MINISTRY OF HEALTH

NATIONAL ACTION PLAN ON COMBATTING DRUG RESISTANCE in the period from 2013 - 2020

(Approved with the Decision No. 2174/QD-BYT dated 21st June 2013 of the Minister of Health)

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ABBREVIATIONS

Abbreviations	Vietnamese	English
AFB	Trực khuẩn kháng cồn kháng	Acid - Fast Bacilli
	toan	
ANSORP	Mạng lưới giám sát của châu Á	Asian Network for Surveillance
	về sự kháng thuốc của vi khuẩn	of Resistant Pathogens
	gây bệnh thường gặp	
AMR	Kháng thuốc	Antimicrobial resistance
ARV	Kháng retro vi rút	Antiretrovirus
AZT - ZDV	Zidovudine	
DDD	Liều xác định trung bình trong	Defined Daily Dose
	ngày	
ESBL	Men Beta - Lactamase phổ rộng	Extended - Spectrum Beta -
		Lactamase
HAART	Liệu pháp kháng retro vi rút hoạt	
	tính cao	
HIV/AIDS	Vi rút suy giảm miễn dịch ở	Human Immunodeficiency
	người/Hội chứng suy giảm miễn	Virus/Acquired Immune
	dịch mắc phải	Deficiency Syndrome
KONSAR	Mạng lưới giám sát quốc gia về	Korean Nationwide Surveillance
	kháng thuốc của Hàn Quốc	of Antimicrobial Resistance
KSNK	Kiểm soát nhiễm khuẩn	Infection Control
NDM1	Men làm cho vi khuẩn kháng với	New Delhi metallo - beta –

	các kháng sinh nhóm beta-lactam	lactamase 1
NKBV	Nhiễm khuẩn bệnh viện	Hospital Infection
NNRTI	Ức chế men sao chép ngược	
	không nucleosid	
NRTI	Ức chế men sao chép ngược	
	nucleosid và nucleotid	
NVP	Nevirapine	
MDR-TB	Bệnh lao đa kháng thuốc	Multidrug - resistant
		tuberculosis
MIC	Nồng độ ức chế tối thiểu	Minimum Inhibitor
		Concentration
MRSA	*Staphylococcus aureus* kháng	Methicillin Resistance
	methicillin	*Staphylococcus aureus*
3TC	Lamivudine	
d4T	Stavudine	
PLTMC	Phòng lây truyền mẹ con	
TCYTTG	Tổ chức Y tế Thế giới	World Health Organization
XDR-TB	Bệnh lao siêu kháng thuốc	Extensively Extremely Drug
		Resistance - TB

Part one

RATIONAL

BACKGROUND

Since the discovery of penicillin antibiotics, hundreds of antibiotics and similar drugs have been invented and used. The discovery of antibiotics marked a new era

of medicine development for the treatment of bacterial infections.

In addition to the role of medicine known to man, anti-bacterial drugs have been widely used in livestock, poultry, aquaculture and cultivation for the treatment, prevention and control of animal diseases, as well as for production purposes. As a result of continuous exposure to antimicrobial drugs, the proportion of drug-resistant bacteria in the feces of these animals is relatively high.

Antibiotics are of great benefit in the treatment and care of patients and the veterinary if they are prescribed and ed properly. However, that these drugs have been widely used, prolonged and abused would make microbes adaptable to drugs, enabling many bacteria to become resistant and as a result, the drugs are becoming less effective or ineffective. Drug resistance is not only a concern of clinicians in the treatment but also the concern of the whole society for public health.

Drug resistance (AMR) is a condition of microorganisms (such as bacteria, viruses, fungi and parasites) are resistant to the antibiotics which used to be susceptible to microorganisms. Resistant organisms (bacteria, viruses, parasites) that can withstand the attack of anti-bacterial drugs (such as antibiotics, antiviral, anti-malarial drugs), therefore, the application of methods, specific therapy, drugs becomes ineffective, the infection will be prolonged (even fatal) and can spread to others. AMR is the corollary of the process of drug use in the treatment and particularly becomes more serious where abuse of antibiotics is increasingly more common.
Bacteria resistant to most antibiotics have appeared in the world, also called XDR bacteria.

In Vietnam, most of the examination and treatment facilities are facing with of spread of bacteria resistant to many antibiotics. The level and speed of drug resistance are increasing, at alarming level. The burden of drug resistance is increasing due to the increasing cost of treatment, prolonged treatment,. That will affect patients' health, community and social development. In the future, many nations will be able to face the possibility of having no effective drugs to treat infectious diseases if they do not make appropriate interventions.

Currently, drug resistance is not a new issue, but it has become dangerous and urgent, requiring the comprehensive effort to help the humankind avoid the risk of returning to the era without antibiotics. The World Health Organization (WHO) said that we live in the era dependent on antibiotic and requires global responsibility to protect valuable source of antibiotics for the next generation.

On the World Health Day 2011, WHO chosen the drug resistance prevention slogan "No action today, no cure tomorrow" and urged the nation to have timely

plan to deal with drug resistance.
Hence, it is essential for Vietnam to build a comprehensive, overall, long-term Plan for the prevention of drug resistance in the current period.

