have spurred the increased emergence of such zoonotic spillover situations.

Referring to the classic quote from Sun Tzu's Art of War, "If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle." Digging deeper, we realise that conducting risk assessments is a systematic process which serves to elucidate the readiness and resource status should the public health sector be required to respond to any emergency. Understanding the hazards and their potential exposure provides us with a basic understanding on the type of control measures to implement in order to curb transmission, mitigate its severity and reduce the impact on the population and healthcare system. Integral to the risk management process are monitoring and keeping check of the resources available to you. These include the expertise of professionals, readiness of responders, available equipment and access to countermeasures (e.g. medications, vaccines). Having these resources are already halfway to winning the battle during a crisis.

In a war, the commander with his generals would conduct battle risk assessments prior to, during, and after the battle to assess the circumstances, troops readiness and resources. The same goes for public health responders where a risk assessment forms the basis to formulate plans in order to effectively carry out interventive measures to curb the spread of the pathogen. Understanding the "terrain" (i.e. operating context and climate) is key to informing the implementation of control measures. An integral part of the process is the communication of outputs to the leadership and relevant stakeholders to ensure the alignment of goals. This is likened to communicating via sounds and smoke during battle to issue commands as described in the Art of War.

In conclusion, tackling health security threats requires coordinated efforts but the essential operational processes lie in assessing the risk, understanding the operating context and environment, with the most important being accepting the uncertainty that lies ahead. As humans, we fear the unknown, but it is this uncertainty that requires us to follow the systematic process of elucidating the threat, its potential impact, the potential resources to pour into it for preparedness and response, and ideally reducing the unintended consequences the threat may bring.

Today, the One Health EID framework for managing zoonotic spillover situations can address complex, interdisciplinary issues that remain crucial for effective public health work in an emergency. The key to combating EIDs is a multisectoral response involving activities across several sectors, such as community development, health, education, agriculture, and infrastructure. Bio-surveillance and threat mitigation are often used in the context of whole-of-society initiatives and involves collaboration among different government departments and other stakeholders from a variety of sectors, such as civil society organisations, the private sector, and community groups. By working together, these parties can create healthier and more sustainable solutions to development challenges.

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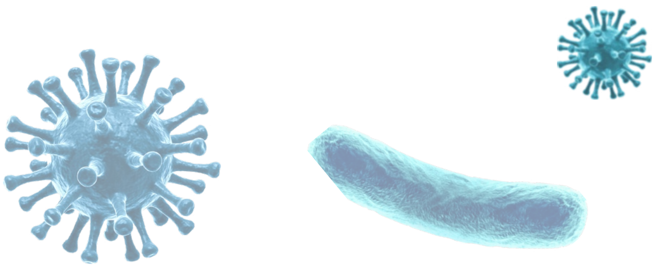


An oximeter measures blood oxygen levels

Point-of-Care Testing

By **Prof Leo Yee Sin,** Senior Advisor, National Centre for Infectious Diseases

Point-of-Care Testing (POCT) generally refers to testing that is done near a patient/person outside of the laboratory, with the results to be acted upon, including potential change in the care of the patient/person. It can be performed by personnel who are not laboratory-trained or by the patient/person himself/herself (self-test), and at multiple locations, such as his/her bedside at the hospital, the emergency room, the intensive care unit, the clinic, in the ambulance, or in the comfort and privacy of his/her home.

History of POCT

In the early days of medicine, almost all tests were done in central laboratories that typically managed hundreds to thousands of samples. But this posed some challenges to healthcare professionals, including having to transport the samples from remote areas, and the subsequent wait for results which could take up to several days or even weeks. Such challenges prompted the need to develop faster tests that can be done near the patient and where results can guide immediate medical interventions.

In recent years, POCT has become a fast-moving field driven by unmet healthcare needs and the rapid advancement of technologies. Today, POCT spans many areas of medicine, and some of the most commonly known POCTs include pregnancy test, and blood sugar test for diabetes. POCT is also being used to detect elevated levels of heart enzymes in cases of suspected heart attack, as well as to detect inflammation markers during an infection or to diagnose rheumatic diseases.

Benefits of POCT

As the tests are done near a patient/person, one key benefit is having a rapid interpretation of the results to support decision making regarding his/her care. Other benefits include readily available self-test kits with better access to them, ease of use, safety, low costs, and the ability to self-monitor. Another advantage is that many different body fluids such as blood, urine, saliva, faeces, nasal and throat swabs can be tested.

However, while many POCTs are designed to be relatively simple and low-risk to use, they are not entirely error-proof. Sensitivity can be compromised due to operator unfamiliarity, inherent nature of the test, and the prevalence of the disease at the time of testing. Therefore, results need to be interpreted appropriately.

