

PRINCE MAHIDOL
AWARD CONFERENCE

2018



MAKING THE WORLD SAFE
FROM THE THREATS OF
EMERGING INFECTIOUS DISEASES

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THE COMPANION BOOK FOR FIELD TRIPS



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*THE COMPANION BOOK
FOR FIELD TRIPS*

Making the World Safe from the Threats of Emerging Infectious Diseases

The companion book for field trips in PMAC 2018

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Thailand National Strategic Plan for Emerging Infectious Diseases and Antimicrobial Resistance¹

The Thailand National Strategic Plan for Emerging Infectious Diseases and Antimicrobial Resistance are guided by two underlying concepts: “One Health”² approach which recognizes the interconnectivity across human, animal and environmental health; and “Triangle that Moves the Mountain”³ concept which emphasizes the importance of resolving complex inter-sectoral issues through policy engagement and social movement driven by evidence from knowledge generation.

Three guiding principles shape the contents of the Thailand National Strategic Plan for Emerging Infectious Diseases and Antimicrobial Resistance as follows:-

- Action oriented with measurable goals and targets by implementing the National Strategic Plan in stepwise manner leading toward continued advancement
- Synergistic efforts which orchestrate and promote coherence of the existing policies, processes and actions across relevant stakeholders
- Political engagement to ensure effective and sustainable implementation.

¹ Adapted from “The Thailand National Strategic Plan for Emerging Infectious Diseases 2017 – 2021” by The Working Group on Establishment of National Strategic Plan for Emerging Infectious Disease 2017 – 2021 and “The Thailand National Strategic Plan for Antimicrobial Resistance 2017 – 2021 ” by The Coordination and Integration Committee on Antimicrobial Resistance.

² ‘One Health’ is an approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes. The areas of work in which a One Health approach is particularly relevant include food safety, the control of zoonoses (diseases that can spread between animals and humans, such as flu, rabies and Rift Valley Fever), and combatting antibiotic resistance (when bacteria change after being exposed to antibiotics and become more difficult to treat). <http://www.who.int/features/qa/one-health/en/>

³ Prawase Wasi, M.D.. Professor of Medicine Emeritus. Former Chairman WHO/SEARO ACHR., Human Resources for Health Development Journal (HRDJ) Vol. 4, No. 2, May - August 2000, . Special Article. “Triangle That Moves The Mountain” and Health Systems Reform Movement in Thailand.

The Thailand National Strategic Plan for Emerging Infectious Diseases 2017 – 2021

Thailand has given priority on the importance of preparedness, prevention for and response to emerging infectious diseases using strategic plan as a common framework for close coordination and collaboration. The strategic plans have been established and used continuously, i.e. the National Strategic Plan for Avian Influenza Response and Pandemic Influenza Preparedness and Response 2005–2007, the National Strategic Plan for Avian Influenza Response and Pandemic Influenza Preparedness and Response 2008 – 2010 and the National Strategic Plan for Emerging Infectious Disease Preparedness, Prevention and Response 2013-2016

Thailand National Strategic Plan for Emerging Infectious Diseases 2017 – 2021 was endorsed by the National Executive Committee on Preparedness, Prevention and Response to Emerging Infectious Diseases chaired by Thailand Deputy Prime Minister. The plan aims to provide a unified frame work for effective implementation efforts on a continuous basis that had been implemented under the earlier strategic plans. Working groups comprised of representatives from main agencies had drafted the plan for systematic expert consultations and public hearings among relevant sectors. Important issues arising from a thorough review of key legal aspects, inter-related plans and international cooperation frameworks were taken into account. Key documents were the Draft Constitution of the Kingdom of Thailand 2016 (receiving the referendum on 7 August 2016), the Draft Twenty-Years National Strategic Framework of the Kingdom of Thailand (2017 – 2036) (Summary), the Draft National Economic and Social Development Plan No.12 (2017 – 2021) (Summary), Communicable Diseases Act B.E. 2558 (2015), Animal Epidemics Act B.E. 2558 (2015), Wildlife Preservation and Protection Act B.E. 2535 (1992), Disaster Prevention and Mitigation Act B.E. 2550 (2007), Master Plan on Preparedness for Climate Change (2015 – 2050), Master Plan on Biodiversity Integrated Management B.E. 2558 – 2564 (2015 – 2021), National Plan on Disaster Prevention and Mitigation B.E. 2558 (2015),

Thailand National Strategic Plan on Antimicrobial Resistance 2017 – 2021, International Health Regulations (2005), The Draft Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies (APSED III, 2016), One Health Approach, and the Post-2015 ASEAN Health Development Agenda.

Thailand National Strategic Plan for Emerging Infectious Diseases, 2017–2021 sets the vision “Thailand is able to systematically, effectively, and promptly prevent and control emerging infectious diseases and therefore well recognized internationally through integrated approach, knowledge management and multi-sectoral participation of all sectors.” Its goal is “Thailand able to reduce morbidity, mortality as well as socio-economic and environmental impacts from outbreaks of emerging infectious disease. The plan defines six strategies as the followings:

- Strategy 1 Preparedness system development for public health emergencies
- Strategy 2 Surveillance, prevention, treatment and control system development for emerging infectious diseases using One Health approach
- Strategy 3 Risk communication and public relations system development for emerging infectious diseases
- Strategy 4 Strengthening of international cooperation
- Strategy 5 Promotion of civil society and private sector participation in emerging infectious disease prevention and control
- Strategy 6 Promotion of knowledge management and research and development

The six strategies are inter-related. Each strategy has clear goals and targets, key performance indicators, strategies, measures and operational guidelines.

It is well aware that preparedness, prevention and response to emerging infectious diseases require multi-sectoral collaboration among all concerned agencies. The plan therefore defines roles and responsibilities of all concerned agencies

and stakeholders including government, state enterprise, private sector as well as civil society. The implementation mechanisms are composed of 3 aspects, i.e. (1) Management of the strategic plan, (2) Coordination of involvement and activities, and (3) Monitoring, evaluation and performance reporting. All involved agencies agree to develop relevant action plans, put their best efforts and implement the plans accordingly. The integration of plans and implementations to build and strengthen core capacities for prevention and response to emerging infectious diseases in a concerted way will help moving Thailand towards achievements of health security of the people which is the foundation of socio-economic security of the country.

Thailand's National Strategic Plan on Antimicrobial Resistance 2017-2021

Antimicrobial medicines, especially antibacterial agents, are essential to medical care and public health. As well as having a vital role in reducing morbidity and mortality in individuals who present with bacterial infections, they are also important for the prevention of infections associated with surgery, organ transplantation and chemotherapy. Antimicrobials are also essential for the prevention and treatment of infectious diseases in veterinary practice and agriculture including the livestock industry and in fisheries; they are also used in crop production. They are therefore important for the food production chain and for the national economy.

In recent years, the problem of antimicrobial resistance (AMR), especially resistance to antibiotics, has increased significantly. Unless drastic action is taken, it is expected that this trend will continue. The further spread of resistance threatens the effectiveness of existing antimicrobials: a situation that is compounded by a lack of incentives for the pharmaceutical industry to invest in research and development of new antibiotics. The concern is therefore that the world is heading towards a post-antibiotic era in which simple bacterial infections may become more lethal. This

scenario also threatens the practice of modern medicine and could lead to a situation where important medical procedures such as those listed above can no longer be safely performed. Globally, AMR is believed to cause approximately 700,000 deaths per year. It has also been estimated that failing to tackle AMR could cause 10 million deaths a year and cost up to 100 trillion USD by 2050. The highest impact is also likely to be found in Asia and Africa, accounting for 4.7 and 4.2 million deaths respectively. In Thailand, a preliminary study on the burden of AMR has revealed that AMR causes approximately 38,000 deaths annually and that overall economic losses due to AMR are as much as 1,200 million USD.

The National Strategic Plan on Antimicrobial Resistance (2017-2021) is the first Thailand's strategy which addresses Antimicrobial Resistance specifically. It was developed by the AMR Coordination and Integration Committee, a multi-sectoral committee appointed by the Ministry of Public Health (MOPH) through a ministerial order in May 2015. The drafting process began in the mid of 2015 with full participation of and engagement by multi-stakeholders. The draft versions have gone through several rounds of public consultation including through the 2015 National Health Assembly (NHA)⁴ and the 2016 formal public hearing forum. Synergizing the National Strategic Plan on Antimicrobial Resistance development process, a NHA Resolution on the integrated approach addressing antibacterial resistance crisis was adopted in December 2015. Through these processes, the draft of National Strategic Plan on Antimicrobial Resistance was finalized in the second half of 2016. Finally, through a joint proposal by Ministry of Public Health (MOPH) and Ministry of Agriculture and Cooperatives (MOAC), the National Strategic Plan on Antimicrobial Resistance was endorsed by a Cabinet resolution in August 2016.

⁴The National Health Assembly (NHA), mandated by the National Health Act 2007, is a bottom-up, evidence-based participatory public policy process through inclusive engagements by government sector, the academia, private and people sectors across all 77 provinces of Thailand

The vision of the National Strategic Plan on Antimicrobial Resistance 2017-2021 is to reduce the morbidity, mortality and economic burden caused by AMR. Its goals are that by the year 2021, morbidity caused by AMR will reduce by 50%; antimicrobial consumption in human and animals will reduce by 20% and 30% respectively; public knowledge on AMR and awareness on the appropriate use of antimicrobials will increase by 20%; and national AMR management systems will comply with international criteria.

In order to achieve these goals, the development of Thailand's National Strategic Plan on Antimicrobial Resistance 2017-2021 is based on three underlying principles: (1) it needs to be an action-oriented strategic plan with measurable outcomes; (2) it needs to be a synergized and orchestrated strategic plan in order to consolidate multi-sectoral efforts; and (3) it needs to be a strategic plan to stimulate political commitment as a key factor leading to the resolution of AMR issues and the allocation of appropriate resources to address AMR issues effectively and sustainably.

Thailand's National Strategic Plan on Antimicrobial Resistance 2017-2021 consists of 6 strategies as follows:-

- | | |
|------------|---|
| Strategy 1 | AMR surveillance system using a "One-Health" approach |
| Strategy 2 | Regulation of antimicrobial distribution |
| Strategy 3 | Infection prevention and control and antimicrobial stewardship in humans |
| Strategy 4 | AMR prevention and control and antimicrobial stewardship in agriculture and animals |
| Strategy 5 | Public knowledge on AMR and awareness of appropriate use of antimicrobials |
| Strategy 6 | Governance mechanisms to develop and sustain AMR-related actions |

The monitoring and evaluation (M&E) will include a few key actions such as establishing baseline indicators for 2016 and strengthening the infrastructure and the functioning of M&E systems which contribute to monitoring progresses of each goal

against each of five targets. Evidence on AMR and magnitudes of antimicrobial use in human and animal will be regularly shared with prescribers in human and agriculture sectors, in order to change course of actions, general public and decision makers. Thailand's National Strategic Plan on Antimicrobial Resistance 2017-2021 is also aligned with the Global Action Plan, reflecting the country's commitment to join forces internationally in resolving AMR issues.

The Prince Mahidol Award Conference 2018 (PMAC 2018) will be organized under the theme "Making the World Safe from the Threats of Emerging Infectious Diseases". The PMAC 2018 field trip will be arranged to share experience in implementing related health care initiatives to promote knowledge and to provide understanding on approach for control toward a One Health Approach to Emerging Infectious Diseases (EID) and Antimicrobial Resistance (AMR) in different settings. The case study of EID and AMR are described in the next consecutive chapters.

1

SIMPLICITY AND COMPLEXITY OF CONTROLLING MULTIDRUG-RESISTANT ORGANISMS IN A UNIVERSITY HOSPITALS

Sukjai Charoensuk
Sirikul Karuncharenpant

SIMPLICITY AND COMPLEXITY OF CONTROLLING MULTIDRUG-RESISTANT ORGANISMS IN A UNIVERSITY HOSPITAL

Sukjai Charoensuk
Sirikul Karuncharernpanit

“To be simple is a pedestrian virtue, but to preserve in simplicity is a virtue of spiritual giants.”