I. PRACTICAL BASIS

1. Status of drug resistance

1.1. Drug resistance in the world

The problem of drug resistance has become alarming around the world, especially the developing countries. The burden of the cost for treating infectious diseases is relatively large due to the replacement of older antibiotics with new expensive antibiotics.

In 2011, drug-resistant TB situation was happening in most countries. There are about 640,000 cases of multidrug-resistant tuberculosis (MDR - TB) worldwide, about 9% of which is XDR - TB [1].

Falciparum malaria parasites resistant to artemisinin is emerging in Southeast Asia. Resistance to anti-malarial drugs of previous generation such as chloroquine and sulfadoxine-pyrimethamine is widespread in most endemic countries [2].

The global approach to antiretroviral drugs to treat HIV patients increases the risk of drug resistance. The resistance of the virus to drugs is a threat to humanity. Approximately 15% of patients treated have resorted to second and tertiary drug regimen. The cost of this drug is 100 times higher than primary regimen. The increasing resistance of HIV poses a challenge to maintain global outreach programs in low-income countries. These countries need to strengthen health services and improve the quality of care for people with HIV to minimize the spread of resistant viruses.

Data of ANSORP monitoring studies from 1/2000 to 6/2001 of 14 centers from 11 countries in Southeast Asia shows the high proportion of resistance of bacteria S. pneumoniae. 483 of the 685 strains of S. pneumoniae isolated from patients (52.4%) are not susceptible to penicillin, 23% at intermediate level and 29.4% resistant to penicillin (MIC $\geq$ 2 mg/l). Results of bacterial isolation showed the highest rate of resistance to penicillin in Vietnam (71.4%), followed by South Korea (54.8%), Hong Kong (43.2%) and Taiwan (38.6 %). Erythromycin resistance rate is also very high in Vietnam 92.1%, Taiwan 86%, South Korea 80.6%, and Hong Kong 76.8% and China 73.9%. Data from multicenter surveillance studies clearly demonstrated the speed and resistance rate of S. pneumoniae in Asian countries, where the most incidence of diseases in the world

[3].

According to data from the 2005-2007 KONSAR study in South Korea hospitals showed that Methicillin-resistant S. aureus (MRSA) was 64%; K. pneumoniae resistant to third-generation cephalosporins was 29%; E. coli resistant to fluoroquinolone 27%, P. aeruginosa resistance 33%, Acinetobacter spp. resistance 48%, P. aeruginosa resistant to amikacin 19%, Acinetobacter spp. resistance 37%. vancomycin-resistant E. faecium and imipenem-resistant Acinetobacter spp. is increasing. Resistance rate detected in the laboratory of E. coli and K. pneumoniae to third-generation cephalosporins and P. aeruginosa to imipenem is higher in hospitals [4].

Antibiotics effectively treated for Shigella dysentery were previously resistant, so WHO is currently recommending ciprofloxacin. However, the rate of ciprofloxacin resistance increasing rapidly reduces both the safety and effectiveness of treatment, especially for children.

AMR has become a serious problem in the treatment of gonorrhea (caused by N. gonorrhoeae), even related to the oral cephalosporin (final treatment remedy) and is increasing worldwide. That Gonococcal infections can not be treated will lead to increasing morbidity and mortality, thus reversing the gains made in the program to control the sexually transmitted diseases. The control of these diseases has been badly affected by the development and spread of drug resistance.

New resistance mechanism such as beta-lactamase NDM-1 has emerged among gram-negative bacilli. This may invalidate the result of strong antibiotics - usually only final prescription against multidrug-resistant strains of bacteria.

1.2. Situation of antibiotic use and resistance in Vietnam

1.2.1. Antibiotic use in community:

According to the survey results of the antibiotics sold in pharmacies in urban and rural areas of Northern provinces showed poor awareness of antibiotics and antibiotic resistance of the people and drug sellers, particularly in rural areas. Among the total 2,953 pharmacies under investigation: 499/2,083 pharmacies in urban areas (accounting for 24%) and 257/870 pharmacies in rural areas (accounting for 29.5%) sold antibiotics prescribed. Antibiotics accounted for 13.4% (urban) and 18.7% (rural) in pharmacies' total sales. Most antibiotics are sold without a prescription: 88% (urban) and 91% (rural). Antibiotics are sold to treat cough 31.6% (urban) and fever 21.7% (rural). Three antibiotics are sold the most: ampicillin/amoxicillin (29.1%), cephalexin (12.2%) and azithromycin (7.3%). People often ask for antibiotics without a prescription: 49.7% (urban) and

28.2% (rural) [5].

1.2.2. Antibiotic use and antibiotic resistance in hospitals

The review of results of the sensitivity of antibiotics carried out in 2003-2006 showed that resistance rate of Klebsiella spp. to cephalosporins of 3rd generation, 4th generation, fluoroquinolones and aminosid has increased from > 30% in 2003 to > 40% in 2006; to Pseudomonas spp. from > 40% in 2004 to > 50% in 2006 and to Acinetobacter spp. from > 50% in 2004 to > 60% in 2006. Although imipenem/cilastatin, carbapenem have just been put into Vietnam markets for nearly 10 years, their susceptibility to gram-negative bacilli with no enzymatic generation is reducing. Imipenem /cilastatin resistance rate of Pseudomonas spp. has increased over the years: 12.5% (2003), 15.5% (2005) and 18.4% (2006) [5].