POCTs for Infectious Diseases and COVID-19

As an Infectious Disease specialist, I have seen the exponential growth of infectious disease testing of POCT in recent years. For a febrile, unwell patient, the tests are intended to: diagnose infections quickly, allow for timely treatment, limit the spread of infection, and bring an epidemic under control. One POCT which everyone is familiar with is the Antigen Rapid Test (ART) for COVID-19. It is strip-coated with antibodies in a cassette to allow nasal secretions mixed with the buffer solution to flow through. Two lines will appear if the sample contains COVID-19 antigens, denoting a positive result. The two lines consist of a control line marked 'C' to ensure the validity of the test strip, and a test line marked ‘T’ to indicate the result. The entire test typically takes between 15 and 30 minutes.

Another POCT used for COVID-19 is the pulse oximeter, which measures blood oxygen levels. The device enables a patient to self-monitor his/her condition at home. Simply clip the oximeter on to any finger or thumb, and it will show one’s oxygen level and pulse rate. A pulse oxygen level of 95 per cent and above is considered adequate, whereas a reading of 93 per cent and below could require urgent medical attention. Readings of any level between 95 and 93 per cent indicates that the patient should closely monitor his/her condition or seek early medical assessment.

Apart from COVID-19, POCT is used in other infectious diseases such as human immunodeficiency virus (HIV) and Streptococcus infections. The Ministry of Health (MOH) and National Centre for Infectious Diseases (NCID) launched a HIV self-testing pilot programme in August 2022, which complements widely available tests at healthcare institutions. This POCT provides an avenue for individuals to test and to repeat the test if necessary in private through the use of an oral swab, and the results can be obtained within 20 to 40 minutes. Those who test positive should visit a healthcare provider to confirm the diagnosis and be referred for treatment. HIV is a very treatable disease, and early detection and treatment is key to achieve the best outcomes and halt further transmission of the disease.

For Streptococcus infections, a less locally-known but widely used POCT in the West is the rapid strep-throat test. Strep-throat is caused by Streptococcus group A bacterial infection of the throat, and is a common infection among children. Unlike most upper respiratory infections which are caused by viruses, strep-throat is treated with antibiotics as it is a bacterial infection. While serious complications are rare, they can occur without treatment and include, rheumatic fever (i.e. a disease that can affect the heart and joints) and post-streptococcal glomerulonephritis (i.e. inflammation in the kidneys).

Unmet Needs in Infectious Disease Management

There are currently two areas most in need of POCT. Fever is among the most common symptoms of infection, yet not all fevers are due to an infection, and not all infections are caused by bacteria and require treatment with antibiotics. To-date, there is no simple, accurate, ‘catch-all’ marker which can detect the cause of a fever via testing a drop of blood or other means to rapidly diagnose the above. Therefore, it is not uncommon for clinicians to err on the side of caution, and prescribe antibiotics as a treatment. However, this can inadvertently hasten the development of multi-drug resistant bugs. Another area is the rapid detection of drug resistant bacteria to guide optimal antibiotic treatment, either at General Practitioner clinics or hospitals. When facing a patient with sepsis, and where every minute counts to save his/her life, most clinicians would empirically start broad and higher-end antibiotics. This can result in the overuse of high-end last resort medication, which can fuel the emergence of super-bugs with very limited treatment options.

Future of POCT

New advances in POCT devices are emerging from lab-on-a-chip technology. These miniature devices are designed to rapidly automate every step of a laboratory test using a very small sample volume, without the need for manual handling of the sample. They are technologies with a flexible platform that can rapidly be modified to suit novel pathogens. I envisage such technologies to manage rapid triage at emergency rooms or screening centres, to reduce waiting times, and the risk of cross contamination during an outbreak. Other innovations include smartphone-based technology and wearable technology, as well as the integration of artificial intelligence, machine learning and neural networks into POCT.

The opinion piece was first published in Lianhe Zaobao on 10 April 2023.

A HIV self-testing kit is a form of POCT which allows individuals to test for HIV in private

SIDW participants were welcomed by Prof Leo Yee Sin, Executive Director of NCID and had a tour of The NCID Gallery

Recap of the 7th Singapore International Dengue Workshop

By **Dr Chia Po Ying**, Consultant, National Centre for Infectious Diseases

The seventh Singapore International Dengue Workshop (SIDW) was held from 8-17 May 2023 with the aims to address the escalating global threat of dengue. It was jointly organised and sponsored by the World Health Organization (WHO), National Environment Agency (NEA)'s Environmental Health Institute, National Centre for Infectious Diseases (NCID) and the Singapore Ministry of Foreign Affairs (MFA) under the auspices of the Singapore Cooperation Programme. With endorsement from the WHO and the participation of local and international experts, this event paved the way forward to the goal of zero dengue deaths by 2030.