Hebrew Proverb

“Hello-hello-hello, we saw an elephant out there. He’s huge and also friendly. He has got two big ears, and he has two ivory tusks. Let’s meet our friend, elephant.” (a part of elephant song lyrics)

The picture of nurses singing an elephant song while performing handwashing is very common and makes other personnel of Ramathibodi Hospital active and ready to work in the morning shift. The nurses told that they were happy to perform WHO 7 steps handwashing using an elephant song every day. They confirmed that handwashing was simple but very important since it could save both nurses and patients from infection. Singing the elephant song and performing handwashing is an idea to encourage nurses to perform handwashing happily and correctly. The song ended at the same time the 7 steps handwashing finishes.



Nurses perform handwashing

Simplicity for Multi Drug Resistance (MDR) Control

Multidrug-resistance (MDR) is an emerging crisis in this era. It is defined as insensitivity or resistance of a microorganism to at least three groups of administered antimicrobial medicine¹. These resistant microorganisms, including bacteria, fungi, viruses, and parasites are able to withstand the attack by antimicrobial drugs, which leads to ineffective treatment resulting in persistence and spreading of infections.

Dr. Kumthorn Malathum, a specialist in infection prevention and control (IPC) of Ramathibodi Hospital talked about the starting point of MDR control in Ramathibodi in 2002. There were frequent infection with MDR *E. coli*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa* in this hospital. He questioned about the cause for a long time, and at last, hygiene of health personnel became his answer. He found that only 30% of health personnel, including physicians and nurses did wash their hands before contacting patients. He started to promote hand hygiene (hygienic hand washing) among healthcare personnel of the hospital to reduce infection, even it was not easy.

“Based on a survey in 2002, it shocked me because physicians and nurses washed their hands before visiting patients or changing to the new patients only 30%, it is a major cause of cross transmission of infection” said Dr. Kumthorn Malathum



*Assistant Professor
Dr. Kumthorn Malathum, MD.*

Thousands of people die every day around the world from infection acquired while receiving health care. Hands are the main pathways of germ transmission while providing care, therefore, hand hygiene is the most important, and the simplest procedure to prevent health care-associated infections. WHO promote 7 steps and 5 moments of handwashing in 2009 as shown in 2 pictures below

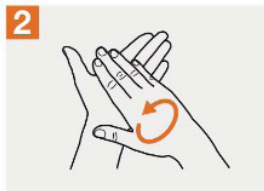
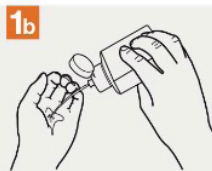
How to Handrub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

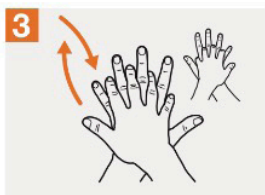
⌚ Duration of the entire procedure: 20-30 seconds



Apply a palmful of the product in a cupped hand, covering all surfaces;



Rub hands palm to palm;



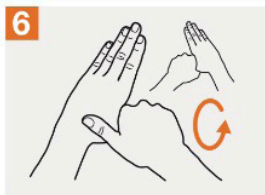
Right palm over left dorsum with interlaced fingers and vice versa;



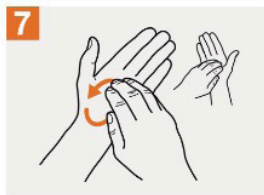
Palm to palm with fingers interlaced;



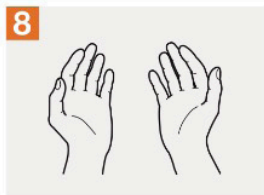
Backs of fingers to opposing palms with fingers interlocked;



Rotational rubbing of left thumb clasped in right palm and vice versa;



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



Once dry, your hands are safe.



World Health Organization

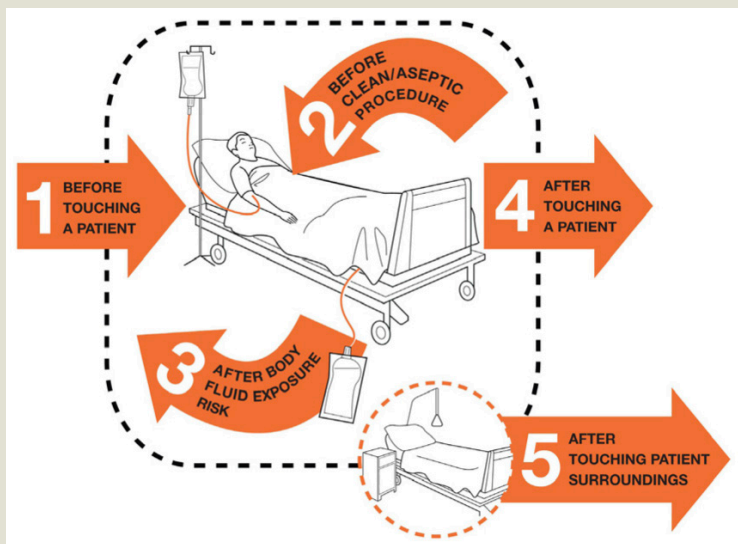
Patient Safety

A World Alliance for Safer Health Care

SAVE LIVES

Clean Your Hands

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WHO 7 steps and 5 moments for hand-washing²

Ramathibodi Hospital started the hand hygiene campaign using the WHO framework in 2012. Various activities were arranged to promote hand hygiene, including training, advertising, and making alcohol hand rub solution available at the point of care. Hand hygiene is a simple technique, but effective to prevent infection. The hospital promotes not only health personnel, but also patients and their family members to perform the 7 steps of hand hygiene in 5 moments, including before touching a patient, before performing a clean/aseptic procedure, after body fluid exposure, after touching a patient, and after touching patients' surroundings. The more hand hygiene performed, the less MDR in the hospital, especially *E. coli*, *Klebsiella*, and *Acinetobacter baumannii*.

Chaos Makes Chances

In 2013, Ramathibodi Hospital encountered to chaos from MDR outbreak in the medical intermediate care unit, leading to a shortage of bed in hospital, long waiting time for treat-

ment; however, lesson learned from that chaos raised awareness on the importance of hand hygiene care or protector usage among staffs which enhanced the success as Dr. Kumthorn later recalled.

“At the first step, we found only a VRE urinary infected patient; later we found over 10 patients were colonized with VRE, namely it was a VRE outbreak. The main reason was cross infection by various routes. Strict IPC protocol was implemented such as using impervious protective attire, service stopping for intermediate medical care unit with systematic cleaning of all areas, all equipment.”

Complexity for Multidrug-Resistance Control

Later, comprehensive guidelines in MDR control, recommended by the US Center of disease control and prevention (CDC) have been fully implemented. It composes of administrative support, education and training of health personnel, antibiotic use containment, multidrug-resistant organisms (MDRO) surveillance, infection control precautions, and environmental measure³. The protocol of Ramathibodi Hospital includes three dimensions: system and environment adjustment for MDRO control; collaboration with multidisciplinary approach, surveillance and warning system.

System and environment adjustment for MDR control

System and environment changes and adjustment has been implemented for MDR control. For instance, computerized prescription has been used for antimicrobial drug check. All these adjustment and changes requires budget and education of staff. Furthermore, ward structure changes such as assigning special MDR zones or ventilation improvement may help containing these problematic organisms in the ward.

Collaboration with multidisciplinary approach

Ramathibodi Hospital has recognized an importance of collaboration among various groups of disciplines in MDR control. The IPC committee of the hospital includes physicians, nurses, nursing instructors, microbiologist, physiotherapist, etc. This committee regularly meets to analyze MDR situations, and then makes a plan and cascades to each department. Working as a team enhances the success of MDR

surveillance system, and making innovations like the ‘MDR test’ that can reduce length of time for a result from 7 days to only 1 day. However, establishing collaboration among multidisciplinary team is not easy. It takes time to develop trust among the members of the team.

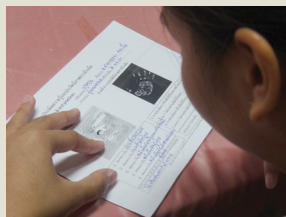
“We believed that bringing out the strength and best of each discipline to work together in MDR surveillance system will enhance the success in the future”. Miss. Suntareeya Sirichot, the head of IPC Nurse, confirmed.



IPC nursing team

Not only has MDR control training for physicians been carried out, but nurses and nursing students are also recognized for their significance. Therefore, Assistant Professor Siriluk Apivanich, the IC nursing instructor has been appointed to join the committee. Based on her roles, she has managed the IPC training for nurses in Ramathibodi Hospital. She has also taught the 2nd year students about IPC concepts and hand hygiene before practicum subject.

She mentioned that ‘Training program requires a balance of KAP (Knowledge, Attitudes and Practice). Only knowledge may not enough to change health personnel’s practice, awareness too. This message needs to transfer to our nursing students and nurses to leads to appropriate and correct practices in IPC in the future’.



Training activities for nursing students



Surveillance and warning system

The surveillance and warning system is the cohesion between laboratory technicians and IPC nurses. For example, if any technician finds suspected cases with MDR infection, they will report directly to the IPC nurses as soon as possible or within a day. Even if no report from the technicians is received, the IPC nurses need to check the suspected MDR cases from reviewing laboratory reports.

Combination of Complexity and Simplicity

Interestingly, even after the applying the complexity CDC based suggestions, some MDROs infection still spread out. As a result, hand hygiene, which is the simple way to control MDRO spread, has been added in the commonly used controls. In addition to an effective improvement of hand hygiene, all MDRO control protocols have been implemented. Apart from mentioned guidelines, other three methods have been added in this section.

Hand hygiene is set as the significant policy of the hospital and some guidelines are refined as detailed. First, alcohol hand rub solution is used to replace the traditional way using water and soap because it is more effective and convenient and less washing time than the traditional way. Second, all physicians and nurses who provide care for or touch patients are required to pass a hand hygiene test, defined as at least 80% of both hand areas is washed. After health personnel wash their hands with the fluorescent hand hygiene-mimicking gel, they need to be scanned in the fluorescent scanner to check the coverage of hand washed areas.



Scanned hands show passing result

Only health personnel who have passed the hand hygiene test can receive the 'hand picture' sticker and will be qualified to work in their wards completely, so if any of them cannot pass the test, they are required to re-examination until passing. Mrs. Sumawadee Skuntaniyom, the manager of the Hand Cleaning Moving Together Project, proudly presented about the success of this project.

"This project is well known and has a good response rate. Last year, approximately 5,000 physicians, medical students, nurses and nursing students passed the hand hygiene test. Therefore, this year, we planned to expand to other groups such as patient transport personnel group, health volunteers and general people".

Currently, Ramathibodi Hospital has widely used alcohol based hands rub as the main method of hand cleansing. It is more effective, reducing time from 60 seconds to 20 seconds to complete hand rubs. Approximately 3,000 alcohol based hands rub stations are provided around the hospital. Even if it costs several millions annually for the hospital; it is considered a worthwhile investment.



Hand Cleaning Moving Together Project

Additionally, raising awareness on MDR cross transmission prevention is applied in various ways. For example, by broadcasting via Rama Chanel, a mass media television channel. The significant video clip which demonstrated how to use protective equipment such as disposable gowns, gloves, masks, and hand hygiene by medical instructors, nursing instructors and all levels of staff.



A medical instructor demonstrates the use of preventive equipment

A combination of simplicity and complexity on MDR control at Ramathibodi Hospital leads to a success as shown by the good results on some performance indicators. For instance, ventilator associated pneumonias (VAP) was reduced from 15% to 3%; at least 80% of handwashing met quality requirements; *Acinetobacter* infection was reduced to one fourth and *Staphylococcus aureus* was also reduced to one fifth, comparing with the data from 5 years ago. Finally, Ramathibodi Hospital has received an Asia Pacific excellence award on hand hygiene in 2017.

From Practice to Policy

The initial success of the infectious controls in Ramathibodi is not enough for Dr. Kumthorn. He realizes that MDR is a complicated problem, and need a systematic approach at a national level. As a Chair of Sub-Committee of Practice Guideline Development for Nosocomial Infection Prevention and Control, he has been appointed to be a member of the Coordination and Integration Committee on Antimicrobial Resistance, Thailand.