According to data reported by 15 hospitals under the Ministry, Provincial General Hospitals in Hanoi, Hai Phong, Hue, Da Nang, Ho Chi Minh city, ... about the use of antibiotics and antibiotic resistance in the period 2008 - 2009 showed that, 30-70% of gram-negative bacteria resistant to cephalosporins of 3rd generation and 4th generation, nearly 40-60% resistant to aminoglycosides and fluoroquinolones in 2009. The sensitivity to imipenem of nearly 40% of Acinetobacter strains decreased.

Using antibiotics averagely 274.7 DDD/100 day-bed. This rate is significantly higher compared with Dutch report at the same period as 58.1 DDD/100 day-bed and higher than that of 139 reports from hospitals of 30 European countries in 2001: 49.6 DDD/100 day-bed. The correlation between antibiotic use and antibiotic resistance is evident when the ratio of gram-negative bacteria resistant to cephalosporins of 4^{th} generation is high in places with greater consumption of antibiotics [6].

According to the results “study antibiotic use in hospital-acquired infections in intensive care units in some health facilities” shows the most four isolated strains Acinetobacter spp, Pseudomonas spp, E. coli, Klebsiella spp. Frequency of Acinetobacter spp or Pseudomonas spp. infections marked dominant proportion (> 50%) in nosocomial pneumonia (ventilator or no ventilator). These 4 isolated strains were multidrug-resistant bacteria. A specially high resistance is detected in cephalosporin of 3^{rd} and 4^{th} generations (66-83%), followed by the group of aminosid and fluoroquinolones with resistance ratio over 60%.

The high resistance is also reflected in the use of antibiotics in the initial empirical results inconsistent with antibiotic regimen 74% [7].

1.2.3. Use anti-TB and drug-resistant TB

Report of WHO 2012 estimates, Vietnam ranks 12 of the 22 countries with high tuberculosis burden globally, ranking 14th out of 27 countries with MDR-TB burden in the world.

MDR-TB rate was 2.7% among new TB patients (approximately 4,800 patients), 19% of re-treatment TB patients (approximately 3,400 patients). In 2011 WHO estimated about 3,500 MDR-TB patients (95% CI: 2,600-4,700) among TB patients detected [8].

However, in recent years, tuberculosis has become more complicated due to the impact of HIV/AIDS and drug resistance.

According to WHO, drug-resistant TB is a particularly serious problem. Result of treatment for patients with drug-resistance is often poor, especially MDR-TB patients. The cost of treating MDR-TB patients is hundreds of times higher than the non-drug-resistant TB patients and some cases can not be treated. Currently, the proportion of MDR in new TB patients in Vietnam is at <3%, but it is not small in comparison with the big number of patients with smear positive pulmonary TB (+) recently detected in Vietnam each year. Moreover, there are about 350 people with chronic tuberculosis each year, and most of them are MDR-TB patients. This is worsening the current status of drug resistance.

The cause of drug resistant TB bacteria may be due to bacteria transforming themselves to survive; patients do not comply with the treatment regimen, voluntary discontinuation, dose reduction ...; due to environmental pollution, spitting, littering in public places ... These causes are main factors which increase TB patients and drug resistance in Vietnam.

1.2.4. Use of HIV drug and HIV resistance

Since the first cases had been detected in 1990, up to 31th March 2012, the number of people living with HIV was 199,744, of which 49,369 people entered AIDS phase, 52,681 people died from AIDS. The speed is still on the rise, but there are signs of slowing down in recent years due to the implementation of the intervention program.

In Vietnam, ARV drugs have been used from the mid-1990s but have been limited in some provinces and cities, especially in Hanoi and Ho Chi Minh City with a one-drug regimen or combination of the two types of ARVs.

Since 2005, the three-drug combination regimen in highly active antiretroviral therapy (HAART) has been mentioned in national guidelines for diagnosis and

treatment of HIV/AIDS of the Ministry of Health. In particular, the issue of compliance with antiretroviral therapy is considered as one of the prerequisite for the success of treatment.

The use of ARV also created the appearance of strains of HIV resistant to ARV and the risk of the spread of drug-resistant strains in the community. In countries where ARV has been put in use for many years, 5-27% of people newly infected with HIV carry the virus HIV-1 strains resistant to one or more antiretroviral drugs.