This year, NCID hosted 15 clinical participants from 13 countries and 10 virtual participants in the Asia-Pacific region for the clinical management track of this workshop from 8-12 May. The participants got to learn more about hot and relevant topics in dengue from NCID experts across four and a half days. There was comprehensive sharing on the future of dengue diagnostics, best management practices for dengue in the elderly with co-morbidities, management of adult dengue population including expectant mothers, management of severe dengue and complications, dengue and the heart, evidence-based medicine in dengue and haemorrhage, post-mortem studies of dengue cases and prognosticating dengue. International speakers included Professor Lucy Lum from Malaysia and Professor Siripen Kalyanarooj from Thailand who shared on dengue in the paediatric population.

Discussions were also enriched by participants from diverse backgrounds and sharing by individual participants on dengue cases from their own home country. Cross disciplinary discussions with participants from the laboratory surveillance and field surveillance tracks also enhanced our discussions on defence plans against dengue. In the face of climate change and increased international connectivity, the seventh SIDW served as a beacon of unified action against dengue, by merging the expertise across multidisciplinary participants ranging from epidemiologists to policymakers.

Dr Shawn Vasoo, Clinical Director, NCID, giving a lecture on the future of dengue diagnostics

Junior Field Epidemiology Training Programme for Community Youths

By **Amos Seow,** Executive, Corporate Communications, Executive Director's Office, National Centre for Infectious Diseases

Over 30 secondary and junior college students participated in the second run of the Disease Detective Camp (DDC) which was held from 12 to 14 June 2023. DDC is a collaboration between the National Centre for Infectious Diseases (NCID) and the Rotary Club of Singapore.

The theme of this year's DDC was "Community at Heart" which focused on social concerns involving communicable and non-communicable diseases as a community. During the three-day camp, student participants were involved in role-play scenarios, and experiential learning activities such as donning and doffing of Personal Protective Equipment (PPE) with Powered Air Purifying Respirator (PAPR).

They were also given the opportunity to engage with several NCID staff and gained a deeper understanding of career options. They were then brought on a tour of The NCID Gallery which gave them greater insights into NCID's operations and functions.

During the camp, speakers from Yishun Health and NCID shared on topics such as multisectoral public health and Singapore's pandemic experience and preparedness, enriching the young minds of the student participants. Group discussions on case studies and presentations were included as part of the programme and allowed the participants to have a feel of the different approaches (e.g. communication, problem-solving, decision-making) to handling various scenarios.

Senior Staff Nurse Wong Yee Qing sharing on her role as an infectious disease nurse in NCID

Camp participants practising proper hand hygiene and the steps for hand rubbing

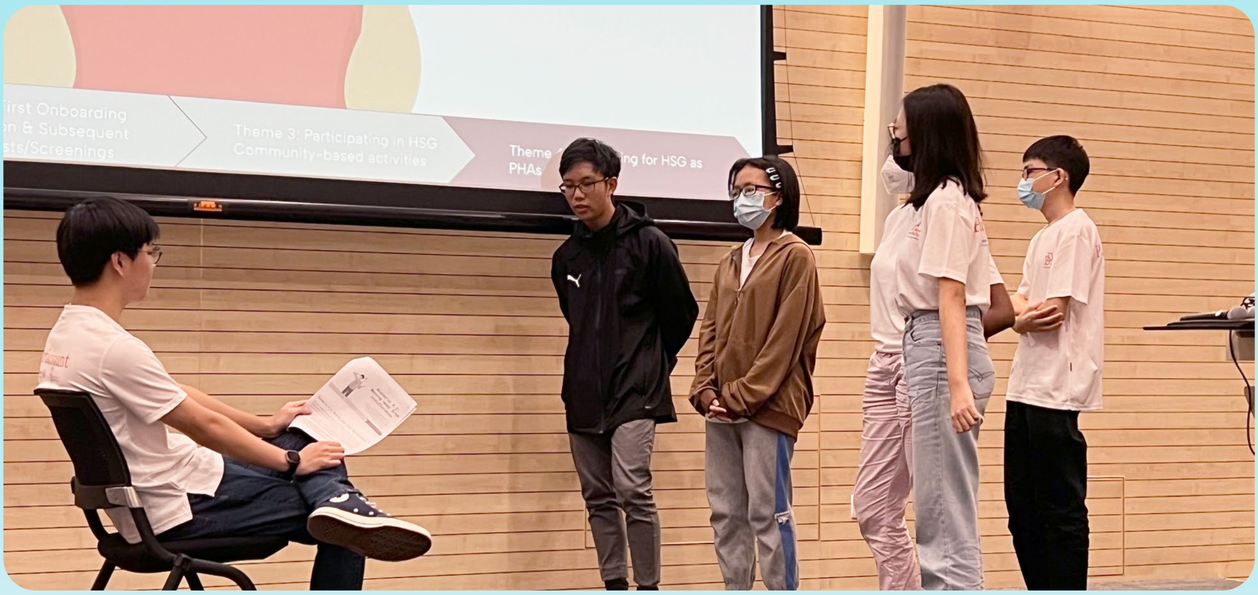
Camp participants wearing shoe covers before donning Personal Protective Equipment (PPE)

