ONE HEALTH MANUAL
ON HANDLING ZOONOTIC DISEASE OUTBREAKS IN MALAYSIA

Chief Editor
PROF DR ABDUL RASHID KHAN

USAID FROM THE AMERICAN PEOPLE

MyOHUN MALAYSIA ONE HEALTH UNIVERSITY NETWORK

One Health WORKFORCE

ONE HEALTH MANUAL

ON HANDLING ZOONOTIC DISEASE OUTBREAKS IN MALAYSIA

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FOREWORD BY DIRECTOR-GENERAL, MINISTRY OF HEALTH MALAYSIA

FIRST, I wish to congratulate the members of the multisectoral and multidisciplinary team from government agencies and the universities, working under the Malaysia One Health University Network (MyOHUN), for initiating and successfully completing this novel Manual.

This One Health Manual is a much needed, and welcome addition, to the existing guidelines and manuals on outbreak management in our country. I believe that this is the first local Manual that deals with zoonoses outbreak investigation based on the One Health paradigm. While the general concepts of One Health are now better known and accepted, how to implement the One Health concept is still not clearly understood. The Manual's strength lies in its transdisciplinary (and not just interdisciplinary or multidisciplinary) and multisectoral approach to the surveillance, prevention, investigation and control of zoonoses. It is hoped that this Manual will address, to some extent, the numerous issues and barriers related to implementation of One Health, thereby bridging the gap between concept and implementation.

Users of this Manual should first read the Introduction to gain a quick understanding of the One Health Paradigm, as well as its history and development. The six Chapters of the Manual cover the following topics: (1) Preparations for outbreak investigation, (2) Establish and verify the diagnosis of zoonotic diseases, (3) Laboratory involvement, (4) Developing, evaluating and refining hypotheses, (5) Implementation of control measures, and (6) Communication during outbreak investigations. The authors have done their best to address the topics based on the One Health concept.

I am confident that by following the recommendations in this Manual, we will improve the way we manage zoonoses outbreaks, many of which have occurred in Malaysia. We were affected by the Nipah virus outbreak in 1998, Severe Acute Respiratory Syndrome (SARS) in 2003, influenza A(H1N1)pdm pandemic in 2009, brucellosis in 2011/2012, rabies in 2015, while leptospirosis has become endemic in our country. Meanwhile, avian influenza continues to smoulder in the region. Our experiences in managing the human health aspects of these zoonoses, have highlighted the need for more horizontal interaction and cooperation among the disciplines and the sectors of the agencies, departments, ministries and academia that are responsible for public health, medical professions, veterinary services, and the environment.

Making One Health operational provides an excellent opportunity for convergence and synergy between the priorities of the human health, and the animal health sectors. In Malaysia, much work still need to be done to address the seven Essential issues and challenges for putting One Health into practice, and the five steps listed in the Way Forward section of the Introduction of this Manual.

Finally, I suggest that MyOHUN collect feedback from users of this Manual, so that shortfalls can be addressed and improvements made to future editions.

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DIRECTOR GENERAL
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FOREWORD BY DIRECTOR-GENERAL, DEPT OF VETERINARY SERVICES, MALAYSIA

"ONE HEALTH" is a concept that human health, animal health and ecosystems are interdependent and bound to each other to work in harmony. If one component is imbalanced, then the others will be affected.

The One Health concept has been envisaged and implemented by the World Organization for Animal Health (OIE) since year 2000 as a collaborative global approach to understanding the risks for human, animal and ecosystem health as a whole. Controlling zoonotic pathogens at their animal source is the most effective and economic way of protecting humans. These initiatives should be coordinated at the human–animal–ecosystems interface and applied at the national level through the implementation of appropriate policies. Therefore, this Manual is a good initiative taken as a guide for working collaboratively in handling zoonotic disease outbreaks efficiently and effectively.

Veterinary Services, play an essential role in the development and implementation of policies to manage animal health risks. In protecting animal health and welfare, they substantially contribute towards improving human health, as well as food safety and security. For this reason, they need appropriate and effective methods to prevent and control zoonotic disease outbreaks, and must be able to communicate and form collaborations with a wide range of stakeholders, in order for efficient joint action to be taken.

Since animal is the main source of human pathogens, controlling all animal pathogens at their animal source is the most effective and economic way of protecting people; therefore collaborative and multi-sectoral and multidisciplinary approach, centred on the concept of "One Health" is important to be realised. Being aware of health risks at the human–animal–ecosystems interface is the cornerstone of their prevention and control. It is high time that a Manual like this is developed to be used as a guide of how One Health approach can be applied in zoonotic disease management.