In a study on drug resistance conducted in Ho Chi Minh City, the rate of HIV drug resistance of people who are drug addicts, prostitutes and patients with sexual transmitted diseases unprecedented access to ARV was 6.5%. The research results of Pasteur Institute in Ho Chi Minh City in pregnant women without access to ARV and new HIV infections (under the age of 30, the number of lymphocytes $CD4^{+}$>500 cells/mm3 without ARVs) showed that the rate of HIV resistance is low <5%. Another study in Ho Chi Minh City showed that, the rate of drug-resistant HIV in pregnant women participating in PMTCT at the time before taking drug was relatively low 0.6%. Two weeks after birth, the percentage of pregnant women were found to be carrying drug-resistant HIV reduced to 17.53% and down to 3.06% two months after birth. 3TC resistance mutations often found in groups of pregnant women using combination regimens AZT+3TC and NVP resistance mutations in pregnant women using sd-NVP. The 3TC resistance mutations often found among women taking combination therapy and the AZT +3 TC NVP resistance mutations in pregnant women using sd-NVP. Although after discontinuing oral prophylaxis, the rate of virus with resistance mutation decreases gradually, drug-resistant strains can persist at levels below the detection threshold and are possible to reoccur when mothers are treated with the regimens using resistant drugs.

In 2008, the Ministry of Health developed the national plan for prevention, monitoring HIV drug resistance as recommended by WHO. The national plan includes contents related to: (1) collect early warning indicators of drug-resistant HIV; (2) monitor the appearance of drug-resistant HIV among patients on ARV therapy grade 1; and (3) investigate the appearance of drug-resistant HIV among HIV-infected people without ARV.

Since 2008, Vietnam has annually collected data regarding ARV treatment results along with the collection of early warning indicators of HIV drug resistance in representative antiretroviral treatment facilities nationally .

The monitoring of HIV drug resistance among newly HIV-infected people

without ARV showed the rate of HIV resistance below 5%.

1.2.5. Use of antibiotics and antibiotic resistance in livestock, cultivation

In order to limit the risk of diseases in livestock industry, people have the habit of using many antibiotics, stimulants including prohibited active ingredients and veterinary drugs to stimulate growth or prevention and treatment for animals. If it is not well controlled, the use of the active ingredient, veterinary drugs in livestock production will cause a great risk for the environment and human health such as drug resistance, antibiotic resistance in humans, residual antibiotics from feces, urine to plants and to humans through water resources, ... In livestock industry, there is so much abuse of synthetic antibiotics. The number of households using antibiotics 3-6 active elements accounts for 27% of pig farms for meat, 24% of farms of small pigs and 10% of chicken farms (Vu Dinh Ton et al 2010). The use of antibiotics and veterinary chemicals based primarily on experience will often lead to the increase of doses and treatment regimen. Use of antibiotics in disease symptoms (44%), as directed by veterinary staff 33%, the use of antibiotics as recommended by the manufacturer for 17% and only 6% of the farms use antibiotics following the antimicrobial susceptibility testing results (Nguyen Quoc An, 2009) [5].

1.2.6. Hospital infections and infection control in hospitals

Hospital infection is one of the challenges and concerns in Viet Nam and around the world. Many studies show that hospital infection increases mortality, prolongs hospital stay, increases duration of antibiotic use, increases antibiotic resistance and increases treatment costs.

U.S. statistics show that the cost of a hospital infection case is usually 2 to 4 times higher than a case without hospital infection. Of which, costs incurred by sepsis related to intravascular devices is set from 34,508 dollars to 56,000 dollars and pneumonia in patients with ventilation support is from US $ 5,800 to US $ 40,000. In the U.S., each year 2 million patients are estimated to be hospital infections, causing 90,000 deaths, costs US $ 4.5 billion of hospital fees.

Hospital infection in Vietnam has not been fully determined. Very little document and monitoring of hospital infection has been published. The expenditure for manpower and financial resources to cope with nationwide hospital infection has not yet determined. Three national cross-sectional surveys were carried out. The 1998 survey on 901 patients in 12 hospitals nationwide showed that the rate of hospital infection was 11.5%, of which, wound infections accounted for 51% of the cases of hospital infection. In 2001, the rate of hospital infection was 6.8% in 11 hospitals and hospital pneumonia was the most common cause (41.8%). That

in 1998 survey in 19 hospitals nationwide was 5.7% and hospital pneumonia was the most common cause (55.4%). There have never been a national study to assess the cost of hospital infection.

The diseases caused by hospital infection has higher level of MDR than infectious diseases in community. Hospital infection is caused by bacteria with high resistance such as S. aureus resistant to methicillin (MRSA) and vancomycin-resistant enterococci, multidrug-resistant A. baumanni, P. aeruginosa acounted for considerable proportion.

Situation of hospital infection control: The BCC system is not completed as required; staff for management of BCC are insufficient, not qualified, most of them have not been trained; lack of infrastructure and necessary facilities for BCC particularly in district hospitals; many critically professional missions on BCC have not been done; lack of a database of hospital infection, diseases, drug-resistant microorganisms, ...

2. Causes of resistance

2.1. Use of inappropriate antimicrobial drug

The overdose, insufficient dose or abuse of antimicrobial drug has caused resistance, creating favorable conditions for resistant microorganisms to emerge, change and spread. In fact, many patients buy antibiotics for self-treatment without prescription, use of antibiotics for treatment of cases which are not caused by pathological infections; inappropriate use of antibiotics and drug to bacteria, viruses, parasites .... use of improper dosage, and time ...

2.2. Control and inspection of drug quality are limited

Quality control system can not meet the actual needs due to lack of testing capacity for many active ingredients; can not control the quality of all production lots of each product circulating in the market.