NCID Senior Nurse Clinician Jeff Thayalamurugan demonstrating how to properly don the Powered Air Purifying Respirator (PAPR) on a participant

These students are gowned up and ready to role-play for a disease outbreak

Camp participants at The NCID Gallery learning about the history and importance of NCID's role in safeguarding Singapore's public health

Camp participants pictured above and below engaged in groupwork for skits on how they can contribute towards healthier communities



Participants fostered new friendships and gained a better understanding of field epidemiology during the Disease Detective Camp

Migratory Bird Flight during Biosurveillance Sampling at Pulau Ubin
(Photo Credit: Wendy Sng, Animal & Veterinary Service, National Parks Board)

One Health **Intelligence Anticipates the Next Pandemic**

By **Dr Kelvin Lim**, Director, Biorisk and Biosurveillance, Veterinary Health Division, and **Dr Chua Tze Hoong**, Group Director, Veterinary Health Division, Animal & Veterinary Service, National Parks Board

One Health is an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals and ecosystems. By linking humans, wildlife and the environment, One Health intelligence can help to address the full spectrum of pandemic preparedness, prevention and response, and contribute to global-urban health security.

Introduction

Avian Influenza, also known as bird flu, refers to the disease caused by highly contagious influenza type A viruses which domestic and wild birds are the natural hosts. [1] It can be classified into Low Pathogenic Avian Influenza (LPAI) that causes little to no clinical signs, or Highly Pathogenic Avian Influenza (HPAI) that can cause severe clinical signs and possible high mortalities. [1] The Avian Influenza virus is spread by direct contact with fecal and respiratory discharges, and can be carried on fomites and droplets. [2] Migratory wild birds, especially waterfowl, are reservoirs of Avian Influenza viruses. [3] Infected waterfowl can be asymptomatic, depending on the virus strain and species of the bird. Thus, they can spread viruses over long distances, along their migratory pathways. This also means that they can maintain the viruses, and allow the influenza to reassort and evolve over time. The ongoing 2021-2022 wave of Avian Influenza H5N1 has been unprecedented in its spread and frequency of outbreaks in poultry and wild birds, including those in Europe, Asia, Africa and North America. [4]

Changing Epidemiology of Avian Influenza

The current Avian Influenza situation has raised significant concerns within the international community. Since October 2021, an unprecedented number of outbreaks have been reported in several regions of the world, reaching new geographical areas, and resulting in significant mortalities of poultry and wild birds. [5] This threatens global food security, and stakeholders who rely on poultry for livelihoods. It has also led to an alarming rate of wild bird die-offs.

The initial A/Goose/Guangdong/1/96 (GsGd) lineage of Avian Influenza first emerged in 1996, but the current variant and clade 2.3.4.4b has expanded its geographical range and animal host range since 2020. [6] For example, more than 5.5 million birds were

culled in the United Kingdom from October 2021 to November 2022, and the 2022 Avian Influenza outbreak in the United States had resulted in about 40 million animal losses and cost US$2.5 – 3 billion. [7]

The impact of climate change and changes in weather patterns have been an area of focus in animal Avian Influenza studies. Although increasing temperatures and precipitation have been correlated with decreased intensity of transmission of the virus, increasing wind speed and decreasing humidity have been associated with influenza outbreaks as well. [8] More importantly, these environmental factors can have an impact on animal ecology and environment, including the timing of migration, timing of stopover and breeding, availability of stopover locations of migratory birds, as well as their interactions with local birds. [8] These could lead to increased transmission of Avian Influenza between domestic and migratory birds. At the same time, environmental changes along the flyways such as the East Asian-Australasian Flyway (EAAF) migratory bird habitat loss or conversion in the form of rice paddy fields, could alter stopover habitats and change Avian Influenza transmission dynamics. [9] These are significant findings as migratory birds wintering in Southeast Asia, specifically Singapore, have been shown to use the Central Asian Flyway and the EAAF, [10] which demonstrates a potential route for Avian Influenza incursion.

The world has also observed a rising number of cases in several mammalian terrestrial and aquatic species. [11] While Avian Influenza viruses do not typically infect humans, occasional human infections have occurred, predominantly in occupational settings or if humans live and work in settings with high densities of susceptible animals. More recently, it has been reported that cats (which are unusual hosts) in Poland have been infected with Avian Influenza. [12] Molecular analyses showed that the viruses that belong to the clade 2.3.4.4b, genotype CH (H5N1-A/Eurasian_Wigeon/Netherlands/3/2022-like) and possess protein mutations previously associated with enhanced transmission and pathogenicity in non-avian species. [13] The exposure pathways are still under investigation [14], but the majority of non-bird mammalian species, including companion animals, remain as insignificant epidemiological vectors of Avian Influenza viruses to humans or other animals at this juncture.

