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PERSPECTIVES

National action plan to combat antimicrobial resistance in Taiwan

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Antibiotic-resistant microorganisms continue to emerge and spread.[1,2] Antimicrobial resistance is one of the three major challenges in patient safety. In 2011, the World Health Organization designated "Combat antimicrobial resistance" as the theme for World Health Day, stating "no action today, no cure tomorrow."[3] We need to actively confront the issue of antimicrobial resistance.

Antimicrobial resistance is both a threat and a challenge to the treatment of infectious diseases in Taiwan. Based on the national database on antimicrobial resistance from the Taiwan Nosocomial Infection Surveillance System during the period 2003–2012, the proportion of methicillin-resistant *Staphylococcus aureus* infections in intensive care units in medical centers and regional hospitals decreased from 89.2% to 69.9%; the proportion of vancomycin-resistant enterococci infections increased from 2.9% to 23.2%; the proportion of Enterobacteriaceae isolates resistant to carbapenems increased from 1.4% to 8.1%; and the proportion of *Acinetobacter baumannii* isolates resistant to imipenem or meropenem increased from 17.2% to 72.8%.[4]

In response to the emergence of antimicrobial resistance in pathogens encountered in hospitals and, more recently, in the community, the Centers for Disease Control, Taiwan (Taiwan CDC) has implemented a national action plan to combat antimicrobial resistance[5]: the antimicrobial management project from 2013 to 2015 for preventing the emergence of resistant microorganisms and decreasing health care-associated infections (HAIs). The national action plan on antimicrobial resistance is a multifaceted, multidisciplinary approach which works through the implementation of antimicrobial stewardship by hospitals, coordination and supervision, regular review and allocation of resources, measuring performance, and benchmarking (Fig.1). The phases of the national action plan—antimicrobial management project include a planning phase, an executive phase, and a policy evaluation phase.

Planning phase

The main intervention measures are the appropriate use of antibiotics and infection control. The former consists of a prospective audit with intervention and feedback, formulary restriction and preauthorization, surveillance of antimicrobial resistance and consumption, an effective health information system, and education.[6] The latter includes hand hygiene, isolation and protection, audit and evaluation, regional labeling, and antimicrobial resistance analysis. The expected achievements are a reduction in the consumption of antimicrobial drugs, reduction in antimicrobial resistance, and a reduction in HAIs. The core

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elements of the national action plan on antimicrobial resistance include multidisciplinary professionals and coordination.[7] The roles for the national action plan—antimicrobial management program are given in the following sections.

Role of the Taiwan CDC

The role of the Taiwan CDC is the coordination of policy planning, management, and inspection for the national action plan to combat antimicrobial resistance.

Role of the infectious diseases service

The role of the infectious diseases service is to coordinate the establishment of the hospital antimicrobial management mechanism and its strategic promotion in hospitals, monitoring HAIs, and implementing infection control measures.

Role of the pharmacy

The role of the pharmacy is the assessment of the appropriateness of prescriptions for antibiotic drugs, monitoring a checklist of adverse drug reactions, and monitoring of therapeutic drugs.

Role of the clinical microbiology service

The role of the clinical microbiology service is the assessment of standard operating procedures for examinations and the proposal of definite improvement plans, such as a reduction in the defect rate and the rate of contamination of specimens, and the use of rapid test kits or equipment to provide fast and accurate test results.

Role of computer technology

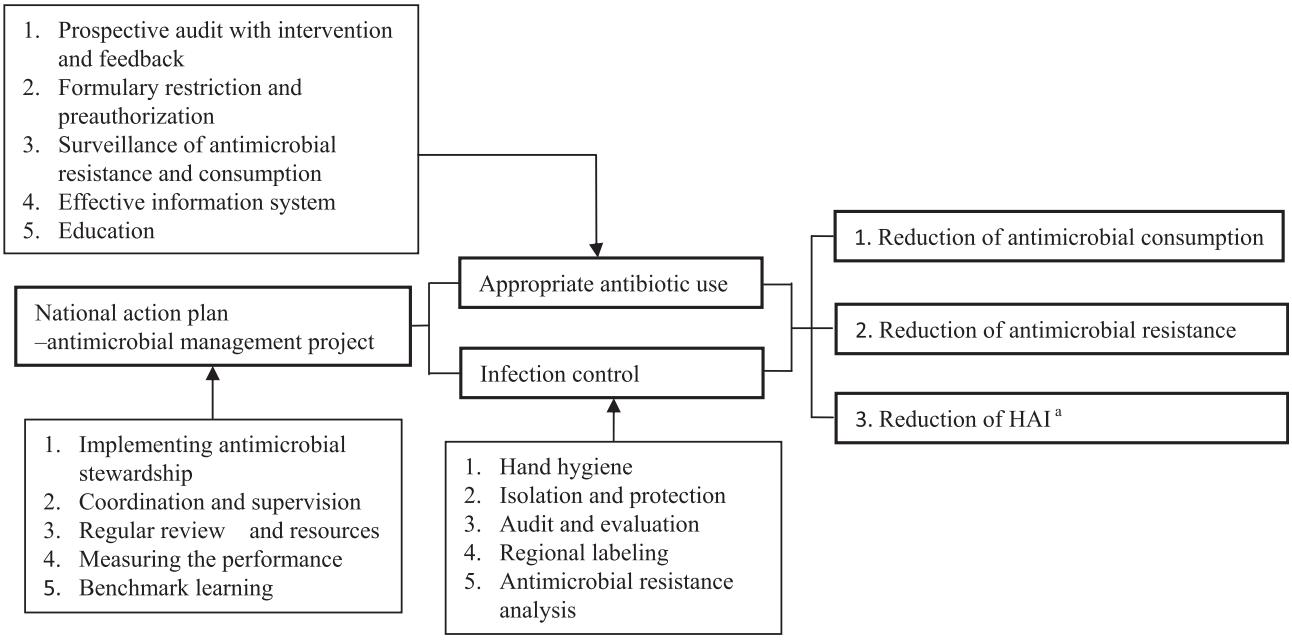
Computer technology has a role in strengthening and integrating the various information systems of consumption of antimicrobial drugs, antimicrobial resistance, HAIs, and clinical information of patients.

Executive phase

There are three levels for the implementation of the executive phase[8]: a project management center, the demonstration centers, and the participating hospitals.

Establishment of the project management center

Professional organizations are entrusted with developing the project management center. The duties of the center include the preparation of an antimicrobial management toolkit and the assessment of the antimicrobial management project, creating and analyzing the monitoring performance indicators periodically, implementing external audits and inspection, organizing the antibiotic management forum, and the promotion of benchmarking and performance competitions. Educating and training medical professionals and the public, developing digital learning



[a] Healthcare- associated infections

Figure 1. Infrastructure of the national action plan—antimicrobial management project in Taiwan.