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DEPARTMENT OF VETERINARY SERVICES MALAYSIA

FOREWORD BY CHAIRMAN, MALAYSIA ONE HEALTH UNIVERSITY NETWORK (MYOHUN)

EMERGING infectious and zoonotic diseases have been identified as a major threat to the health of people and animals globally, and to the security of our food systems and the environments. In the past few decades, several emerging infectious and zoonotic disease outbreaks have occurred at an unprecedented rate, which resulted in suffering and death of human and animals, and imposed enormous financial burden on society. The unique nature of emerging infectious and zoonotic disease requires rigorous procedures involving trans-disciplinary team; a team of many individuals from different specialties and expertise. At present, there are various Standard Operation Procedures used by governmental departments or ministries in handling disease outbreak. Malaysia One Health University Network (MyOHUN) sees this opportunity as imperative to revise and introduce a common manual for the use of novice and for guidance of workers in the field to respond and manage an emerging infectious and zoonotic disease outbreak.

This manual is a product of the joint efforts of MyOHUN members, a national network under the umbrella of South East Asia One Health University Network (SEAOHUN) dedicated in building capacity of the global health workforce to prevent, detect and respond to emerging infectious and zoonotic diseases with the financial support from The United States Agency for International Development (USAID) and in collaboration with the University of Minnesota and Tuft University, USA. As the chairman of MyOHUN, I sincerely hope that this manual will be used to train our students from the medical, veterinary and other related disciplines, and will provide ministerial officers and practitioner's guide when handling emerging infectious and zoonotic diseases. I am humbled and am extremely grateful to the contributors of this manual, led by Prof Abdul Rashid Khan and team members from universities and ministries, for their time and determination leading towards its completion. It is indeed a testament to the commitment of members of MyOHUN to the education and training of the current and future one health workforce on the emerging infectious and zoonotic diseases. Thank you.

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PREFACE

TO ME, "One Health" connotes "multidisciplinary collaboration". Although most are aware with the term multidisciplinary but the concept of One Health is alien to some and the idea of working in a multidisciplinary team disconcerting. This is not surprising considering it is human nature to fear things/concepts we are not familiar with. Interestingly it was fear that triggered experts to appreciate the importance of coordinated collaboration of a multidisciplinary team. The estimated 50 million deaths associated with the Spanish influenza at the end of the First World War triggered a worldwide fear of a pandemic when HPAI H5N1 emerged. This resulted in the start of the One Health concept being taken seriously by experts and governments. One Health has now progressed beyond the "bird flu" and SARS pandemic threat to enclose other zoonotic diseases and beyond, including climate change as a global threat.

The population of the world is increasing and it is inevitable that the interface between humans, animals and environment becomes more intimate. Because of the increased human-animal interaction, compounded by the increasing land use, changes in climate and international trade and travel, the risk of exposure to new and existing pathogens also increases incrementally. Because both humans and animals carry many similarities there is a real risk of infections originating from either. Hence it is pertinent that we are aware of the similarity and interconnectivity of these two species health in planning and preventing global disease prevention measures. With the increase in awareness, knowledge and understanding of the interdependency of the human, animal and environment interaction, the One Health concept is now gaining momentum in the world.

Although One Health is generally considered as a new concept but the foundation had been laid long ago with Hippocrates work in "On Airs, Waters and Places". In the 1800's Rudolf Virchow succinctly described this concept - "Between animal and human medicine there is no dividing line—nor should there be. The object is different but the experience obtained constitutes the basis of all medicine." But not until the 1980's, when epidemiologist Calvin Schwabe called for a unified human and veterinary approach to combat zoonotic diseases, was the modern foundation for One Health laid. But it took almost another three decades before the American Veterinary Medical Association and the American Medical Association adopted the concept. The idea and concept has now grown large and many international organizations including the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO), the World Organisation for Animal Health (OIE), the United Nations Children's Fund (UNICEF), the World Bank, and the United Nations System Influenza Coordination (UNSIC) have adopted the principles of One Health.

In the search for the most appropriate definition of One Health, I found a myriad, but all of which point to a common theme - collaboration. The importance of collaboration cannot be emphasized enough, collaboration increase the thought process, effectiveness, optimize resources and break down the practice and mentality of working in silos and enables the building of new networks and expanding of existing ones among professionals through multidisciplinary communication, cooperation, and collaboration.