Protecting Singapore against Avian Influenza

Singapore is currently free from Avian Influenza. However, this is not to be taken for granted. The Animal & Veterinary Service (AVS) of the National Parks Board works with other agencies on a multipronged approach to safeguard Singapore against the risk of incursion of Avian Influenza. This includes requiring overseas countries or territories exporting poultry, ornamental birds, poultry products and eggs to Singapore to be free from Avian Influenza and meet veterinary conditions for import. AVS has an ongoing biosurveillance programme that monitors bird flu outbreaks worldwide and measures will be taken to suspend import sources where necessary. These biosurveillance programmes also monitor for the virus which could potentially be present in Singapore in populations (e.g. local bird establishments or migratory bird roosting sites). More information can be found on the AVS website: https://www.nparks.gov.sg/avs/animals/animal-health-and-veterinarians/animal-diseases-and-antimicrobial-resistance/bird-flu#:~:text=AVS%20has%20in%20place%20measures,poultry%20slaughterhouses%20and%20poultry%20farms.

What precautions can members of the public, including pet owners take?

Members of the public should avoid direct contact with sick poultry, fallen wild birds, and environmental sources contaminated with discharges of birds. Practise regular and proper hygienie such as washing hands with warm water and soap, especially before handling food. Maintain hygienic conditions while preparing meals for companion animals, and avoid feeding companion animals raw poultry meat as a rule.

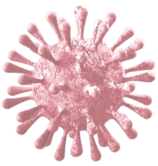
Zoonotic Spillover with Pandemic Potential

The One Health definition, developed by the One Health High Level Expert Panel (OHHLEP) states that it is an integrated, unifying approach that aims to sustainably balance and optimise the health of animals and ecosystems, recognising the health of domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and interdependent. [15]

The Food and Agriculture Organization (FAO) of the United Nations, the World Health Organization (WHO) and the World Organization for Animal Health (WOAH) have come up with a statement urging countries to work together in a One Health approach to protect animals and people. This statement was a result of the H5N1 clade 2.3.4.4b, which began circulating in 2020 and has caused unprecedented deaths in wild birds and poultry. One of the key components is to monitor virus evolution and look for any changes that could make the virus more dangerous to humans and animals.

While the WHO has assessed the current Avian Influenza risk to be "low", their recommendation is that the situation needs to be closely monitored. Sporadic detections in humans have been reported but remain very rare with eight cases reported since December 2021. Dr Sylvie Briand, Director of Epidemic and Pandemic Preparedness and Prevention, WHO said, "With the information available so far, the virus does not appear to be able to transmit from one person to another easily, but vigilance is needed to identify any evolution in the virus that can change that". [16]

This requires formation of cross-disciplinary teams to share information and scans on human and animal outbreaks, provision and sharing of virus and sequence data, if any, study biosurveillance strategies, preparedness, response and communication strategies to control potential outbreaks.



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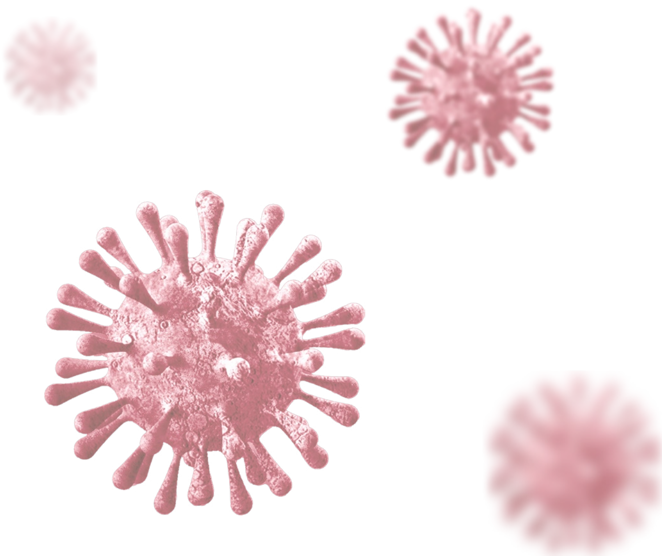


Avian Influenza Viruses

Who Should Notify

Medical Practitioners
Laboratories

NOTIFIABLE DISEASE

YES

How to Notify

Call MOH Surveillance Duty Officer and submit MD131 Notification Form via CDLENS (http://www.cdlens.moh.gov.sg) or fax (6221 5528/38/67)

When to Notify

On clinical suspicion
Upon laboratory confirmation

Notification Time Line

Immediately

Causative Agent

Type A influenza viruses that usually circulate in birds. Classification into two categories based on level of virulence in poultry: low pathogenic avian influenza (LPAI) and highly pathogenic avian influenza (HPAI). All HPAI are of the H5 and H7 subtypes, which have been responsible for large avian epidemics to date.

INCUBATION PERIOD

1-10 days. The incubation period for both influenza A(H5N1) and A(H7N9) is about five days, i.e. longer than the typical two days for seasonal influenza, and up to 17 days for A(H5N1).