Thailand's National Strategic Plan on Antimicrobial Resistance 2017-2021 is developed by the initiative of the Ministry of Public Health in 2014, and completed in 2016 with a vision of reducing the morbidity, mortality and economic burden caused by MDR. The strategic plan was developed based on three underlying principles, including: action-oriented with measurable outcomes; synergized and harmonized to consolidate multi-sectoral efforts; and stimulate political commitment. It consists of 6 strategies as follows:

Strategy 1 AMR surveillance system using a 'One-Health' approach

Strategy 2 Regulation of antimicrobial distribution

Strategy 3 Infection prevention and control and antimicrobial stewardship in humans

Strategy 4 AMR prevention and control and antimicrobial stewardship in agriculture and animals

Strategy 5 Public knowledge on AMR and awareness of appropriate use of antimicrobials

Strategy 6 Governance mechanisms to develop and sustain AMR-related actions

Lesson Learned

The success of MDR control in Ramathibodi Hospital comes from a good multi-disciplinary teamwork, strong policy support, and continuity of practice. Trust and respect among disciplines is critical, making the team put all efforts to improve and help each other. It leads to a good multidisciplinary collaboration system and success of MDR control. The executives' policy to support MDR control, such as setting up hand hygiene as an important policy and all health personnel required to pass hand hygiene test as well as an investment in providing equipment for MDR prevention, enhancing the success of MDR controls. Continuity of practice by consistent communication across the organization regarding goals, information and persistent work such as following up and monitoring regularly as the normal situation also enhanced a success. Sustainability is the main challenge for Ramathibodi Hospital in the future. Though raising awareness is hard, sustaining is even harder. Moreover, the team would like to transfer this

knowledge to others at the national and international level as a training center on MDR control.

Acknowledgement

We would like to express our deep gratitude to Assistant Professor Dr. Kumthorn Malathum, MD, a specialist on infectious disease, Assistant Professor Siriluk Apivanich, a nursing instructor, Miss. Suntareeya Sirichot, the head of IPC Nurse and her team for their kind and comprehensive information. Also thanks for a support from Faculty of Medicine Ramathibodi Hospital in an allowance to visit. Special thanks to Daniel Choi for his kind English editing.

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2

ANTIBIOTIC SMART USE (ASU) PROGRAM TO PROMOTE RATIONAL USE OF ANTIBIOTICS IN HOSPITALS AND COMMUNITIES: PHRAPHUTHABAT HOSPITAL & BAN LANG KHAO HEALTH CENTRE, SARABURI PROVINCE

Boontuan Wattanakul
Laiad Jamjan

ANTIBIOTIC SMART USE (ASU) PROGRAM TO PROMOTE RATIONAL USE OF ANTIBIOTICS IN HOSPITALS AND COMMUNITIES: PHRAPHUTHABAT HOSPITAL AND BAN LANG KHAO HEALTH CENTRE, SARABURI PROVINCE

Boontuan Wattanakul
Laiad Jamjan

Saraburi at Glance

Saraburi Province is in the central part of Thailand, 200 km to the north of Bangkok. It is located by a very famous Buddhist temple names Wat Phraphuthabat or Buddha Footprint Temple. The structure of the main building of this temple is very elegant with its seven tiered roof laid with beautiful ceramic tiles, the doors inlaid with intricate mother of pearl artwork. The Buddha footprint is housed in a richly decorated golden case inside the main building.

Saraburi Province with a population of 617,384 is comprised of 13 districts, Phraphuthabat and Mauklek are 2 districts where we will visit in this province.

Global Problems of Irrational Use of Drug

Irrational use of drug is a major global problem. More than half of all medicines are prescribed, dispensed or sold inappropriately. The consequences of the overuse or misuse of medicines are wastage of scarce resources and widespread health hazards. In the past 10 years, antibiotic use has increased of 36%. With highly concerns, carbapenems and polymyxins use grows up to 45% and 13% for highly resistant bacteria, respectively. It was estimated that antimicrobial resistance results in 700,000 globally deaths per year, particularly Asia and Africa were the highest dead regions from antimicrobial resistance (AMR).

Irrational Use of Drug in Thailand

Thailand has an extensive health care system with many skilled health care personnel, universal health coverage, and a fair drug distribution system. However, there are a number of problems in the pharmaceutical area concerning drug selection, utilization and regulation. Inappropriate use of medicine is still be existing even in the hospitals.

Under conditions of treating more complicated patients, the use of non-essential drugs and the drug cost per patient increased with increasing level of facility. Use of antibiotics for upper respiratory tract infection was quite high being over 50% and some 'polypharmacy' was observed in the treatment of upper respiratory tract infections and other symptoms. Although there are many Standard Treatment Guidelines (STGs) produced, they are often not consistent with the national essential drug list (NEDL). To improve the rational use of drug, it was recommended that prescription audit must be undertaken for outpatient and inpatient care by Pharmaceutical & Therapeutic Committee (PTC) of each hospital.

Antibiotic Resistance Situation in Thailand

Recent years, AMR has increased continuously in Thailand, it was primarily estimated that 40% of patients with antibiotic resistant bacteria had died and all of them had longer length of stay in hospitals. Currently, plastic or beauty surgery has increased risk of AMR from New Delhi metallo-beta-lactamase-1 (NDM-1) in Thailand.

Initiative: the Antibiotic Smart Use (ASU) in Thailand

Thailand initiated the Antibiotic Smart Use (ASU) Program in 2007 to promote rational use of antibiotics. The ASU Program was a three phase program run by a team of local multidisciplinary members (healthcare personnel, local leaders, etc.) and organized by partners at the national agencies as well as academics and researchers (central partners). The local partner designed intervention and created strategy to be implemented in their unit, while the central partner played catalytic and supportive roles and facilitated collaboration between

local partners. Since the rational use of medicines is a concept which is not always getting translated into practice, this article will focus on an example how the ASU was implemented in both hospital and community.

Pilot Project of Antibiotic Smart Use in Saraburi

Saraburi province was one of ASU pilot project in Thailand started in 2007. The ASU project was introduced in 10 district hospitals and 87 subdistrict health centres (or sub-district health promoting hospitals) of Saraburi. Phra Nakhon Si Ayutthaya, an adjoining province with similar geography, population and health care delivery system, was purposively selected to be the control group. In the first phase, an intervention was designed for mitigating prescription of irrational use of antibiotics. In the second phase, important factors influencing the local prescription practice were identified as poor understanding of antibiotics and disease management that patients expected to receive antibiotics for their ailments. All hospitals completed a half day ASU course, and received a package of materials for patients and prescribers, and financial support for implementation and evaluation. The evaluation showed a 97% recovery of patients despite not having received antibiotics, and an 18-46% reduction in antibiotic use. This phase focused on feasibility for ASU scaling up in different contexts and health care units. And, ASU was extensive decentralization by training new trainers, encouraging local partners to conduct research and promoting good practices. Finally, ASU practice was integrated into national policies. The mission of the policies and national multi-sectoral mechanisms supported an effective and sustainable AMR management system.

The adoption of ASU practice as a pay-for-performance criterion was an important achievement that prompted nationwide expansion of ASU. Thus, the ASU practice had been implemented in pharmacies and communities. The project has now moved into the third phase to be sustainable. The national drug policy inaugurated the strategies on combating AMR and promoting rational use of medicines together with civil society

movements, such as adoption of Antibiotic Awareness Day as a public campaign in Thailand. The 2011 National Drug Policy had been implemented and strengthened the AMR movement as a supportive climate for sustaining ASU practice.

The ASU project had launched over 10 years to support the rational antibiotic use for three common ailments—upper respiratory tract infections, especially common cold with sore throat, acute diarrhea, and simple wound. The ASU practice had implemented and moved forward changing behaviors in antibiotic use in communities, schools, health centres, hospitals, and advocated to other communities.

An Example of ASU in Phraphuthabat Hospital

The Phraphuthabat Hospital took a chance to establish the ASU management system when a pay-for-performance criterion prompted nationwide expansion of ASU. The Saraburi provincial health office facilitated ASU implementation and data collection. In general, it was designed with few available resources to battle an irrational use of antibiotics which is rampant. The Phraphuthabat Hospital had adjusted the existing pharmaceutical service system to handle with irrational use of medicines. And, a half day training was conducted for educating prescribers and convincing the prescribers to stop prescribing antibiotics for three target diseases. The coherent pharmaceutical system had been revised and rearranged for better communication among multi-professionals regarding rational use of medicines.

*Associate Professor
Todsaporn Sirisopikun,
Director of Phraphuthabat
Hospital. He strongly
supports to establish the
ASU management system.*



Rearranged the ASU System

The Rational Drug Use (RDU) was pushed up to be one of the strategic plans of the hospital to achieve the national goals. Then, the hospital needed to rearrange the ASU system. The hospital PTC used the medical records from existing electronic database systems for analyzing the patterns of diagnosis and drug use. The PTC reported the RDU indicators and problems of irrational use of medicines to the meeting of the Patient Care Team (PCT). Before starting the ASU, data showed that azithromycin and tazocin injection were considerably prescribed by internal medicines. Moreover, tazocin was prescribed where it does not fit with the criteria of the protocol. Over 50% of tazocin injection prescriptions were used for patients without COPD.

The PTC monitored irrational use of medicines and sent feedback to doctors, for example, doctors would be notified when a doctor prescribed antibiotics for simple wound treatment in an emergency room or for normal delivery. All doctors were requested to write a diagnosis on the prescription. Pharmacists would notify a doctor when an antibiotic drug was inappropriately prescribed for outpatients. On the other hand, the AMR event in the hospital was monitored in both inpatient and outpatient departments. Therefore, the more communication among multi-health professions contributed to better cooperation.

Abnormal Laboratory Alert

Technical laboratory is very important for AMR surveillance systems in the hospital. An abnormal laboratory is going to immediately show alarming signs in the electronic medical records so that the doctors will be aware of antibiotic prescriptions without indication. If events of *vancomycin-resistant enterococcus* (VRE) and *carbapenem-resistant enterobacteriaceae* (CRE) were found in the inpatient department, lab technicians would immediately call doctors and nurses. The doctor considered to change antibiotics, and nurses managed for patient isolation to prevent AMR transmission in the hospital. Lab technicians also reported the AMR situation of VRE and CRE in the hospital to the PTC quarterly. This report was promptly used for the PTC review and to adjust the drug list in the next year.

ASU Benefits

The primary aim of ASU practice is not to reduce cost, it cannot generate savings for common diseases which antibiotics are not needed, compared to IPD and high-cost medicines. Although, it is viewed that ASU is not complex and it is compatible with patient safety and good health. There are a number of uncontrollable factors that may influence the ASU implementation in hospitals. The ASU in large hospitals where antibiotics are used indiscriminately to treat URIs is difficult in implementing. There is argue that ASU is not applicable to the outpatient department because their patients are more severity of illness, compared to smaller hospitals; therefore, rate of antibiotic use should be higher. Doctors in district hospital trained in ASU always move to other settings that makes it necessary to train incoming doctors. Resistance to change is common among doctors. Outcomes of ASU can be easily observed from advantage of ASU, which minimizes expenditure on unnecessary antibiotics and prevents AMR.

To promote the rational use of medicines, PTC has analyzed electronic medical records to monitor consistency between prescription and diagnosis, as well as assess the cost of prescribed medicines. Inconsistencies between diagnosis and the conditions listed in ASU treatment guideline make it difficult to assess the use of antibiotics for the treatment of specific conditions, especially simple wound. The common purpose of ASU data analysis is to promote the rational use of antibiotics. Overall, data shows reduction in prescribing antibiotics.

Active RDU in Community of Phraphuthabat Hospital

Prescribing behaviors might be influenced by patients' request on antibiotics. Implementing ASU in district hospital needs changing in community people's attitude too. The pharmacists from district hospital had delivered the knowledge of rational use of antibiotics and impact of AMR to subdistrict public health officers, health volunteer, and other villagers in the community.

Pharmacists had inspected drug administration not only in inpatient and outpatient departments of the hospital, but they also examined drug administration in community health centres. With the concept, “*Where medicine is, where pharmacists are*”, they scrutinized drug distribution system of subdistrict health centres annually. ASU evaluation will be reported through multiple communicating medias. The registered nurse and practitioner nurse of subdistrict health centres had been trained about differential diagnosis by family medicine team of Phraphuthabat Hospital. Pharmacists and nurses delivered knowledge of rational use of antibiotic to community members, workers in factory or industrial farms, and school students. By the way, Phraphuthabat Hospital had rearranged pharmaceutical system and multi-professionals involved the process of ASU management in regarding rational use of medicines. Communication and feedback helped improve the pharmaceutical system.

