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Short Communication

# Thailand Antimicrobial Resistance Containment and Prevention Program

Visanu Thamlikitkul [a,*], Pinyo Rattanaumpawan [a], Adhiratha Boonyasiri [a], Varaporn Pumsuwan [a], Tepnimitr Judaeng [a], Surapee Tiengrim [a], Wantana Paveenkittiporn [b], Suvichai Rojanasthien [c], Sasi Jaroenpoj [d], Saisiri Issaracharnvanich [e]

[a] Faculty of Medicine Siriraj Hospital and Faculty of Medical Technology, Mahidol University, 2 Wang Lung Road, Bangkok, 10700, Thailand
[b] Department of Medical Sciences, Ministry of Public Health, Bangkok, Thailand
[c] Faculty of Veterinary Medicine, Chiang Mai University, Chiang Mai, Thailand
[d] Department of Livestock Development, Ministry of Agriculture and Cooperatives, Bangkok, Thailand
[e] Independent Health Communication Consultant, Thailand

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ABSTRACT

The Thailand Antimicrobial Resistance (AMR) Containment and Prevention Program was founded to develop, co-ordinate and implement AMR Containment and Prevention (AMRCP) operational actions in Thailand following the 'One Health' approach. This article summarises the ten AMRCP operational actions initiated during the initial phase of the programme from 2012 to 2016: 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, 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 programme'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 and prevention practices.


## 1. Introduction

Antimicrobial resistance (AMR) has been an urgent health threat in Thailand over the past few decades. Data from national AMR surveillance in Thailand as well as a previous study revealed that AMR in Thailand has been increasing over the past decade [1]. The prevalence of extended-spectrum β-lactamase (ESBL)-producing Enterobacteriaceae and carbapenem-resistant *Acinetobacter baumannii* was <10% in 2000 and had increased to 40–80% in 2011. Interventions to contain and prevent AMR in Thailand have been frequently but not systematically proposed or executed over the past decade.

## 2. Development of the Thailand Antimicrobial Resistance Containment and Prevention Program

The Thailand AMR Containment and Prevention (AMRCP) Program was founded in 2011 by individuals with academic and social credentials and a history of leadership in AMR. The programme's vision is to contain and prevent the emergence and spread of key antimicrobial-resistant bacterial infections in Thailand. The programme established AMRCP operational actions

* Corresponding author. Tel.: +66 2 412 5994; fax: +66 2 412 5994.
*E-mail address:* visanu.tha@mahidol.ac.th (V. Thamlikitkul).

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under the 'One Health' approach. These operational actions were chosen by identifying the actions required to fill the gaps between the existing AMRCP systems in place in 2011 and the desired AMRCP systems proposed by the committee on AMRCP research and development appointed by the Health Systems Research Institute, Ministry of Public Health (Thailand).

The Thailand AMRCP Program is undertaking 10 operational actions between 2012 and 2016, which are in accordance with global and regional actions (Table 1). They were endorsed by the relevant stakeholders at the national workshop on AMRCP in Thailand in May 2012.

Since 2012, the Thailand AMRCP Program has been supported by the Thai Health Promotion Foundation, Health Systems Research Institute (Thailand), Faculty of Medicine Siriraj Hospital, Government Pharmaceutical Organization (Thailand) and International Development Research Center (Canada).

## 3. Implementation of Thailand Antimicrobial Resistance Containment and Prevention operational actions

The Thailand AMRCP Program has been implementing operational actions since 2012 in collaboration with major domestic partners, including the Ministry of Education, the Ministry of Public Health, the Ministry of Agriculture and Cooperatives, several concurrent and complimentary projects, and relevant professional institutes, councils and societies.

### 3.1. Action 1: estimate the national antimicrobial resistance burden

The Thailand AMRCP Program estimated the health and economic burden of antimicrobial-resistant infections in Thailand by using the secondary data from 1023 hospitals in 2010 where the prevalence of nosocomial infections was 2.1–7.6% [2]. Nosocomial infections caused by antimicrobial-resistant bacteria resulted in an additional 3.24 million days of hospitalisation and 38,481 deaths. The cost of antibiotics for treatment of antimicrobial-resistant infections accounted for US$202 million, and the total costs including the costs of morbidity and mortality associated with premature deaths related to AMR were at least US$1300 million in 2010. The aforementioned findings confirm that AMR is a major and urgent health problem in Thailand that requires comprehensive and systematic approaches at local, national and international levels.