INFECTIOUS PERIOD

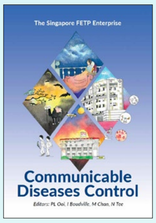
Person-to-person transmission is thought to be rare and is not sustained, occurring only when there is prolonged and close contact.

TRANSMISSION

Avian influenza viruses spread among susceptible birds through contact with contaminated excretions of other infected birds. They do not normally infect other species with the exception of pigs and horses. Human infection results from close contact with infected poultry (live or dead), poultry secretions and excrement, or contaminated environments (such as poultry markets).

EPIDEMIOLOGY

The virus circulates among birds worldwide. The first documented human infection with an avian influenza virus (H5N1 strain) occurred in Hong Kong in 1997. The infection in humans coincided with an epidemic of HPAI caused by the same strain in Hong Kong's poultry population. In 2003, a re-emergence of A(H5N1) in poultry that occurred initially in Southeast Asia spread worldwide. Since then, there have been sporadic human cases with almost all having had antecedent avian exposure. Human cases of influenza A(H7N9) were also detected in China since February 2013. Over 90% of infected persons had exposure to poultry, mostly at live poultry markets. There has not been sustained human-to-human transmission, although several small clusters of infections have been reported. From 2014 through 2015, poultry and egg producers in the United States experienced the largest outbreak of Avian Influenza Virus (H5N2 subtype) in recorded history with approximately 51 million birds depopulated to control the spread of the virus. By the end of 2020, several outbreaks were reported in Europe and three subtypes of HPAI viruses were found: A(H5N8), A(H5N5) and A(H5N1).



SCAN ME!

Editor's Note:

Refer to Communicable Diseases Control, a practical handbook on infectious diseases of public health importance in Singapore. The PDF copy of this 372-page book is downloadable from the NCID website via this QR code.

On 18 October 2023, following the World Health Summit in Berlin, Germany, the Global Field Epidemiology Partnership was launched to bring organisations together to bridge major health security gaps

Rolling Out **Urban NextGen FETP for the World**

By **Assoc Prof Steven Ooi**, Senior Consultant and Field Epidemiology Training Programme Director, National Centre for Infectious Diseases, and International TEPHINET Advisory Board Member

In 2020, amid the raging COVID-19 pandemic, the Singapore Field Epidemiology Training Programme (FETP) conceived the next generation (*NextGen*) field epidemiology training to produce a pool of physicians and non-physicians who are capable of working as field investigators under complex and challenging circumstances. Collaborative training across multiple agencies was designed to meet the formidable challenges of modern lifestyles and urban epidemiology practice. Through multisectoral epidemic intelligence, a One Health approach melded the expertise of various professionals to address critical stakeholders, businesses, political interests, infodemics, and concerned populations.

Introduction

Field epidemiology is a professional area of public health practice requiring training in a wide range of technical and operational competencies. FETPs have been effective and popular such that after four decades since their introduction, there are now more than 85 FETPs around the world, strengthening field epidemiology capacities in over 100 countries. Following COVID-19, it has become even clearer that the defining essence of FETPs is to support critically needed public health intelligence, outbreak investigations, and global-urban health security services. The recognition that health security now requires interdisciplinary teams with effective management and systems support is accelerating FETP's transition into providing more holistic and coordinated training to strengthen the field epidemiology-relevant workforce and their institutions.

Health Security Gaps Today

Classical field epidemiology collects, analyses and interprets human, animal, and environmental health data to play an important role in informing evidence-based decisions. Today, with advances in whole genome sequencing and digital technologies, we need teamwork among laboratorians, informaticians, social scientists and others to ensure services that generate true impact are integrated. Some of the global-urban health security gaps we face are:

- Real shortage of field epidemiologists (less than half of all countries currently meet the target of one trained field epidemiology specialist per 200,000 population)
- Ineffective interoperability mechanisms to mobilise and deploy field epidemiologists for outbreaks and other public health emergencies

- Suboptimal operational and functional integration among field agencies to ensure harmonised interdisciplinary actions for preparedness and response to public health emergencies
- Programmatic and financial inefficiencies due to inadequate coordination and collaboration among field agencies and public health stakeholders
- Limited understanding of field epidemiology amongst the broader public health workforce
- Failure to use technological developments to enhance scalability and cost-effectiveness of training activities
- Variable quality, lack of standardisation and suboptimal quality assurance mechanisms of field epidemiology capacity building initiatives, including the One Health approach
- Inconsistent mechanisms and tools for planning field epidemiology workforce at the local, regional and global levels
- Low level of institutionalisation, financing, and sustainability of training with inconsistent career paths in field epidemiology
- Lack of common assessment criteria for field epidemiology workforce development

GFEP Bridging Health Security Gaps

On 18 October 2023, at the margins of the World Health Summit (WHS) in Berlin, the Global Field Epidemiology Partnership (GFEP) was launched as a partnership of organisations to address major health security gaps. This side-event to the WHS presented the GFEP with the opportunity to reach an agreement on its establishment, key principles, and strategic priorities among a broad group of stakeholders (see Figure 1).