An Example of ASU in Community: Ban Lang Khao Subdistrict, Muaklek District

Ban Lang Khao was identified as one of 87 subdistrict health centres in Saraburi for primarily research to determine if the interventions could reduce antibiotic use for three diseases which antibiotics were often prescribed despite it had no need. Before starting ASU, 4 patients were allergy to antibiotics and 1 patient died from sepsis. This event raised concern to launch ASU practice with concept of “*No antibiotic, No neglect, Keep follow-up*”; ‘*No antibiotic*’ stands for not giving antibiotic drugs, ‘*No neglect and Keep follow-up*’ stands for visiting and not neglect patients, and following up to monitor behavior and clinical change.

Power of Communications

With strong power of communication through a school aged kids, health literacy was promoted with the message on antibiotic resistance. With symbol of “words of mouth”, they put three fingers at mouth of the passing public message, each finger standing for a common disease with no need to use antibiotics. The ASU campaign in three common ailments was





Symbol of “words of mouth” which uses in communication to different groups of people in the community.



initiated to combat growing of inappropriate antimicrobial resistance in both subdistrict hospital and community settings.

It is important to raise public awareness on consequences of antimicrobial resistance and how antibiotics should be rationally used. Rational antibiotic use with easy message was on-site delivered on health volunteers through a network training. The on-site training focused on educating and empowering on treatments without antibiotic to induce individual behaviour change. Furthermore, at the beginning of every community meeting, staff of the health centre would talk to educate people about the ASU. The effective communication formed an extensive group to advocate and promote the rational use of antibiotics.

ASU educational materials were given to health professionals to display or distribute to patients, along with instructions on their proper use. The given materials included ASU treatment guidelines for URIs, diarrhea and simple wounds, posters of diagnosis and treatment algorithms, and diagnostic tools such as white lighter for throat examination. Hospitals received financial support from municipality and other organizations for project implementation and evaluation.

“At the beginning, patients resisted and frustrated when antibiotics were not prescribed but now it is greater accepted because we built trust how antibiotic should be smart used” said *Mrs. Kedsanee Kongsamboon*, ex-Director of the Ban Lang Khao Subdistrict Health Centre in Muaklek District.

Mrs. Kedsanee and a group of trained health volunteers had tried to convince patients and community members in many ways to reduce irrational use of antibiotics for the three common ailments. Besides door-to-door visits, ASU pamphlets were disseminated and raised a special quiz on antibiotics use for patients and community members. Their marks on the quizzes were put in ASU knowledge bank. When they obtained good marks, they were rewarded with household goods sponsored by local agency. The ASU bank was a strategy for evaluating their understanding about rational use of antibiotics.



Mrs. Kedsanee Kongsamboon, Senior Health officer of Muaklek District Public Health Office, and ex-Director of the Ban Lang Khao Subdistrict Health Centre in Muaklek District, Saraburi.



Mrs. Kedsanee Kongsamboon and a group of trained health volunteers promote rational drug use for youth in the school. And, ASU educational materials were prepared to distribute to community members.

Behavioral Change in Antibiotic Use

The concept of “*No antibiotic, No neglect, Keep follow-up*” was cultivated to all health personnel and changed the way they prescribe to be more rational use of antibiotics for the three target ailments. However, target patients were not neglected from treatment, they were monitored for clinical problems through home visit until they had got better. Traditional medicines were more prescribed instead and patients were educated about appropriate use of medicines. Training, posting ASU guideline, and distributing lighter were done for health practitioners to change their prescribing behavior.

In addition, research was conducted for describing behavioral change in antibiotic use. The research findings showed that antibiotics were prescribed less than 6% of 182 patients in three target ailments. Over 85% of 81 patients recovered without antibiotic use. However, greater than 14% of patients kept seeking antibiotic drug from clinics and drugstores because they still believed that it should be treated with antibiotics. This research won awarded from the national R2R (Routine to Research) conference.

Community Acceptance

When patients with the three target ailments visited the health centre in Muaklek, the nurse would explain briefly about treatment needed and why antibiotics was not needed. In addition, patients were also given pamphlets to read and information was provided through posters put up in the centres.

The on-site ASU education was delivered to community members to make them realize how impact of antibiotic resistance was distressing. Community members felt more confident because of the personnel’s role models in the rational use of antibiotics.

Scaling up ASU practice

ASU practice was extended to people in the temples and schools to build their capacity. Monks and students were trained about rational use of antibiotic. Network building

involved community leaders, health volunteers, monks and students that makes ASU practice steps in horizontal and vertical scaling up.

Mrs. Patima Sangkamanee, chief executive of the subdistrict administrative organization (SAO) in Muaklek District, Saraburi. She experienced difficulty in allergy to antibiotics. As a chief executive, she gave financial support and allowed to talk about ASU education before the monthly community meeting.



From the results of evaluating the ASU campaign, they were found that 67% of the community members recognized that antibiotics were not necessary for the URIs, diarrhea, and simple wounds. And, 63% of the community members realized that antibiotics were not the same as anti-inflammatory drugs, while 33% were still not sure that the ASU practice would benefit them.

Scaling up ASU practice was done by integrating it into routine practice with emphasis on two approaches, decentralization and strengthening the capacity of local partners. Strengthening local partners included training for the trainers, sharing good practices, and encouraging local partners to conduct ASU related research in parallel with routine ASU practice to generate scientific evidence for guiding the work of ASU. Policy advocacy aimed at building a climate for hospital directors or provincial health administrators to support ASU practice.

Sustainable ASU Practice

ASU practice will be sustainable if there are achievements of policy advocacy, networking strengthening, and forming

new attitude on rational use of antibiotics. To promote sustainability, the ASU project was extended to vertical and horizontal scale. Horizontal scaling up underlined expanding and strengthening decentralized ASU networks, whereas vertical scaling up emphasized on integrating ASU into national policies.

ASU vertical scaling up started by a series of training sessions across Thailand to update clinical knowledge and sharing good practices of changing prescribing behavior. The National Drug Policy on the rational use of medicines offered consolidation of the ASU initiatives pursuing roadmap of antimicrobial resistance in Thailand. This policy reflected a strong commitment to support the rational use of medicines in Thailand. By using the computerized e-tool program, national data showed the reduction of prescribed antibiotics. Prescribed antibiotics for upper respiratory infections decreased by 10-20% and those for acute diarrhea decreased by 20-40%.

Horizontal scaling up was inaugural expansion through a combination of ASU and a newly launched national medicines policy. This involved strategies for promoting rational use of medicines and combating antimicrobial resistance. ASU training was expanded from hospitals to communities. Promoting local ownership and mutual recognition was done for generating pride and commitment, expected to the success of ASU program.

By decentralized network, local partners were given full autonomy in naming their own ASU projects and designing culturally sensitive interventions and media materials. This, in turn, generated a sense of ownership, pride and long-term commitment. The interventions implemented at the network and policy levels showed the feasibility of program scale-up and sustainability. Some local partners applied ASU methods to promote the rational use of other medicines more than antibiotics. Others conducted parallel ASU related research and won research awards.

For network strengthening, the concept of “*No antibiotic, No neglect, Keep follow-up*” was implemented in order to acknowledge and change beliefs of people in the society. To improve ASU knowledge, a bank of knowledge was formed and people would gain a deposit score if they had answered to questions about the rational use of antibiotics, it did not matter if it was correct answer or not. The scores would be exchanged for household stuffs from the ASU knowledge bank.

Due to limited resources and the intention to empower local ASU networks to be self-reliant, the central ASU team had not provided any grant to local ASU networks and had reduced its interference in local implementation of ASU. Change agent was needed for community empowerment for sustainable ASU practice. The community empowerment needed support from key persons including chief executive of the subdistrict administrative organization (SAO), district public health executive, registered nurse, health volunteer, and community radio. Local networks needed technical support and educational materials from external partners. This stepdown approach of the central team was to stimulate local ASU networks to manage their own resources and administration in order to sustain ASU practice as part of their routine.

Lesson Learnt

Technology supported the decision making on better ASU practice in the hospital. Effective ASU project had been implemented through strengthening local networks and integrated ASU into routine. It is important to generate a sense of ownership, pride and long-term commitment. In addition, the “*words of mouth*” strategy is powerful communication for changing attitude of people in the community.

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3

MULTI-SECTORAL COORDINATION: PREPAREDNESS APPROACHES FOR ADDRESSING EMERGING INFECTIOUS DISEASES & ANTIMICROBIAL RESISTANCE IN UNIVERSITY HOSPITAL

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Pattarawalai Talungchit

MULTI-SECTORAL COORDINATION: PREPAREDNESS APPROACHES FOR ADDRESSING EMERGING INFECTIOUS DISEASES AND ANTIMICROBIAL RESISTANCE IN UNIVERSITY HOSPITAL

Achara Suksamran
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Infectious diseases are leading cause of death and disability and pose burden to public health around the world. Infectious diseases increase the threat from both emerging and re-emerging pathogens. The effective strategies for controlling emergence and re-emergence of infectious diseases are very vital to prevent severe outbreak. Faculty of Medicine, Siriraj Hospital under Mahidol University has been made attempt to address the issues of emerging infectious diseases (EIDs), re-emergence of infectious diseases and antimicrobial resistance (AMR) by implementing several strategies within the health care settings and through national and international collaborative projects.

1. Infection control at Siriraj Hospital

Siriraj Hospital is a very big hospital (the biggest one in Thailand) with 2,322 beds providing care for over 3,300,000 out-patients and 94,000 in-patients per year. The physical design and infrastructure of the hospital has several access points allowing public entry. High patient numbers and hospital infrastructure put challenges to infection control system to prevent the spread of infectious diseases in the hospital. Several strategies have been implemented in order to minimize the risk of transmission of any infectious disease as following: First, rapid case detection, the hospital uses two ways for early detection and control the spread of the diseases. In normal situation without outbreak, patients will be screened at outpatient clinics. If there is any suspected case for exposure

to infectious diseases such as Influenza A: H5N1, H7N9 or MERS-CoV, doctors or nurses will activate “Code E” which is the emerging infectious disease protocol for safe screening and transfer; suspected individuals are transferred to isolation unit for further investigations. Next, the infection control practices in outbreak situation, when the Ministry of Public Health announces an outbreak of any disease, the hospital will implement outbreak management. All patients will be screened for illness especially in high risk areas such as pediatric and outpatient clinics.

Second, tracing and monitoring contact, the details of susceptible persons exposed to confirmed cases will be collected in order to identify infected cases and isolate individuals as soon as possible. “Contact tracing is very challenge task. We use several methods to trace exposed persons such as the information from closed circuit camera vector and photo taking around contaminated areas” said Miss Tepnimitr Judaeng, the Director of Infection Control Unit. All people’s known or suspected to be exposed to serious contagious diseases will be contacted and need different approaches for monitoring such as self-monitoring, active monitoring via telephone call or direct active monitoring at the hospital depending on the seriousness of the diseases and infection exposure. The further implications such as self-isolation, isolation in the Isolation Unit or other medical attentions might need for some exposed individuals.

Third, immediate isolation, the Isolation Unit is used for immediate isolation and treatment for people’s known or



Isolation Unit

suspected to be exposed to contagious disease such as MERS-CoV, Influenza A H5N1, Chickenpox and Herpes Zoster. “Having airborne infection isolation unit in hospital is very high investment. As we face a lot of problems of infectious diseases, the isolation unit is useful for handling new emerging infectious diseases and preventing the outbreak of airborne infections to ensure that our patients and staff are protected and safe.” said Dr. Susan Assnasen, Assistant Director of Siriraj Hospital. The isolation unit comprises of seven airborne infection isolation rooms (AIIR) and one combination AIIR / protective environment (PE) room. The unit places specific facilities to ensure the patient can be treated safely and securely. The system is operated by using computer control which has regular testing for the operation. Doctors and nurses who operate the unit also receive specific training with regular refresher training.