Outbreak investigations which are a component of epidemiology and public health, are not only important for immediate identification of the source of the outbreak but also to prevent future outbreaks by increasing the knowledge and skills of the persons involved in the investigations. In most instances, outbreak investigation requires individuals with different background to be effective. Hence outbreak investigation provides a unique opportunity for collaboration, training and cooperation between the people with different disciplines i.e. a One Health team. Internationally, One Health teams usually comprise of physicians, veterinarians, wildlife specialists, environmentalists, anthropologists, economist and sociologist. This eclectic group is the best means of controlling infectious diseases including zoonotic infections some of which have a potential to cause extensive human morbidity and mortality, however this concept is still novel within Malaysian.

We are cognizant that there are many standard operating procedures to investigate and control infectious diseases but all are very specific to each discipline. Hence this project provided a unique opportunity to create a manual to encompass the One Health concept in an interdisciplinary team collaborating to investigate an outbreak and provide an avenue to educate existing and future One Health workforce.

This manual was prepared by a multidisciplinary team; for some this was a first experience working in an One Health team. The exercise of preparing this manual provided us with the opportunity to understand each other's invaluable role in zoonotic disease prevention and control. It is our fervent hope that the users of this manual will benefit from it and become productive one health members in the prevention and control of zoonotic infections. This manual is not meant to replace existing manuals/standard operating procedures available but rather to complement and provide opportunities for field workers to consider all aspects of disease control. The content of this manual was taken from many sources which we have cited, we encourage the user to refer to these sources for further reference. Considering this user friendly multidisciplinary One Health manual on handling disease outbreaks is the first of its kind, we look forward to feedbacks and suggestions for improvement in the future edition.

'It is not the strongest of the species who survive, nor the most intelligent; rather it is those most responsive to change' (Charles Darwin).

One Health is an important response to change, change to the way we respond to emerging and remerging infectious diseases. Our survival depends on it!

PROF DR ABDUL RASHID KHAN
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Veterinary Research Institute

We would also like to extend our gratitude to Mr Raja Khairul Adli Bin Raja Kamalzaman and his MyOHUN National Coordinating Office team for their invaluable help in making this project a success.

Finally I would like to congratulate and thank the team in making this experience pleasant and educational for me personally. It may be small, but all of us have played a part in the Global Health Security Agenda.

LIST OF ABBREVIATIONS

AAHL	-	Australian Animal Health Lab
ACD	-	Active case detection
ADIC	-	Animal Disease Information Centre
AIV	-	Avian Influenza Virus
AMA	-	American Medical Association
AMRO	-	Assistant Medical Record Officer
AMT	-	Alert Management Team
AR	-	Attack Rate
AVMA	-	American Veterinary Medical Association
BSL	-	Biosafety lab
CI	-	Confidence interval
DFAT	-	Direct Fluorescent Antibody Test
DG	-	Director General
DHO	-	District Health Office
DNA	-	Deoxyribonucleic acid
DVS	-	Department of Veterinary Services
ELISA	-	Enzyme Linked Immunosorbent Assay
FAO	-	Food and Agricultural Organization
HA (genes)	-	Hemagglutinin
HAZMAT	-	Hazardous Material Team
HPAI	-	Highly pathogenic avian influenza
ICU	-	Intensive Care Unit
IHR	-	International Health Regulations
ILI	-	Influenza Like Illness
IMR	-	Institute of Medical Research
IV	-	Intravenous
MAT	-	Microscopic Agglutination Test
OHW	-	One Health Workers
OIE	-	Office of International Des Epizooties (World Organization for Animal Health)
OR	-	Odds Ratio
OWOH	-	One World One Health
PCR	-	Polymerase chain reaction

PERHILITAN	-	Department of Wildlife and National Parks
PHEICs	-	Public Health Emergencies of International Concern
PPKP	-	Assistant Environmental Health Officer
PUO	-	Pyrexia of unknown origins
RAT	-	Rapid Action Team
RBPT	-	Rose Bengal Plate Test
RR	-	Relative Risk
RRT	-	Rapid Response Team
RTPCR	-	Reverse transcription polymerase chain reaction
SPS	-	Sanitary and Phytosanitary
STI	-	Sexually Transmittable Illnesses
UNICEF	-	United Nations International Children's Emergency Fund
VRI	-	Veterinary Research Institute
WHO	-	World Health Organization