GFEP aims to function as a convening forum that brings together stakeholders to collaborate on common causes and strategic priorities, including joint actions, learning exchange, capacity building and mutual support. It will also build on the strengths of an expansive network of stakeholders with technical, operational, and institutional expertise and on optimising working relationships with key organisations and partners. By doing so, it will set the standard of excellence in scaling up the workforce, developing institutions and strengthening systems for preparedness, detection, early warning, and response.

To address identified gaps and promote resilient health systems, experts agreed it is essential to nurture and train the next generation of public health professionals through expanded training opportunities to continuously build their skills and network. Capacity building increases the ability to prevent, detect, and respond to threats and helps public health professionals to develop skills that would make them more effective. As such, GFEP is prioritising FETP workforce development and capacity building as one of the pillars for progress.

Singapore's NextGen FETP Contributions

Singapore is a founding member of the ASEAN Plus Three (i.e. 10 ASEAN Member States, and the People's Republic of China, Japan and the Republic of Korea) Field Epidemiology Training Network. Its progressive NextGen FETP is modelled after the United States Centers for Disease Control and Prevention (USCDC)'s Epidemic Intelligence Service training and enhanced with multisectoral all-hazards (One Health) curriculum, materials and approaches to address our unique global-urban health security situation. The programme has completed 12 runs of its flagship courses from 2020 to 2023, and over 300 participants from 16 public agencies have gained practical insights in public health practice and outbreak management. This includes learning how to apply an evidence-based holistic approach, and how to explain transmission dynamics in the emergence of unusual events and epidemics.

The World Health Organization, USCDC, and the Training Programs in Epidemiology and Public Health Interventions Network have collectively noted that Singapore's NextGen FETP could contribute towards strengthening field epidemiology in many (especially low-mid income) countries facing globalisation and urbanisation, and that GFEP, as an example of value-add, can channel Singapore's experiences and competencies to them. Suggestions included collaborating to:

- Explore areas for joint training via virtual and live outreach, materials development, and professional scientific programmatic exchanges
- Incubate new ideas, projects and novel training methods for building capacities, field epidemiology training, and public health workforce development

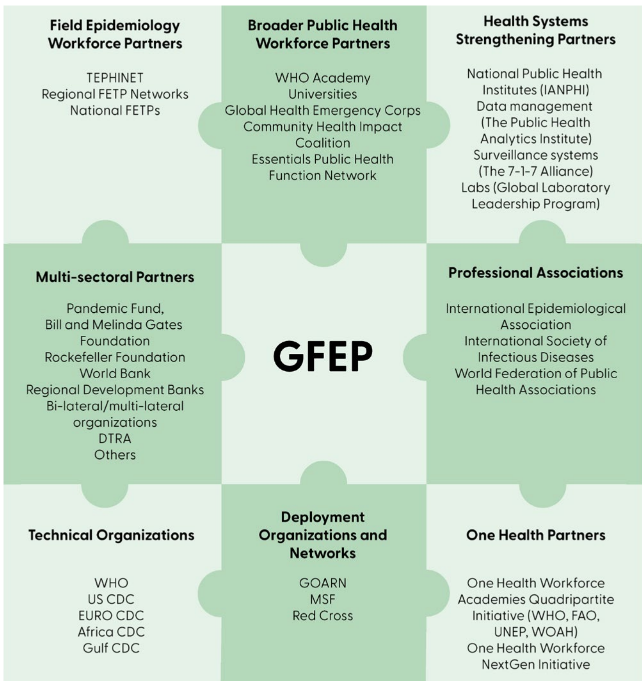


Figure 1. GFEP stakeholders
(Photo Credit: Global Field Epidemiology Partnership)

- Advocate for coordination of common strategies and workplans, with networking for career field epidemiology officers internationally

Singapore's FETP continues to be engaged with many countries internationally (see Figure 2). Given the interdisciplinary and cross-sectoral nature of field epidemiology, GFEP embraces a whole range of stakeholders at the global, regional and national levels engaged in strengthening the workforce, institutional capacities and systems relevant to field epidemiology. In beneficial ways, these stakeholders will provide access to a synergy that promotes collaboration, coordination, information sharing, mutual learning and joint actions in an effective and efficient manner.

Master Class 2024 is now open for applications by local and international candidates. The foundational FETP course is professionally certified by the National University of Singapore, and will run on five full Saturdays from 6 July to 3 August 2024 at the Saw Swee Hock School of Public Health. Those interested may seek details from Programme Director, Assoc Prof Steven Ooi at steven_pl_ooi@ncid.sg.