Besides considering about infection control, unintended consequence of patient isolation is also high priority. Nurses



*Airborne
Infection
Isolation Room*

are trained to triage patients for mental health issues and provide mental health support. If there is any concern about mental health issues, patients will be referred to specialists for further investigation and treatment. “We are aware that anxiety increases when patients are isolated in separated room; some patients experience loneliness and increase feelings of isolation, leading to depression. Thus, we assess patients’ feeling everyday throughout hospitalization using the assessment tool: “How do you feel today?” and try to help and

support them with activities that they prefer” Ms. Supanee Petchyim, the head nurse of the Isolation Unit. In addition to the health care service, the Isolation Unit provides study visit for other organizations and residency training; health care professionals can learn about infection control system which can be applied in other areas of Thailand.

How Do You Feel Today? 😊 วันนี้คุณรู้สึกอย่างไร?



ดี



เฉยๆ



รู้สึกไม่ดี, เบื่อ, แ่

Assessment tool: “How do you feel today?”



Listening to music



Praying



Reading



Watching TV

List of activities

Fourth, infection control precautions, several efforts have been made to prevent and control infectious diseases in health care facility such as environmental control. Personal protection equipment is readily available and accessible for staff to prevent transmission of infectious diseases. Education and training on infection control and safety management are arranged for both clinical and non-clinical staff. Refresher training is run in regular basis. As emergence and re-emergence of infectious diseases increase the threat for everyone, implementation of several approaches in health are setting is need to ensure the safety of people.

2. WHO collaborating center for antimicrobial resistance prevention and containment

Faculty of Medicine Siriraj Hospital has been designated as a WHO collaborating center for antimicrobial resistance (AMR) prevention and containment since November 2016. Responding to the WHO global plan on AMR, this center with multi-stakeholder partnerships contributed to the Thailand Antimicrobial Resistance Containment and Prevention Program which was founded to develop, coordinate and implement AMR Containment and Prevention (AMRCP) operational actions in Thailand following the 'One Health' approach.

The AMRCP has been implementing the ten operational actions since 2013. These actions includes estimating the national AMR burden, establishing the dynamics of AMR chains to understand how AMR in Thailand develops and spreads, developing a national AMRCP infrastructure, developing laboratory and information technology systems for surveillance of AMR, monitoring antibiotic use and hospital-acquired infections, regulating the use and distribution of antibiotics in humans and food animals, generating local evidence for promoting responsible use of antibiotics and efficient practices for infection prevention and control, designing AMRCP campaigns, creating an AMRCP package, implementing the AMRCP package in selected pilot communities, and conducting research and development on diagnostics, therapy and prevention of antimicrobial-resistant bacterial infections. The program's core campaign is to stop producing AMR by promoting responsible use of antibiotics, and to stop the acquisition and transmission of AMR by promoting good sanitation and hygiene as well as compliance with infection control, precautions and prevention practices.

By implementing multiple actions, the AMR program show effectiveness on improving understanding of magnitude of the AMR problem in Thailand, making educational resources targeting AMR available for health care professionals and lay people and enhancing national awareness of AMR to people. In addition, the outcomes of the program are adopted to

formulate a national policy on AMR and implemented at national scale.

3. Thai Traditional Medicine

With antimicrobial resistance (AMR) on the rise, complementary and alternative medicines (CAM) can make a significant contribution to reducing the problem of AMR (WHO, 2017). CAM is an alternative to antimicrobials for relieving symptoms. Herbal medicinal products in particular can be used as an alternative means to fight infection based on their own antimicrobial properties to reduce one's reliance on antibiotics.



Therapeutic Thai herbs and compress pouch

Thai Traditional Medicine (TTM) is one of the complementary and alternative medicines that emphasizes on individualized holistic approach and promotes the individual's health by assisting the person's innate self-healing and health maintaining capacity. TTM composes of traditional medicine, traditional pharmacy, traditional massage and traditional midwifery. The principles of TTM view the human being as a composite of body, energy and spirit. It is vital that all components exist in harmony and receive equal care. In order to screen the patient for making diagnosis, the TTM practitioner needs to know 2 components, 1) Body elements, and, 2) influence factors such as age, season, time, geography, and human behaviors.

One of the key concepts of TTM is the theory of the four elements: earth, water, wind, and fire, and their relationship with the human body and herbal uses. Each element rules specific body parts and functions, and an imbalance of an element manifests as a disease of the areas it is concerned with. For example, a disharmony of the earth element may manifest as a disease of the organs, bones or muscles; a disharmony of the water element may show symptoms such as urinary trouble, blood or lymph disease; a disharmony of the air element may show as respiratory problems like bronchitis, dizziness, stiffness, arthritis; and a disharmony of the fire element may cause metabolism, body warm, anxiety and aging. Health can be restored through lifestyle changes, massage, herbal treatment and/or exercise.

Center of Applied Thai Traditional Medicine, Faculty of Medicine Siriraj Hospital has many responsibilities. The center provides applied TTM education, health service, and knowledge management, as well as the manufacturing of herbal medicines. Another important responsibility is to conduct formal research and development for the purposes of advancing TTM and further promoting its acceptance and use among the Thai general public.

TTM services at the Center of Applied TTM, Faculty of Medicine Siriraj Hospital include herbal uses, healing procedures, and advices related to illness or to health promotion.

Herbal uses

After making the diagnosis, the practitioner may compound herbal medicine for each patient in fluid extract form or prescribe ready-to-use herbal medicine in various dosage forms, such as pills, tablets, or capsules. Herbal medicines are derived from medicinal plants, animal organs, and minerals that contain active compounds. Examples of active ingredients from herbal medicines are Flavonoid Derivative, Terpenoid, Alkaloid, Essential Oils, Anthraquinone, Phenolic Compounds. They are useful for early treatment for some symptoms such as coughing, sore throat or diarrhea that

might not relate to bacterial infection. Thus, people can reduce unnecessary use of antibiotics that might contribute to microbial resistance later.

Herbal medicines are prepared based on the knowledge of the four basic principles of pharmacy, including drug matters, drug attributes, drug grouping, and drug compounding. For the principles of herbal drug administration, there are 5 important concerns including: use the right plant, use the right part, use it properly, use the right proportions, and use for the right symptom or disease.

One of the most important herbal medicine recipes is *Andrographis paniculata* (Burm.f.) Nees, known as “The King of Bitters”, or commonly known in Thai as “Fah-talai-joan”. Based on clinical trials, Andrographolide has a bunch of benefits. It helps with the common cold and upper respiratory tract infections.



Andrographis paniculata (Burm.f.) Nees
known in Thai as “Fah-talai-joan”

Another important herbal medicine recipe is “Learng pid samud”. This herbal medicine recipe contains a number of ingredients. It contains compounds with medical properties

including “curcuminoids” which is the most important active ingredient in turmeric. Learning pid samud recipe is used as an anti-diarrheal drug.

Healing procedures

The procedures include massage, hot herbal compress treatment, hot herbal charcoal seat, herbal skin care, etc. Thai traditional massage provided at Siriraj hospital is called “Court-type Thai traditional massage.” There are 2 aspects in Court-type Thai traditional massage; basic massage and massage of the signal points. Both aspects of Court-type Thai traditional massage can stimulate blood circulation, lymphatic and nervous systems. Moreover, it also can relieve musculoskeletal disorders.

Advices related to illness or to health promotion

This service refers to giving advice on what the patient should and should not do, healthy food or food that should be avoided, and physical exercise. Health promotion with TTM focuses on Dhammanamaya, a complete practical system for health promotion using natural methods. This system emphasizes the holistic approach to obtain good health and longevity, concerning body, mind, and behavior. In Thai, having a healthy body is Kayanamaya, a healthy mind is Cittanamaya, and a healthy way of life to achieve good health is Jivitanamaya. Some examples for TTM health promotion activity are the 9-square step exercise initiated by Professor Dr. Ouay Ketusingh to maintain a strong and healthy body and exercise using the postures of the Hermit doing body contortions.

With the effort of Center of Applied TTM and its services, clients have alternatives to health healing and health promotion in order to obtain good health and longevity. Patients can find herbal medicines as alternatives to antimicrobials for treating diseases and relieving symptoms. Along with other strategies, the overuse of antibiotics was reduced; hence, the problem of antimicrobial resistance was minimized.

4. Keys to success

Important keys to success in addressing emerging infectious diseases and antimicrobial resistance at Siriraj Hospital relate to its roles as Medical Centers and WHO Collaborating Center for Antimicrobial Resistance Prevention and Control. Education and training on infection control and safety management are arranged for doctors, nurses, and non-clinical staff on a regular basis. Siriraj Hospital has the isolation unit for handling new emerging infectious diseases and preventing the outbreak of airborne infections, as well as the Siriraj Laboratory Center (SiLC) for their ability to detect resistance, especially new types of resistance quickly and effectively. In addition, services provided by the Center of Applied TTM, including herbal medicines usage and holistic health promotion, is another important key to success in reducing the problem of AMR.

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4

EMERGING INFECTIOUS DISEASE PREPAREDNESS IN THAILAND: LINKING COMMUNITY-BASED APPROACH AND RESEARCH FOR THE NATIONAL SYSTEM

Kanokwan Wetasin
Yupaporn Tirapaiwong
Suthida Muangnoicharoen

EMERGING INFECTIOUS DISEASE PREPAREDNESS IN THAILAND: LINKING COMMUNITY-BASED APPROACH AND RESEARCH FOR THE NATIONAL SYSTEM

Kanokwan Wetasin
Yupaporn Tirapaiwong
Suthida Muangnoicharoen

Chonburi at a glance

Chonburi Province is located in the eastern part on the shore of the Gulf of Thailand, just 80 kilometers from Bangkok. It is famous for Pattaya beach, making tourism an important contribution to the provincial economy. Industrial estates and seaports have also rapidly developed in the province. Phanatnikhom District of Chonburi is well-known for being one of country's main sellers and producers of bamboo products, with many farmers turning to the business during their off season.

Introduction

"The fruit bats lived in my village long before I was born. They may have lived here more than one hundred years ago".
"...We had never thought about getting infectious diseases from fruit bats before".
Mr. Thanapol Puttaraksa said.

Mr.Thanapol Puttaraksa,
the President of the Village
Health Volunteers



Mr.Thanapol Puttaraksa is the President of the Village Health Volunteers in Wat Luang Subdistrict, which located by a Buddhist monastery and is surrounded by a large area of rainforest with a population of around 8,000 fruit bats, the so-called 'Lyle's flying fox'. The community was unaware of the risks of EIDs (Emerging Infectious Diseases) from the fruit bats or of the need for risk communication and education about potential EIDs. There are 30 roosting sites of Lyle's flying foxes around Thailand and the roosting site at Wat Luang is the largest in Thailand.



Fruit bats



The roosting site of fruit bats at Wat Luang

Emerging Infectious Diseases (EIDs) caused by Zoonotic pathogens

“More than seventy percent of emerging and re-emerging infectious diseases in human are caused from zoonotic pathogens.”



*Dr. Woraya Luang-on,
Director of Bureau of
Emerging Infectious
Disease*

Dr. Luang-on stated that some of EIDs originate from spill-over animal-human infection, or zoonosis. Wildlife, bats in particular, are important wild animal reservoirs for zoonotic viruses, as they host more viruses per species, such as Nipah virus (NiV) and Middle Eastern Respiratory Syndrome coronavirus (MERS-CoV), than other mammals. At least 140 bat species (>20 million individuals) are believed to be present in Thailand. Fortunately, no serious EID from bats has appeared in Thailand so far. However, one outbreak may be able to produce victims numbering beyond imagination, not just in Thailand, but across the globe because of globalization.

Threats from Emerging Infectious Diseases (EIDs) in Thailand

“Since EIDs can cause serious health problems, economic losses, or social impacts; therefore, prevention of EIDs is still better than cure”, Dr. Luang-on said.

Complex nature of a new EID, lack of health literacy about immunity, limited knowledge, and incomplete information can easily cause public confusion, misunderstanding, and panic resulting in huge economic and social disruption. EIDs have occurred in Thailand from time to time. Over the last 2 decades, Thailand has been sporadically affected by major outbreaks of EIDs, including the resurgence of avian influenza between 2004-2008, the influenza pandemic (H1N1) back in 2009, and faces threats from other infectious diseases which continue to pose a constant global health threat, such as the outbreaks of Ebola Virus Disease and MERSCoV. The initial outbreaks often occur in an area where there is high human-animal interaction, but can spread rapidly.