### 3.2. Action 2: establish the dynamics of antimicrobial resistance (AMR) chains to understand how AMR in Thailand develops and spreads

Understanding how AMR develops and spreads in Thailand is critical for designing suitable AMRCP campaigns. The dynamics of AMR chains in communities and in hospitals are defined by reviewing the available information relevant to Thailand and conducting additional surveys in local settings, as described in detail elsewhere [3].

AMR in communities in Thailand begins with human and non-human antibiotic use, especially in food animals. Antibiotic use among Thais seeking care from retail shops, drug stores, clinics and hospitals is very prevalent and is often inappropriate. The prevalence of ESBL-producing Enterobacteriaceae in faeces of asymptomatic individuals in Thailand is between 29% and 93%. Antibiotic use in food animals is also very common in Thailand. The prevalence of ESBL-producing Enterobacteriaceae in faeces of asymptomatic pigs and chickens in Thai farms is 76.7% and 40%, respectively [4]. Antimicrobial-resistant bacteria from these people and food animals can be transmitted to foods, the environment and other people. The prevalence of colonisation with ESBL-producing Enterobacteriaceae in the gastrointestinal tract of travellers was <10% prior to travel but increased to 49% following travel to Asia, including Thailand. Antimicrobial-resistant bacteria can initially create a silent carrier state and may later cause community-acquired infections due to antimicrobial-resistant bacteria [5].

AMR in Thai hospitals is usually associated with inappropriate use of antibiotics as well as inefficient infection prevention and control practices. The frequency of inappropriate use of antimicrobials in hospitalised patients in Thailand is between 25% and 92%. Hospital-acquired infections (HAIs) are common in Thailand, and most of these infections are caused by antimicrobial-resistant bacteria [6]. Many HAIs caused by antimicrobial-resistant bacteria can be prevented by infection prevention and control practices including hand hygiene, barrier precautions and environmental decontamination. However, compliance with the single most effective and basic infection prevention and control measure—hand hygiene-is still inadequate among healthcare personnel in many Thai hospitals.

### 3.3. Action 3: develop a national antimicrobial resistance containment and prevention infrastructure

The sustainability of AMRCP is extremely important. A national AMRCP infrastructure should be established to ensure such sustainability. The national AMRCP Alliance in Thailand was established in 2013. It is composed of one committee, two subcommittees and several working groups for each subcommittee. The subcommittee on the surveillance of antibiotic use and the promotion of responsible antibiotic use in humans and animals is appointed by the Deputy Prime Minister. This subcommittee has four working groups: (i) working group on the surveillance of antibiotic use in humans; (ii) working group on the surveillance of antibiotic use in animals; (iii) working group on the promotion of responsible antibiotic use in humans; and (iv) working group on the promotion of responsible antibiotic use in animals. The subcommittee on the surveillance of AMR and infection prevention and control is also appointed by the Deputy Prime Minister. This subcommittee has three working groups: (i) working group on the surveillance of AMR in humans; (ii) working group on infection prevention and control; and (iii) working group on the surveillance of AMR in animals. The committee on AMRCP research and development is appointed by the director of the Health Systems Research Institute, Ministry of Public Health.

The national AMR co-ordinating centre to oversee and co-ordinate the aforementioned AMR Alliance was established in 2015.

**Table 1**
The Thailand Antimicrobial Resistance Containment and Prevention (AMRCP) Program operational actions, 2012–2016.

- Estimate the national antimicrobial resistance (AMR) burden.
- Establish the dynamics of AMR chains to understand how AMR develops and spreads.
- Develop a national AMRCP infrastructure.
- Develop laboratory and information technology systems for surveillance of AMR, antibiotic use and hospital-acquired infections.
- Regulate the use and distribution of antibiotics in humans and food animals.
- Design AMRCP campaigns.
- Generate local evidence for promoting responsible use of antibiotics and develop context-appropriate efficient practices for infection prevention and control.
- Create an AMRCP package.
- Implement the AMRCP package in selected pilot communities.
- Conduct research and development of diagnostics, therapy and prevention of antimicrobial-resistant bacterial infections.