2.3. Prevention and control of infectious diseases are ineffective

Ineffective prevention and control of infectious diseases help increase the spread of drug-resistant bacteria. The patients treated in hospitals are the major source of spread of resistant microorganisms from one person to others.

2.4.The monitoring system of drug resistance has not been established

At present, there is not a national network for monitoring drug resistance in Vietnam. The monitoring of drug resistance is only set up and implemented in some hospitals, such as the Central Tropical Diseases Hospital, Bach Mai Hospital,

Children's Hospital No.1...

However, the monitoring activities are not done frequently. The lack of testing facilities accurately identifying microbial resistance leads to difficulties in the detection of newly emerging resistant microbes, therefore, it is impossible to act quickly to control the drug resistance.

2.5. Use of antimicrobial drugs in livestock is not properly controlled

Antibiotics are increasingly widely used in livestock to promote growth and prevent diseases. This can lead to microbial resistance and cause drug resistance in humans.

2.6. The expertise regulations of health care is not regularly updated

There have not been enough instruction for diagnosis and treatment or updated guidelines for many infectious diseases. In addition, the regulation on the use of antibiotics, antibiotic regimen, microbiological testing has not been completed; the inspection and supervision of the implementation process at the local level is not frequent enough.

2.7. Awareness of community, health workers on drug resistance is limited.

People's habits “heal myself” and “imitate” prescriptions lead to the arbitrary use of antibiotics, contributing to increased drug resistance. In addition, limitations of health workers, equipment of some health facilities, especially at the lower levels, regional and remote areas, lack of conditions for antibiotic regimen lead to improper use of antibiotics by patients.

3. The consequences and the burden of drug-resistance

Drug resistance is not a new phenomenon, however, it is becoming more serious and its growth rate is badly affecting community health. As a result, after 70 years since the introduction of antibiotics, we have to face with the possibility of a future without effective antibiotics for treatment for a number of infectious diseases, especially the surgery and treatments such as cancer chemotherapy and human body parts, tissue transplant.

In addition, drug resistance has induced scarcity, lack of new antimicrobial drugs, especially in patients with infections caused by multidrug-resistant organisms (MDR).

The social costs and financing in the treatment of drug-resistant infections put a significant burden on individuals, families and society, due to prolonged duration of treatment, bad prognosis and waste of costs for drugs due to inappropriate

medication use.

II. LEGAL BASIS

1. Law on health examination and treatment No. 40/2009/QH12 dated November 23rd 2009

2. Law on Pharmacy No. 34/2005/QH11 dated June 14th, 2005

3. Law on Prevention and Control of Infectious Diseases No. 03/2007/QH12 dated November 21st, 2007.

4. Law on prevention and control of viral infection causing immunodeficiency syndrome (HIV/AIDS) No. 64/2006/QH11 dated June 29th, 2006.

5. Decree No. 63/2012/ND-CP dated August 31st, 2012 of the Government defining the functions, tasks, powers and organizational structure of the Ministry of Health.

6. Decision No. 1208/QD-TTg dated September 4th, 2012 approving the national target program on Health for the period 2012-2015 by the Prime Minister.

Part two

CONTENTS OF PLAN

I. OBJECTIVES

1. The overall objective

Promote prevention of drug resistance, contributing to improving the quality and effectiveness of the prevention and control of epidemics, medical examination and treatment to protect, care for and improve people's health.

2. Specific objectives

2.1. Raise awareness of community and health workers on drug resistance.

2.2. Strengthen, improve national surveillance system on the use of antibiotics and drug resistance

2.3. Ensure adequate supply of quality medicines to meet the needs of people.

2.4. Promote proper safe use of drugs

2.5. Promote infection control.

2.6. Promote proper safe antibiotic use in livestock, poultry, aquaculture and cultivation

II. ACTIVITIES

1. Raising awareness of the community and health workers about drug resistance

1.1. Activities

a) Compile documents for continuous training and develop IEC communication materials.

b) Organization of communication activities, including direct communication (seminars, talks, consultations, ...) and indirect communication in mass media (TV spots, radio spots, knowledge, articles, ...).

1.2. Time and schedule for implementation

Phase 1 (from 2013 to 2016):

a) Develop communication materials: brochures, posters, flip pictures, video spot, television spot for propaganda, dissemination on the causes and consequences, measures to prevent drug resistance.
b) Develop materials to guide health workers, community on prevention of drug resistance.
c) Organize seminars, talks and consultation to answer questions about prevention

of drug resistance on mass media.
d) Organization of communication and education activities on the prevention of drug resistance on mass media from the central to local levels.
e) Launch the month for prevention of drug resistance in the country.
e) Organize training conferences, disseminate and educate laws on on the prevention of drug resistance
g) Organize continuous training, training in communication skills, monitoring and evaluation of prevention of drug resistance.

Phase 2 (from 2016 to 2020):

Maintain communication activities in addition to the survey, assessment of community's knowledge about drug resistance.