EIDs are important public health threats due to their impact on illnesses and deaths. Moreover, they can spread rapidly and have a high potential to produce a large epidemic. In past decades, huge economic losses and social chaos have occurred in association with outbreaks and pandemics of new EIDs.

According to WHO and USCDC, the emergence of infectious diseases is infectious diseases whose incidence in humans has increased in the past 2 decades or threatens to increase in the near future. It can be classified as follows:

- 1) Infections resulting from changes or evolution of existing organisms, such as a novel influenza virus strain;
- 2) Potentially new infections imported from other countries, such as MERS-CoV, Yellow fever, Leishmaniasis, West Nile fever, Ebola, Marburgs, etc.;
- 3) Old infections reemerging as a result of breakdowns in public health measures such as Tuberculosis, Influenza H1N1 2009, and antimicrobial resistance;
- 4) Previously unrecognized infections appearing in areas undergoing ecologic transformation such as Hantavirus Pulmonary Syndrome

One Health Policy as a multi-sector approach: Thailand National Strategic Plan for EIDs

To promote the country's preparedness for, prevention of, and response to EIDs, the five-year Thailand National Strategic Plan for EIDs (2017-2021) was established. The national strategic plan serves as a framework for all concerned units in formulating their respective operational plans to ensure multi-sector cooperation and the realization of the objectives contained in the national plan. The plan also emphasizes the participation of all sectors, including the government, community, and private sectors, to coordinate and foster closer cooperation among the members of the network to achieve the goals stated in the **"One Health"** concept.

One Health' is a holistic concept of the interrelated health aspects and closely linked Animal-Human-Wildlife and Eco-Health systems. Spill-over of infections, especially with zoonotic diseases, creates a potential for an emerging infection to become a global epidemic. The One Health concept encourages a multi-sector, multidisciplinary approach to emerging disease control and health security.

The six main strategies in the National Plan include:

1. Public Health Emergency Preparedness

The goal of this strategy is to establish a competent public health emergency response system, capable of effectively managing, coordinating, and mitigating the preparedness and response in all phases of an EID outbreak, Before-During-After, and seamless coordination with the National Disaster Prevention and Mitigation Plan.

2. EID Surveillance, Prevention, and Control with the One Health Approach

The main goal of this strategy is a competent, integrated, and efficient human-animal-wildlife surveillance system for EIDs with the one health approach.

3. Enhancing public information, risk communication, and education about EIDs.

The main goal of this strategy is to promote the general public's, officials', and people in the community's access to correct information, ability to understand the risks and change their behaviors to prevent diseases, and have full awareness the situation without panic or misunderstanding.

4. International, Regional, and Global Collaboration

This strategy aims to promote international collaboration at the regional and global levels, enhance the leadership role of the country in supporting technical collaboration, research, knowledge, and information sharing, and to detect, prevent, and respond to trans-boundary EIDs.

5. Multi-sectoral, private, provincial and community sector participation.

The strategic aim of this strategy is to promote wider and more effective participation of communities, networks, and the private sector in preventing and controlling EIDs.

6. Research Development and Knowledge Management.

This main strategic aim of this part of the plan is to promote a research roadmap and to increase amount of research and development for supporting EID preparedness and response.

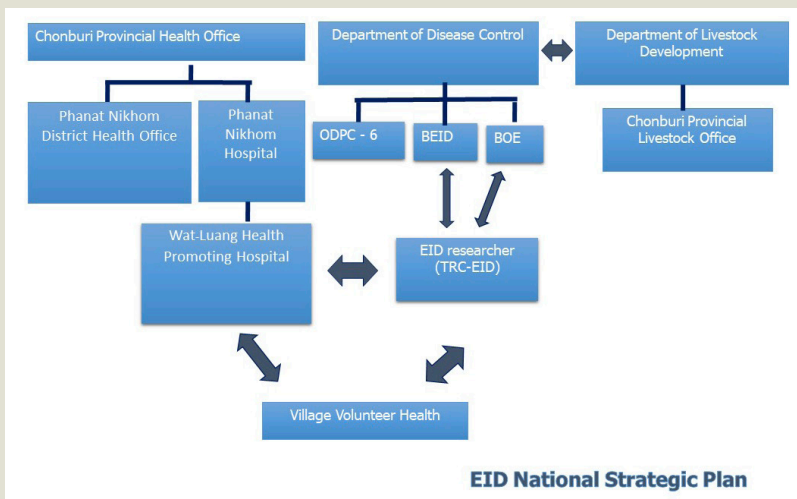
The implementation of the National Emerging Infectious Disease Prevention and Control Plan

Development of the strategic plan has been driven by a committee chaired by the Deputy Prime Minister. The Director General of the Department of Disease Control serves as the secretariat for EID prevention and control activities and DGs of Departments of Livestock Development, National Parks, Wildlife and Plant Conservation and Disaster Prevention and Mitigation as co-secretariat, which have been incorporated into the routine healthcare and public health system's work, through the disease control section or community health in each Provincial Health Office. Since the Department of Disease Control does not have any local bodies itself, Offices of Disease Prevention and Control at the region (ODPC) have helped to clarify and follow-up on activities as aimed at enhancing the capacities of the Surveillance and Rapid

Response Teams (SRRT), improving risk communication, and performing preparedness exercises. Their role is to monitor and evaluate the activities conducted within their areas of responsibility.

Demonstration of EID Preparedness in Thailand can be viewed through Chonburi Provincial Health System. If there is an EID suspected/ detected in its areas of responsibility, the actions used to combat an EID include:

- *Outbreak simulation exercises*: participants from all related governmental organizations, agencies, and authorities meet to seek ways to prepare for outbreaks and identify gaps.
- *Emergency operation center*: an emergency unit was set up to respond to health crises.
- *Chonburi Provincial Health Regulation*: the so-called “STOP” measure was set up. Health staff and involved parties are required to put the measures into practice on EIDs and other public health threats as follows:
 - S: Speed up meaning rapid case finding, setting up screening units in hospitals and communities and raising public awareness
 - T: Treatment on time meaning performing standard treatment procedures and case referral system in a timely manner
 - O: Outbreak Prevention meaning timely response according to standard and can control the outbreaks and prevent the second generation
 - P: Participation meaning Participation of stakeholders during planning, conducting activities and evaluation process



EID National Strategic Plan

Linking Community-Based Approach and Research to the National System

Multisectorality of related parties, such as the public sector, academic and research institutes, and, in particular, the civic sector is the key to the implementation of EID preparedness in Chonburi province. Strong collaboration among three main parties at the provincial level have carried the National Strategic Plan for EIDs into practice.

First and foremost, local government agencies have operated the EID preparedness according to the National Strategic Plan through the SRRT. Chonburi Provincial Health Office is responsible for surveillance of the unusual events and investigation of zoonotic diseases. Once a report is received from the Phanatnikhom District Health Office or the hospital, they conduct an outbreak investigation in human cases. Chonburi Provincial Livestock Office is responsible for monitoring the

disease situation and conducting the outbreak investigation in animals and resolving issues related to animal health, reporting outbreaks, and early warning to public health officials responsible for controlling the disease and summarizing the zoonotic disease situation in the province. Phanatnikhom Hospital is responsible for health screening, conducting disease investigations, providing care and treatment, and referring the patients if needed. Wat-Luang Health Promoting Hospital, on the front line of service provision, also plays a major role, not only in providing curative care, but also in promoting community awareness of EIDs. The Health Promoting Hospital works hand in hand with the Village Health Volunteers (VHVs) and EID researchers to prevent and control EIDs.



EID activities at Phanatnikhom Hospital



EID activities at Wat-Luang Health Promoting Hospital

Second, academic and private sectors have conducted EID research related to wildlife, particularly on fruit bats, and have disseminated the findings to raise the community's awareness. Dr. Supaporn Wacharapluesadee as the Principal Investigator of EID research from the Thai Red Cross Emerging Infectious Diseases Health Science Centre, Chulalongkorn Hospital and Faculty of Medicine, Chulalongkorn University (TRC-EID) stated that the EID research related to wildlife has moved beyond the pure science research focusing on virus detection to a community-based research. TRC-EID has coordinated with Faculty of Veterinary Science, Chulalongkorn University, Faculty of Forestry and Faculty of Veterinary Medicine, Kasetsart University, the Department of Livestock Development and Department of National Parks, Wildlife and plant Conservation to conduct the surveillance study in bat, pig and human using One Health approach. The study comprised NiV surveillance from bats by molecular detection and antibody assays, serology screenings for evidence of NiV infection in high risk villagers, community risk assessments, and risk behavior investigations. Although results showed that NiV found in the fruit bats residing in community have not transmitted from animals to humans yet, the continuous monitoring of the potential risk of an EID transmission is needed to prevent an outbreak.



Dr. Supaporn Wacharapluesadee, EID researcher and research activities

Last but not least, the community, including the VHVs have enthusiastically and passionately participated in the EID preparedness, prevention, and control program. The VHVs are well equipped through EID training provided by the staff of Wat-Luang Health Promoting Hospital and EID researchers from TRC-EID. The training programs include practice on conducting case investigations, using the reporting system, and having case scenario discussions. After training, the VHVs have integrated EID preparedness with other routine work related to disease surveillance, prevention, and control. Students at Wat-Luang Phromawas School, monks, and other villagers have also been educated and this has resulted in a good awareness of the potential risks from the fruit bats. One result demonstrating this is that community people are no longer eating fruits bitten by the bats, which can/ may be a significant mode of disease transmission from bat to human.



VHV activities at Wat-Luang Community

Obviously, under the One Health Policy for EID management, the community based approach, using evidence-based practices from EID research is an effective prevention measure to bridge the gap between research and practice in this area. Furthermore, preparedness for EID investigations and rapid response through the SRRT helps strengthen the capacity of the public health emergency response system for EIDs.

Overcoming challenges in EID preparedness

Official systems for disease prevention and control often suffer from inadequate resources and face challenges in engaging local communities. Therefore, collaboration from communities, as well as academic and research institutes, is necessary in order to narrow down these gaps. The combination of shared goals and principles, as well as sustained engagement by all parties concerned is testament to this success story in Thailand, which will ultimately lead to an efficient horizontal expansion of all the existing strategies. Community participation plays a major role in primary health care policies and VHVs are the key persons working with health personnel to solve common, local health problems. In addition to community engagement, good cooperation among health professionals on the front line and in the SRRTs also helps control EIDs.

In brief, it is crucial that the collaboration between the central government, local administrative organizations, relevant agencies, and private businesses which needed to deal with an outbreak effectively and efficiently is in place and well developed.

Acknowledgement

We would like to gratefully thank to three main contributors. First, our special thank is to government agencies including Dr. Woraya Luang-on, Director of Bureau of Emerging Infectious Diseases, Department of Disease Control, Ministry of Public Health and the Coordinating Unit for One Health Thailand for kind assistance and insightful information given regarding EID preparedness in Thailand; We are appreciated the kind cooperation from the local government agencies including Chief Medical Director of Chonburi Provincial Public Health Office and staff; Director of Phanatnikhom Hospital and staff; Director of Wat-Luang Health Promoting Hospital and staff. Next, we would like to thank Dr. Supaporn Wacharapluesadee from TRC-EID, the Principal Investigator of EID research related to wildlife and Dr. Prateep Duangkae from Kasetsart University and research, for sharing useful information related to EID

research. Last, we truly thank Mr.Thanapol Puttaraksa, the President of the Village Health Volunteers and VHVs Team for providing information from the community aspect.

5

AN EVAP PIG FARM: COMMITMENTS TO RESPONSIBLE ANTIMICROBIAL USE IN ANIMALS, A PRIVATE PIG FARM, RAYONG

Panarut Wisawatapnimit
Kamolrat Turner

AN EVAP PIG FARM: COMMITMENTS TO RESPONSIBLE ANTIMICROBIAL USE IN ANIMALS, A PRIVATE PIG FARM, RAYONG

**Panarut Wisawatapnimit
Kamolrat Turner**



Pig farm in the past

Pig farm in the present

Introduction

“When I studied in an animal science department and I was assigned to practice in a pig farm, I imagined that a pig farm was dirty and had unpleasant smell. I also had to shoulder heavy bags of pig feed. After graduating,



Mr. Thawatchai Namprai, Farm manager

I started working at this commercial pig farm. It was different from what I thought because it was clean and had no unpleasant smell. I had learned what the real role of an animal husbandman is, how to raise pigs to be happy, be healthy, and be good product. It is quite a challenge to raise pigs because they cannot speak or communicate with us”, said Mr. Thawatchai Namprai, farm manager in Rayong II owned by the biggest agriculture and food industry in Thailand.