SG FETP as an international training resource to strengthen the FETP experience of countries and advance health emergency preparedness and response

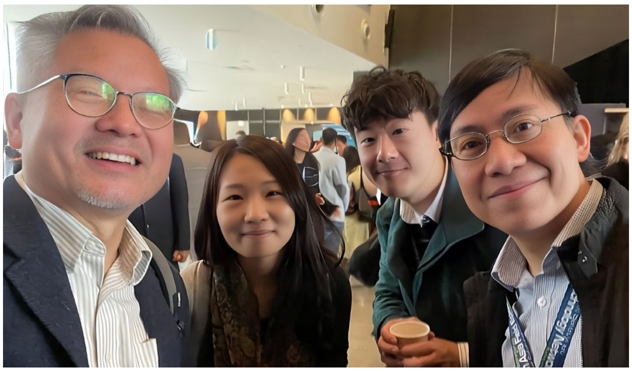
Urban Health Security Course, 13-17 Nov 2023

- First post-pandemic live FETP course supported by the Ministry of Foreign Affairs under the SG Coorperation Programme, designed as a workshop for mid-to senior-level government officials following positive feedback on the "Urban Pandemic Response in Cities" virtual course in 2022
- Participants exchange practical ideas on health security services, including: (1) building national capacities and capabilities to respond to outbreak effectively; (2) use of technology in urban health preparedness; (3) risk communication, community engagement and protecting vulnerable groups; (4) policy implementation at hospitals and primary care institutions; (5) building community resilience and enhancing participatory governance

Multisectoral Urban Epidemiological Response Course, 29 Jan-2 Feb 2024

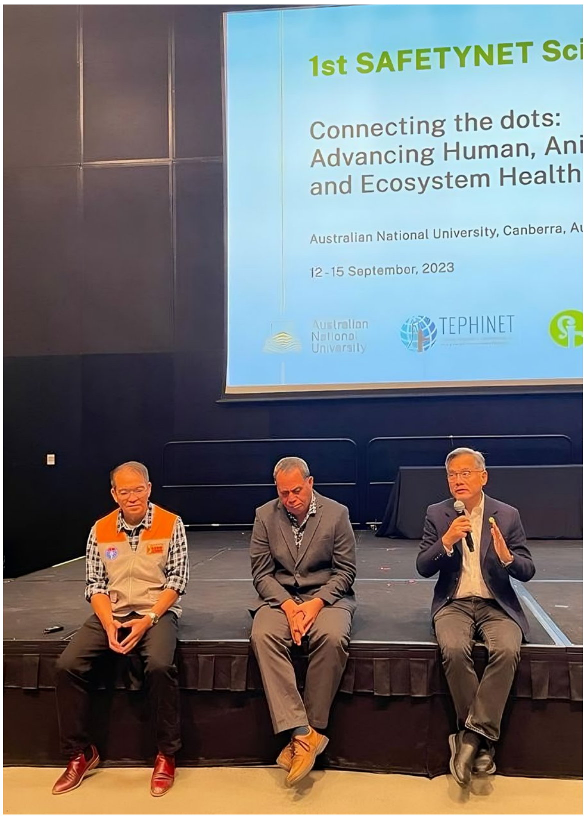
- Third run of FETP course supported by the Ministry of Foreign Affairs under the Japan-SG Partnership Programme for the 21st Century (JSPP21) with FETP Trainers from Japan and SG, designed as a workshop for mid-to senior-level goverment officials and epidemiologists
- Participants share strategies and techniques for managing outbreaks and controlling the spread of infectious disease, including: (1) applied epidemiology and rapid response; (2) outbreak detection and investigation; (3) COVID-19 pandemic experience; (4) surveillance and risk assessment; (5) global health engagement

Figure 2. Singapore FETP's international technical engagements through urban NextGen FETP courses



From Left to Right: A/Prof Steven Ooi, FETP Director, NCID, with Hong Kong FETP trainees Cynthia and Sam, and their Director, Dr Albert Au, at an international meeting in Canberra, Australia

Field epidemiologists from Singapore, Thailand, Cambodia and Indonesia sharing a light moment at an FETP Training of Trainers workshop in Phuket, Thailand



A/Prof Steven Ooi in a panel discussion on the challenges of conducting field epidemiology in different contexts at an international scientific conference hosted by the Australian National University, Canberra

Singapore HIV Congress 2023

The third run of the Singapore HIV Congress (SHC) 2023 presented by the National HIV Programme (NHIVP) under the National Centre for Infectious Diseases (NCID) was held on 2 December 2023. The congress brought together medical, scientific and academic experts to discuss and provide updates on the latest developments in HIV medicine and related fields. This year's theme, "Integrate – Empower – Advance: Improving Outcomes, Enhancing Health", emphasised the integration of HIV care across all specialities and into the broader healthcare and community landscape. The congress highlighted partnerships between community groups, people living with HIV, healthcare providers and public health practitioners. By empowering them with knowledge, skills and tools, the ultimate goal is to advance in the field of HIV, improving outcomes and enhancing health for all.

The congress was held at the Centre for Healthcare Innovation (CHI) auditorium. For more information on the programme, visit https://for.sg/shc2023

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