2. Enhance, improve the capacity of the national surveillance system on antibiotic use and resistance

2.1. Activities

a) Developing and completing documents regulating clinical microbiology laboratory; standard testing procedures, building standard microbiology laboratories and reference laboratories;
b) Establish drug resistance surveillance system;
c) Participating in curriculum development for training in microbiology and antibiotics in universities, medical- pharmacy schools;
d) Continuing education and training to enhance the capacity of the clinical microbiology laboratory, scientific research capacity of staff on the resistance;
e) Developing training cooperation programs on drug resistance prevention between domestic and abroad medicine – pharmacy schools;
e) Developing a database of antibiotic use and resistance.

2.2. Time and schedule for implementation

2.2.1. Phase 1

a) Develop and improve standard test procedures, guidelines for clinical microbiology laboratory.
b) Establish the National Center of clinical microbiology laboratory.
c) Conduct training, continuous training on technical expertise of the clinical microbiology for laboratory staff at the national standard center and 30 laboratories nationwide.
d) Build functions, tasks, organizational structure, human resources and equipments for laboratories of clinical microbiology.
e) Organize abroad training courses on drug resistance surveillance system.

e) Set up a network of monitoring of antibiotic use and resistance in 30 laboratories across the country.
g) Develop forms, tracking software and reports of the use of antibiotics, reports of drug resistance.
h) Carry out scientific research on drug resistance.
i) Participation in scientific conferences on drug resistance in the country and abroad.

2.2.2. Phase 2

a) Develop a database of antibiotic use and resistance.
b) Develop evaluation indicators, establish a system for collecting and processing information, develop websites for tracking, monitoring and evaluation of drug resistance.
c) Organize scientific conferences on drug resistance prevention.

3. Ensure adequate supply of quality essential drugs

3.1. Activities

a) Improving, updating the documents defining the list of essential medicines, major drug categories used in the examination and treatment;
b) Investing in production supply the market with drugs of good quality, reasonable price;
c) Implementing comprehensive management of drug quality during the entire process of production, export, import, distribution and use of drugs.

3.2. Time and schedule for implementation

3.2.1.Phase 1

a) Update list of essential medicines, major drug categories that are consistent with the pattern of disease and socio-economic conditions of Vietnam; in line with advances in science and technology in healthcare in each specific stage and technical capabilities of each level.
b) Monitoring and surveillance of counterfeit drugs circulating in the market.
c) Continue to promote the implementation of the project “The Vietnamese use drugs made in Vietnam with priority”.
d) Develop and propose mechanisms to prioritize the production of generic drugs for pharmaceutical companies in the country.
e) Investment in production to supply the market with drugs of good quality, reasonable price.

3.2.2. Phase 2

Continue some activities of the phase before 2015 combined with topical scientific workshop on enhancing patients' access to essential medicines.

4. Strengthen safe and rational use of drugs

4.1. Activities

a) Developing and completing documents and manuals regulating rational drug use, antibiotics and treatment;
b) Conducting workshops, seminars, training, ongoing training on good prescribing practice, clinical pharmacy practice.
c) Building capacity for the Council of Drugs and Treatment;
d) Conducting workshops, seminars on evaluation of the rational safe use of drugs, assessment of activities of Council of Drugs and Treatment.
e) Monitoring , inspecting and supervising the rational safe use of drugs in the examination and treatment facilities.
e) Developing and completing the training program, ongoing training on clinical pharmacy practice.

4.2. Time and schedule for implementation

4.2.1. Phase 1

a) Develop, update and promulgate treatment guidelines.
b) Develop guidelines for the use of antibiotics for medical staff and community.
c) Conduct training, continuous training of clinical pharmacy practice, good prescription.
d) Develop regulations for the operation of the Council of Medicines and Treatment.
e) Conduct training, continuous training in treatment guidelines for health workers.
e) Evaluate the compliance to treatment guidelines in health facilities.
g) Develop documents defining the assessment of drug use.
h) Develop indicators for the assessment of drug use in hospitals and community.
i) Do monitoring and evaluation of drug use, monitoring the treatment compliance and operation of Council of Medicines and Treatment in health facilities.
k) Conduct conference on the assessment of drug use, operation of Council of Medicines and Treatment in health facilities.

4.2.2. Phase 2

a) Cooperate in research on the use of drugs, especially antibiotics
b) Do continuous training and training nationally and internationally on drug information, drug use, clinical pharmacy practice
c) Conduct management, information collection, evaluation of indicators of drug

use
d) Conduct scientific conferences on antibiotics and antibiotic resistance.

5. Strengthen infection control.

5.1. Activities

a) Improve and update documents on infection control;
b) Continuing education, training, inspecting, monitoring and evaluating the implementation of infection control for health workers.
c) Promote the monitoring system and report of data to form the database of national infection control.

5.2. Time and schedule for implementation

5.2.1. Phase 1

a) Add, update and promulgate legal documents, policies, national technical regulations and BCC hospital guidelines.
b) Improve the organization of infection control in accordance with Circular No. 18/2009/TT-BYT dated 14/10/2009 guiding the implementation of BCC in the examination and treatment facilities.
c) Conduct continuing training and training to improve their knowledge and skills to practise infection control for health workers and specialized BCC staff at health facilities.
d) Develop the monitoring indicators in infection control.
e) Establish monitoring systems and reporting data on hospital infections from hospitals under the Ministry of Health and provincial hospitals.