This reflects that he is not only concerned with productivity but also animal welfare. The farm where he has been working has developed an evaporative cooling system (also known as EVAP) and mechanisms to reduce pollution in the surrounding area. With a strong commitment to food security and safety for society of the owner, veterinarians and staff of this company put efforts to raise quality, enhance animal welfare and foster good environment with the belief that these could help reduce the need of antimicrobial use in pigs. The philosophy of this farm supports the concept of one health as animal health can affect human health.

Animal health affecting human health

It is globally recognized that human health is connected to the health of animals and the environment. Rick Weiss mentioned in the article “Africa’s Apes Are Imperiled, Researchers Warn”, in *The Washington Post*, 7 April 2003, that “Human or livestock or wildlife health can’t be discussed in isolation anymore. There is just one health and the solutions require everyone working together on all the different levels. The Centers for Disease Control and Prevention (CDC) has established the ‘One Health’ website and propose the importance of a ‘One Health’ approach because 6 out of every 10 infectious diseases in humans are spread from animals. Therefore, to achieve the best for human health, we need to work together for the health of animals and the environment.

Recently, the use of antimicrobials in animals has led to the problem of antimicrobial resistance in people. Reducing the

use of antimicrobials in animals is seen as one of the critical measures to solve the problem. As pork is a common animal product consumed by Thai people, the health of pigs is critically important. Making pigs healthy brings to the reduction of using antimicrobials, EVAP pig farms have therefore, played an important role for this. They are responsible for abandoning and reducing antimicrobial use either as a growth promotor or treatment for infectious diseases.

Standardized pig farm

This standard pig farm is a business line of a big, private company focusing on food production in Thailand, including pigs, chickens, and other animals. For the pig farm, it started in 1973 with the vision “Kitchen of the World”, the mission to sustain food security, become a self-sufficient society, and to balance nature. The farm has continually developed its quality in all areas related to the pig farm, including breeding practices for raising pigs in Thailand’s high temperature and humid environment, pig houses using an EVAP, feed, management and good disease prevention (biosecurity). Currently, it is the largest pig producer in Thailand and ranked third in the world. There are about 30 pig farms operated by the company, 48 leased pig farms and 125 contracted pig farms all over Thailand, and ten countries abroad mainly in South East Asia.

This company is a good example of how to implement national and international antimicrobial use in the swine industry, by using strategies employing advanced technology, research and development, and social accountability. The main purpose of this article is to analyze lessoned learned from roles and approaches in responsibility on antimicrobial use in pigs of a private pig farm rather than to advertise the company.

Quality priorities: from concern to policies and actions

Quality is set as the heart of the company and staff. All swine farms of this company are assessed as Good Agricultural Practice (GAP) and certified by the Department of Livestock

Development, Ministry of Agriculture and Cooperatives, Thailand. The company strictly follows national and international policies and standards related to animals and antimicrobial use that may affect human health and may promote antimicrobial resistance. The global vision of this company for antimicrobial use stewardship in food animals focusing on “Producing Safe, High Quality and Sustainable Food with the Responsible Use of Antimicrobials” has been formulated and has started to be implemented since 16 October 2017. The policy followed the guidelines of the World Health Organization and other standards of veterinary associations and organizations. “Any beta-agonists, antimicrobials, and hormones for growth promotion



Urine test for examining beta-agonist

of pigs has been abandoned”, said Mr. Damnoen Chaturavittawong, Senior Vice President, Swine Veterinary Service Department.



*Mr. Damnoen Chaturavittawong,
Senior Vice President,
Swine Veterinary Service
Department*

To achieve antimicrobial use stewardship in the pig farms of this company, global best practices in using antimicrobials in animals are applied. Antimicrobials in animals, including pigs, are able to be used for therapeutic purposes under a veterinarian’s prescription only. Antimicrobials that are not medically important for human medicine or use for animals only are the priorities to consider for a veterinarian. Shared-class antimicrobials of human medicine will also be used for



*Mr. Chaiyong Kritsnakriengkrai,
Veterinarian*



A pharmacy unit

therapeutic purposes under direction of a veterinarian only. Mr. Chaiyong Kritsnakriengkrai, veterinarian of this farm, mentioned that “Antimicrobials used in a pharmacy unit of this branching pig farm are under veterinarian prescription.” A policy of “no antibiotic before slaughter” has also been implemented since 2000.

Roles and capacities of the company’s veterinarians on the proper use of antimicrobials are raised up and strengthened. A monitoring system for antimicrobial resistance is also developed.

Good Farm System Leading to Healthy Pigs and Low Antimicrobial Use

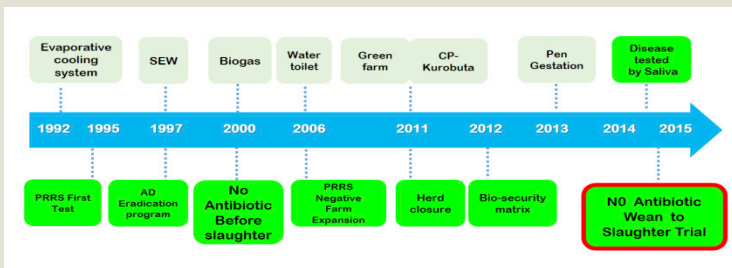
In addition to policies on antimicrobial use, the pig farms strive to develop quality of all production processes to raise the pigs based on advanced technology, results of research, scientific evidences, and innovation. It is clear that principle of epidemiology triad— host, agent, and environment— to prevent pig diseases and to promote good hygienic pigs is already applied.

Animal welfare has been the main strategy to promote healthy and happy pigs as well as diseases prevention and control. Five Freedoms of Animals— freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury or disease;

freedom to express normal behavior; and freedom from fear and distress— are main strategies to action.



Animal welfare: five freedoms



Development of reducing antimicrobial use in pigs

To promote pig welfare, an appropriate environment that can prevent the agent of the disease needs to be provided. EVAP has been established in all pig farms of this company since 1992, replacing an open housing system to prevent stress from heat and humidity as well as to isolate pigs from external epidemics and common infections. The EVAP is controlled by an advanced computerized farm management system to manage the environment most appropriate for the age of the pigs. The system is also controlled within a pigsty to keep minimal human contact for minimizing disease carriers. It also provides enough space for pigs to move freely.



An EVAP farm



Advanced computerized farm management system



There is an evidence supporting the idea that “pigs without suffering from heat stress will yield good production”. A water toilet for pigs is also developed as an initiative project to help clean the area of pigsties. A good environment for fostering pigs also reduces antimicrobial use. “If the pigs are not stressed and can grow healthily, there is no need to use antibiotics or hormones”, said by Mr. Damnoen Chaturavittawong.

The screening for preventing pig diseases is also the main approach to reduce antimicrobial use. Porcine reproductive and respiratory syndrome (PRRS), or blue ear disease, which is acute and contagious has been screened in pig farms since 1995. Eradication program for Aujeszky’s disease (AD), an infectious disease, has also been implemented since 1997. Currently, the diseases screening is done by testing saliva in the standard laboratory of the company. Vaccines for preventing some pig diseases are also used.

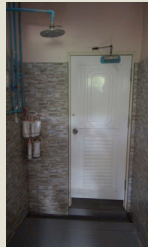
Management for controlling pig diseases was also established. For example, segregated early weaning (SEW) and herd closure have been initiated since 1997 and 2011, respectively. The distance between each farm is about 3 kilometers and they need to be far from the local community. The pigsty cleaning protocol and transportation for pigs are also strict.

Staff who work in a farm and people visiting farms can also be a host of the diseases. Therefore, regulations for entering the farm were established and strictly enforced. Staff and all visitors need to pass through disinfectant area, shower and

shampoo in a designated room, and change clothes to the uniform provided by the farm before entering the farms. People who are sick or have been exposed to other animal farms within 48 hours will not be allowed to enter the farm.



Disinfectant area



Shower room



Biogas system

The natural environment is also a main concern of the pig farms of this company. All farms are designed as a green farm, similar to a resort. To reduce odor from the pigs, the pig house has settled three layers: nano filtration, dried coconut peel, and Korean banyan planting. The biogas system was also established in every farm to compile waste products of pigs. This biogas is also useful for creating electricity for utilizing in the farms and pig faeces can be used as fertilizer. The farms also distribute the fertilizer for farmers in the area free of charge as part of corporate social responsibility (CSR).

Outcomes of Healthy and Happy Farm on Antimicrobial Use

The policy of qualified farm mentioned above would not be successfully achieved without high qualified staff who love to raise pigs. The welfare of the staff working in the farm is also concerned. They are provided with accommodation in a good environment. Their children are supported to go to schools. A few workers we interviewed expressed their pleasure and happiness working and living in the farm. They all showed their passion in the pigs they raised. Human resource management is another key that the company needs to employ so as to obtain healthy pigs.



Staff working in the pig farm



Green farm in Rayong province

With the effort of the pig farms to promote healthy, happy farms and reduce antimicrobial use, it found that the number of severe ill pigs decreased or was eliminated. Mr. Damnoen Chaturavittawong confirmed that many pig farms of this company, including those in Rayong province, had been free from PRRS-virus for many years.

Key Success and Challenges

To reduce antimicrobial use in the pig farms and other livestock, three involved stakeholders: regulatory bodies, food producers, and consumers must be in cooperation.

The regulatory bodies, especially the Department of Livestock Development and the Ministry of Public Health, play vital roles in formulating antimicrobial use policies, communicating the policies to food producers and consumers, enforcing and monitoring all food producers to put the policies into action. Integration and collaboration between involved sectors and ministries are also important because “one health” is related to many stakeholders working in drug, human, animals, plants, and the environment. Mr. Damnoen Chaturavittawong mentioned “Antimicrobial resistance is “one health” issue that all sectors need to collaborate and work best on their roles. It is needed to raise awareness of those who use antimicrobials that he or she needs to use them with responsibility”.

Social accountability and commitment to be responsible for consumers and society of the food producers are the keys for the rational use of antimicrobials that will be safe for humans

and animals. Making trust and quality assurance for their products are necessary for the food producers. They need to guarantee quality of hygienic pork products from farms to consumer's hands. Mr. Chaiyong Kritsnakriengkrai said "Raising pigs is a job that can help humans because we can produce food for humans. How to produce safe foods for humans is our main mission. If pigs are healthy and do not have any diseases, we will not use antimicrobials. The food chain will be safe from farms to consumers". Mr. Damnoen Chaturavittawong said "If the animals are sick, we need to treat them. If we do not treat them, it is unethical. But we need to consider the use of drugs with the principles of rational drug use."

Research and development is also an important tool for food producers to raise healthy pigs. Mr. Damnoen Chaturavittawong informed "Research and development is at the heart of our business. Because of the research results, we believe that the key factors of our pig farms are our pig breeding, pigs' feed, pig house, and management. We can ensure that our pig products are high qualified, fresh, medication-free, safe, hygienic and environmentally friendly." The results of the research also provide scientific evidences for consumers to understand about the impacts from antimicrobial use in animals and the effect on humans.

Approaches to raise healthy and happy pigs affect antimicrobial use in pigs. Although an EVAP pig farm can promote animal welfare and prevent some pig diseases, it costs a lot for investment. Big business farms can establish it but it may be limited for some small or local farms. Other low-cost initiatives and local wisdom, such as using herbs instead of antimicrobials, should be considered.

Knowledge of the effects of using antimicrobials in animals on health of the consumers can help people make the right choice to buy pork meat from the food producers that concern food safety. It also forces the food producers to produce antimicrobial-free and hygienic pork for people.

Therefore, an awareness of people on this issue will make a strong voice for enforcing food producers to be responsible for antimicrobial use in animals, including pigs.