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INTRODUCTION

ONE HEALTH MANUAL

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Importance of the challenges posed by the spread of infectious diseases

The importance of the challenges posed by the spread of infectious diseases is evident in the first sentence of the first paragraph of the Executive Summary of the Consultation Document entitled Contributing to One World, One Health which was produced by five United Nations agencies and The World Bank (2008) -

> *"Humanity faces many challenges that require global solutions. One of these challenges is the spread of infectious diseases that emerge (or re-emerge) from the interfaces between animals and humans and the ecosystems in which they live. This is a result of several trends, including the exponential growth in human and livestock populations, rapid urbanization, rapidly changing farming systems, closer integration between livestock and wildlife, forest encroachment, changes in ecosystems and globalization of trade in animal and animal products." (FAO, OIE, WHO, UNSIC, UNICEF & The World Bank, 2008)*

A comprehensive literature review by Taylor et al (2001) identified 1,415 species of infectious organisms which are known to be pathogenic to humans. Of these, 868 (61%) are zoonotic, and 175 (12.4%) pathogenic species are associated with diseases that are considered to be "emerging". Of the emerging pathogens, 132 (75%) are zoonotic. Overall, zoonotic pathogens are twice more likely to be associated with emerging diseases than non-zoonotic pathogens.

Further investigations into a variety of wildlife species revealed a plethora of new viruses carried by fruit and insectivorous bats, rodents and other species of wildlife from around the globe.

The SARS outbreak in 2003 showed that:

- a previously unknown pathogen could emerge from animal sources at any time and in any place and, without warning, threaten the health, well-being and economies of all societies;
- there was a clear need for countries to have the capability and capacity to maintain an effective alert and response system to detect and quickly react to outbreaks of international concern, and to share information about such outbreaks rapidly and transparently.

Following the lessons learnt from the SARS and H5N1 outbreaks, WHO put together a strategic action plan for pandemic influenza (2006 – 2007) which emphasized the need for all countries to develop capacities to rapidly detect, contain, respond to, and cope with such pandemics. Five strategic actions and corresponding goals that contribute to an overall objective of pandemic prevention and preparedness were suggested. (*Table 1*) The document (WHO, 2006) is available at: *http://www.who.int/csr/resources/publications/influenza/StregPlanEPR_GIP_2006_2.pdf*

Table Introduction 1: *Strategic action plan and goal*

STRATEGIC ACTION	GOAL
1. Reduce human exposure to the H5N1 virus	Reduce opportunities for human infection and, in so doing, reduce opportunities for a pandemic virus to emerge
2. Strengthen the early warning system	Ensure that affected countries, WHO, and the international community have all data and clinical specimens needed for an accurate risk assessment
3. Intensify rapid containment operations	Prevent the H5N1 virus from further increasing its transmissibility among humans or delay its international spread
4. Build capacity to cope with a pandemic	Ensure that all countries have formulated and tested pandemic response plans and that WHO is fully able to perform its leadership role during a pandemic
5. Coordinate global scientific research and development	Ensure that pandemic vaccines and antiviral drugs are rapidly and widely available, shortly after the start of a pandemic and that scientific understanding of the virus evolves quickly

Source: *WHO (2006). p2*

Thus Malaysia must develop the capability and capacity to be ever ready to face zoonotic disease outbreaks, and be better prepared than we were during the Nipah virus outbreak in 1998/1999.

Following WHO's advice, the Ministry of Health Malaysia (MOH, 2006) also put in place structures (planning committee) and a policy document (interim national plan) aimed at providing guidance and the capacity to adequately pre-empt, respond, and contain such outbreaks through rapid, timely and coordinated inter-sectoral and inter-agencies action. Six phases of pandemic preparedness and response were identified, with clearly specified goals, and the responsible agencies/personnel including public health, medical, laboratory, risk communication and pharmaceuticals. This action plan and steps are detailed on *pages 24 to 42* of the National Influenza Pandemic Preparedness Plan (2006), available at: *http://jknns.moh.gov.my/v1/images/borang/cdc/s.National%20Influenza%20Pandemic%20Preparedness%20Plan.pdf*

The objectives of the national influenza surveillance system are to:

a. detect increased influenza activities, either epidemic or pandemic through:
   - » detection of influenza-like illness (ILI) in the community using sentinel general/primary medical practices;