5.2.2. Phase 2

a) Promote scientific research in the BCC field.
b) Regularly organise national scientific workshops once/year and international scientific workshops on infection control once/5 years.

6. Strengthen safe, appropriate antibiotic use in livestock, poultry, aquaculture and cultivation

6.1. Activities

a) Develop documents and manuals prescribing antibiotics, growth drug in livestock, poultry, aquaculture and cultivation.
b) Develop list of permitted antibiotics and prescribe limitations of antibiotic residues in livestock, poultry, aquaculture and cultivation
c) Establish monitoring system of safe **appropriate** use of antibiotics in livestock,

poultry, aquaculture and cultivation.

6.2. Time and schedule for implementation

6.2.1. Phase 1

a) Develop documents prescribing antibiotic use in livestock, poultry, aquaculture and cultivation.
b) Make the list of antibiotics and prescribe restricted antibiotic residues in livestock, poultry, aquaculture and cultivation
c) Establish the monitoring system of antibiotic use in livestock, poultry, aquaculture and cultivation.

6.2.2. Phase 2

a) Cooperate in research and evaluation of antibiotic use and resistance in livestock, poultry, aquaculture and cultivation.
b) Evaluation of antibiotic use and resistance in livestock, poultry, aquaculture and cultivation.
c) Continue to implement activities to prevent drug resistance.

Part three

SOLUTIONS

I. POLICY AND MANAGEMENT

1. Gradually improve the system of legal documents and instructions on technical

expertise in infectious disease control, infection control, surveillance of drug resistance, enhancing rational drug use.
2. Improve the system of documents on antibiotic use in livestock, poultry, aquaculture and cultivation.
3. Strengthen inspection and supervision of the implementation of professional rules relating to treatment guidelines, medication use, hospital pharmacy, infection control in health facilities.
4. Enhance the assessment of tuberculosis epidemiology, medicine and equipment, tuberculosis with HIV/AIDS, situation of TB drug resistance.
5. Closely monitor the quality of drugs, prevent poor quality drugs, counterfeit drugs from circulating in the market.
6. Increase the capacity of program management: prevention of tuberculosis, HIV/AIDS, drug resistance, infection control.

II. INFORMATION, EDUCATION AND COMMUNICATION,

1. Promote dissemination, advocacy, legal education on the rational safe use of drugs.
2. Raise awareness of community, health workers, people who work in the fields of livestock, poultry, aquaculture and cultivation on antibiotics and drug resistance.
3. Mobilize people to follow The month for prevention of drug resistance.
4. Strengthen education and communication for the entire population, gradually socializing TB prevention: advocacy, requirement, use of all society components, relatives of patients participating in the tuberculosis prevention at all levels and under different forms.

III. TECHNICAL EXPERTISE AND TRAINING

1. Complete expertise guidance, technical procedures in health examination and treatment, microbiology testing, drug resistance surveillance as the basis for the implementation of units.
2. Enhance training, improve qualification for health workers, diversifying forms of training, continuous training, additional training, domestic and international training on diagnosis and treatment of diseases, especially infectious diseases; microbiology testing, infection control, surveillance of drug resistance in health facilities.
3. Complete training frame, curriculum in microbiology and antibiotics in universities, health schools.
4. Increase investment in infrastructure, support facilities and equipment to meet the demands of infection control, microbiology testing, monitoring drug resistance, drug quality control.
5. Upgrade laboratories, research centers on microbiology at central hospitals,

universities.
6. Continuously improve the quality of drugs and bioequivalence assessment.
7. Ensure adequate supply of medicines in the list of essential drugs used in the examination and treatment.
8. Complete system for collecting statistical data and reports, gradual modernization, application of information technology to manage information on the national network.
9. Coordinate activities between the national TB control and other national health programs at district, commune and village levels.

IV. FINANCE

Investment from the state budget, ODA funding and other legitimate funds to implement the National action plan to combat antimicrobial resistance in the period from 2013 to 2020:
1. In the country: the units ensure funding to implement activities within assigned missions and state budget distributed in the annual and 5-years plan.
2. Mobilize resources from international organizations, non-governmental organizations: WHO, UN forestry fund, GARP - Vietnam, UNAIDS, WB, ... **V. SCIENTIFIC RESEARCH AND INTERNATIONAL COOPERATION**

1. Strengthen research and transfer of new techniques in the diagnosis and treatment of infectious diseases, microbiology testing, quality control, microbiology laboratory.
2. Enhance the capacity of study on drug use, drug resistance research, especially research on multi-drug resistant bacteria.
3. Promote research on hospital infections.
4. Coordinate with relevant agencies to promote cooperation in research: assessment of antibiotics use, antivirals, parasite; study on drug resistance especially study on multi-drug-resistant bacteria.
5. Strengthen international cooperation, experience exchange and sharing, participate in workshops, specialized scientific conferences, forums on prevention and control of infectious diseases, rational drug use, hospital infection, quality control of microbiological testing, drug resistance.
6. International cooperation on continuous training, research on drug use, clinical pharmacy practice.