The Way Forward

For food safety, the issue of using antimicrobials in pigs is not the only one consideration. All processes used by pig producers from raising pigs in farms, slaughtering them, packing their meats, and selling fresh meat to consumers, also need to be considered. For this big, business farm, they plan to increase the quality of all food processes to ensure high food product quality from farms to consumers' hands.

Research and development with collaboration of academic institutes will also be one of the pig farms' mission to continue combating pig diseases and raising standards of the pig industry at the national and international level.



Healthy, happy pigs



Pig farm

Acknowledgement

We would like to extend our deepest gratitude to the staff of Charoen Pokphand Foods PCL., especially Mr. Damnoen Chaturavittawong, Senior Vice President, Swine Veterinary Service Department; Mr. Chaiyong Kritsnakriengkrai, Veterinary; Mr. Apisit Kittawornrat, Veterinary; Mr. Thawatchai Namprai, a manager and animal husbandryman of Rayong II farm; and all staff of Rayong II Farm. Finally, we would like to thank Dr. Paul Turner for English language editing.

6

A FREE RANGE PIG FARM: COMMITMENTS TO RESPONSIBLE ANTIMICROBIAL USE IN ANIMALS, A PRIVATE PIG FARM, RATCHABURI

Orarat Wangpradit
Pornruedee Nitirat

“A FREE RANGE PIG FARM: COMMITMENTS TO RESPONSIBLE ANTIMICROBIAL USE IN ANIMALS” A PRIVATE PIG FARM IN RATCHABURI

Orarat Wangpradit
Pornruedee Nitirat

The phrase “you are what you eat” may reflect the association between individuals’ health and their food consumption. Culturally, having rice with many kinds of dishes is Thai eating lifestyle. Meat especially pork is mainly an ingredient of most Thai dishes. Each year, Thais consume 756 million kilograms of pork (14 kilograms per person per year). If pork contaminated with some residues including toxins, chemicals, and antimicrobials, it can bring harm to those who consume the meat. Some evidence in Thailand supported that antimicrobial used in food animals induced an increasing rate of antibiotic resistance among Thai people. This health problem has been taken into account as a national issue and many agencies have tried to solve it over years.

Antimicrobial resistance situations

Antimicrobial resistance (AMR) is a critical threat worldwide. It is estimated that 700,000 people a year had died from antimicrobial-resistant infections globally and 88,000 people were infected with antimicrobial-resistant bacteria each year in Thailand. An emerging of antimicrobial-resistant bacteria required higher doses and limited treatment options, especially for carbapenem and colistin-resistant bacteria which have been used as a last-resort treatment for multi-drug-resistant strains.

Overuse and misuse of antibiotics are the major factors urging antimicrobial resistance. This includes use of antibiotics in non-bacterial infected patients such as common cold and

flu, or adding of antibiotics, especially colistin, in livestock feed to promote growth performances.

Recently, colistin-resistant bacteria were firstly reported from a swine farm in China in November 2015. These were *E. coli* contained Plasmid-Mediated Colistin Resistance genes (MCR-1) which could rapidly transfer from one to other species (cross-species). Five months later, MCR-1 genes were detected in urine of an American female patient. Nowadays, MCR-1 genes have been found in both human and animals in many countries including Thailand.

Global reactions to control antimicrobial resistance

In the past 30 years, rapid expansion of livestock production has brought about increasing use of antibiotics for both treatment and prophylaxis of diseases by adding sub-therapeutic doses in animal feed. In addition, if only small numbers of pigs are infected with a contagious disease, other pigs in the same herd will be treated as well despite absence of symptoms in order to keep the herd safe from an outbreak.

Concerning about risks to human health from the dissemination of antibiotic-resistant genes *via* the food chain by meat consumed and dispersion of antibiotics in the environment, the European Union (EU) completely banned the use of antibiotics as growth promoters since 2006.

In the US, a voluntary ban of medically important antibiotic use in food animals was announced by USFDA in 2013 in order to save essential antibiotics for human. This policy requires drug manufacturers to change labeling on antibiotics that they should not be used for animal growth promotion. When in need, the use of medically important antibiotics in food animals can only be possible under the supervision of a veterinarian.

In 2015, to support World Health Assembly-68 (WHA-68) regarding the Global Action Plan on AMR, many member

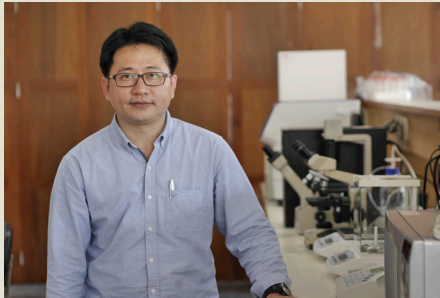
countries agreed to implement the action plan for their countries. Thai government also launched a Strategic Plan for Tackling Antimicrobial Resistance (2017-2021). This plan was aimed to reduce the use of antimicrobials in human and animals for 20% and 30%, respectively.

Autogenous vaccines and herbal medicines: alternative approaches to reduce antibacterials used in swine farms

The implementation of the AMR Strategic Plan in Thailand has led to the control of certain animal drugs and pharmaceutical raw materials not allowed to add in animal feed. Furthermore, colistin is listed as a special controlled drug which could be used only by veterinarians for treatment of infectious diseases when other antibacterials are not effective. Although most food animal producers and farmers agree to abide by this strategic plan, but other options to substitute the use of antibacterials are in need.

Vaccination is one of good alternatives. Vaccination in swine bleeders could produce immunity in piglets through their sow's colostrum, thus protecting baby pigs from infectious diseases and increasing their growth performances. Even though commercially imported vaccines are available for major pig diseases, but the cost of imported vaccines for swine is higher than 2.5 trillion baht (approx. 80 million USD) per year. In addition, some infectious organisms have genetic variation and genetic mutation; therefore, commercial vaccine may not be fully effective.

“Autogenous vaccine development is necessary for swine production in Thailand in order to reduce cost of imported vaccines, enhance vaccine security, and decrease antibacterial use in swine farms” said Dr. Suphot Wattanaphansak, deputy director of the Livestock Hospital, Faculty of Veterinary Science, Chulalongkorn University



Dr. Suphot Wattanaphansak, Deputy Director of the Livestock Hospital, Faculty of Veterinary Science, Chulalongkorn University

Therefore, Chulalongkorn University had signed a Memorandum of Understanding (MOU) with the Department of Livestock Development on research and development of autogenous vaccines used in swine farms. The autogenous vaccines are tailor-made from specific virus or bacteria causing an infectious epidemic in each farm, and are subsequently immunized in swine to prevent a re-emerging of the same infectious diseases.



Swine disease diagnosis for autogenous vaccine development at the Livestock Hospital, Chulalongkorn University

The other potential alternative applied is the mixing of Thai herbs such as karyiat and turmeric in animal feeds. These herbs are indicated as antipyretic, anti-diarrhea, anti-microbial infection in human, and are listed in the National List of

Essential Medicines. Kariyat and turmeric have been used instead of antibiotics at the sub-therapeutic doses to prevent infectious diseases in some swine farms such as Samphran Farm in Ratchaburi.



Pig are fed with kariyat and turmeric mixed feed at Samphran Farm

Cooperative willingness of entrepreneurs to reduce antimicrobial use in swine farms

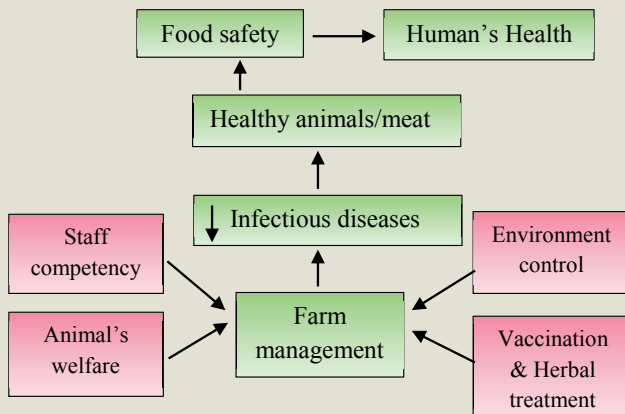
Samphran Farm is a private pig farm aiming to provide an alternative choice of pork for consumers. With the concern of social responsibility and animal welfare, a free range farm is operated.

“I think that in the past, Thai people didn’t have a choice of antimicrobial-free pork because all farms used antibacterials to protect their pigs from infectious diseases. But, nowadays, there are Evap (Evaporative cooling system) farms and standard natural-raising farm like my farm, producing alternative meat of choices for them. Actually, the cost of free range farm is much higher but the price of product increases by 25%. Although challenging, I still wanted to be responsible for the society.” said Mr. Subin Teeranuwat, the farm owner.



Free-range farm operation at Samphan Farm, Ratchaburi

Managing a standard free range farm is an ambitious task since pigs are not confined within a stable. Therefore, they are more likely to contact with germs than those in an Evap or a closed farming system. Vaccination is, therefore, essential to protect pigs from infectious diseases. Both breeders and piglets are scheduled for routine and seasonal vaccinations. The autogenous vaccines are also used to immunize susceptible pigs for preventing an outbreak of re-emerging diseases. A concept of Samphan Farm management is depicted in the diagram below:



Environment control is the most important task in farm management since proper environment helps reduce zoonotic diseases. The ranch area was designed not only to meet a standard of swine farm but also to concern pig's safety such as keeping the land free of poisonous plants that pigs might eat, mowing the lawn to prevent dangerous reptiles, setting up shade, wet, and dry zones, and so on. Physical environment accounts for the healthiness of the pigs.

“Along with good management of swine farms, autogenous vaccination and herbal medicine used to prevent bacterial infections in this farm showed effective results of increased body weight, decreased mortality and reduced antibiotics used for treatment” said Dr. Wattanaphansak.



The owner of Samphran Farm (middle) consults with Dr. Wattanaphansak and an animal husbandry officer routinely to keep his pigs safe and healthy.

However, when pigs contact diseases, they will be treated with low strength antimicrobials under veterinarian supervision. If drugs are used in infected pigs, those pigs will be moved from this farm to another antimicrobial-use farm in order to keep high quality as an antimicrobial-free farm.

Each day, the farm workers diligently carry out their tasks. This free range farm cannot be successful without the hands of those workers. One important competency specially required for farm workers is the ability to early detect sick pigs and urgently remove them from the farm to get treatment. On-the-job training has been given to all new workers. Also, personnel from Department of Livestock Development periodically come to the farm to update workers' knowledge and skills, especially when swine disease outbreak occurred. Besides, the head staffs were supported to attend special trainings or lectures to bring updated information to improve the farm quality.

According to animal's welfare issue, a concept of a "happy pig farm" is concerned. Pigs in Samphran Farm are raised quite naturally. There is enough space for them to run, play, sleep, browse, and stay close to the nature. It is found that happy pigs are quite healthy with high immunity, thus reducing antibiotic use.



Free range area connected with spacious stable for pigs at Samphran Farm

“I can say that the happier pigs, the healthier pork. Most of my pigs are healthy probably because they run all day (laugh). The quality of their meat is good too. When I see my pigs stay happy, I am happy too.” said Mr. Teeranuwat, the farm owner.

Opportunities of antimicrobial-free pork from standard free range pig farms are prosperous. Although, antimicrobial-free pork is a good alternative choice of consumption for Thai people, especially for health lovers, it owns very little market share due to its high price when it was sold as a premium good in supermarkets. There are some rooms of improvement to make antimicrobial-free pork accessible for all as follows:

- Ranchers should be encouraged to be aware of the quality rather than the quantity of products. Consumers’ health should be their first priority.
- The process of antimicrobial-free pork production should be widely introduced to Thai society to increase consumer’s trust and decision making.
- The price of antimicrobial-free pork at supermarkets should be reasonable and affordable for a majority of consumers.
- The standard guarantee (5-star farm) should be given to not only qualified Evap farms but to any kind of qualified farms also in order to encourage the production of antimicrobial-free pork.



Certified antimicrobial-free pork from Samphran Farm

Producing safe food is one of social responsibilities to protect health of consumers. Antimicrobial-free pork is an alternative choice for Thai people. There are some difficulties impeding the growth of antimicrobial-free pork production and consumption. We still need strong efforts to bring safe pork to the table of all Thai households.

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Note :

Date



*“I don’t want you to be only a doctor,
but I also want you to be a man.”*

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