Part four

IMPLEMENTATION

I. ESTABLISHMENT OF STEERING COMMITTEE

1. Chairman: Minister of Health

2. The Deputy Chairmen: Deputy Minister of Health, Ministry of Agriculture and Rural Development

3. The Commissioners: Leaders of Departments of examination and treatment Administration, Food Safety, Preventive Medicine, HIV/AIDS, Drug Administration, Health Environmental Management, Science Technology and Training ... Leaders of Departments of Planning - Finance, Facilities and health services Works, Health Insurance, ... Inspector of the Ministry of Health; relevant Departments of Ministry of Agriculture and Rural Development.

4. Secretaries: Representatives of relevant Departments, agencies of Ministry of Health, Ministry of Agriculture and Rural Development.

5. The sub-committees:
a) Sub-Committee on infection control
b) Sub-committee on treatment (Infection, intensive care, HIV/AIDS, TB)
c) Sub-Committee on monitoring, inspection and examination of the use of antibiotics:
- Prevention, diagnosis and treatment in health facilities and communities
- Livestock, poultry, aquaculture and cultivation.

d) Subcommittee on logistics
e) Sub-committee on education and communication

6. Permanent Division: Department of examination and treatment Administration

II. ASSIGNMENT OF RESPONSIBILITY

1. The agencies of the Ministry of Health

1.1. Department of Examination and treatment administration:

a) Act as the focal point to collaborate with other relevant units to direct and guide the implementation; summing up the results of operations in the plan to report to the Ministry of Health;
b) Develop technical expertise guidance on infection control, treatment regimens, surveillance of drug resistance and drug use;
c) Examine and supervise the implementation of professional rules relating to treatment guidelines, drug use, infection control in health facilities;
d) Establish the system of national drug resistance surveillance; monitoring, management, warning of the resistance and the danger of drug resistance; develop the database on antibiotic use and resistance; training, continuous technical

professional training on clinical microbiology for laboratory staff at the national standard center and 30 laboratories throughout the country;
e) Establish the system of monitoring and reporting data on hospital infections from hospitals under the Ministry of Health and provincial and cities hospitals under central authority;
e) Monitoring and evaluation of drug use, compliance monitoring, promoting activities of the Council of Drug and Treatment in health facilities;
g) Evaluate TB epidemiology, drugs and equipment, tuberculosis with HIV/AIDS, TB drug resistance.

1.2. Drug Administration

a) Implement measures to improve the quality of drugs and bioequivalence assessment.
b) Provide enough drugs in the list of essential drugs mainly used in health facilities.
c) Monitoring and surveillance of counterfeit drugs circulating in the market.

1.3. Bureau of HIV/AIDS prevention and control

a) Collect data regarding antiretroviral treatment outcomes; collecting early warning indicators of HIV drug resistance in nationally representative facilities treating HIV/AIDS.
b) Monitoring, supervision and evaluation of HIV drug resistance in patients receiving therapy and new HIV infected patients without ARV.
c) Implement measures to improve capacity for HIV resistance testing laboratory.

1.4. Department of Preventive Medicine

Tracking, monitoring, doing research, evaluation of the use of antibiotic and antibiotic resistance in community

1.5. Department of Food Safety

Tracking, monitoring antibiotic residues in foods directly affecting people's health.

1.6. Inspector of the Ministry

Inspecting the sale of antibiotics without prescription.

1.7. Department of Planning – Finance

a) Guide relevant departments in estimating the annual budget as assigned in the

plan.
b) Investments from the state budget, official sources for development assistance and other legitimate funding sources to implement the National Action Plan to Combat Antimicrobial Resistance in the period 2013-2020.
c) Arrangement, allocation of regular budget for hospitals to implement solutions of prevention of drug resistance.

1.8. Health Insurance Department, Bureau of Environmental Health Management

Coordinate with relevant agencies to implement the Action Plan in accordance with the functions assigned.

1.9. Bureau of Science, Technology and Training

a) Propose, support, give priority to research and new techniques transfer in diagnosis of infectious diseases, microbiology testing.
b) Training to strengthen the capacity of study on assessment on drug use, drug resistance studies, especially study of multidrug-resistant bacteria, study of hospital infection.
c) Strengthen continuous training with appropriate forms domestic and abroad to improve the qualification of health workers.
d) Improve the curriculum frame, curriculum for microbiology, antibiotic in medical and pharmaceutical training units.

1.10. Department of Communications and emulation, commendation

Assume the prime responsibility and coordinate with the relevant departments in the dissemination and propagation, education to raise awareness of community and health workers on prevention of drug resistance and mobilize them to perform the month for actions against drug resistance.

1.11. Department of Health in provinces and cities under central management

Guide provincial health facilities in plan development and implementation; allocating resources to implement the national action plan against drug resistance in the period 2013-2020 in accordance with the specific circumstances of each locality.

1.12. Hospitals

a) Develop a specific plan in accordance with the conditions of each unit to implement the National action plan against drug resistance in the period 2013-2020.

b) Allocate resources for the prevention of drug resistance: upgrade microbiology laboratories; strengthening infection control; monitor and control the use of inappropriate antibiotics, ...

2. Ministry of Agriculture and Rural Development

Ministry of Agriculture and Rural Development assigns its agencies in collaboration with the Ministry of Health to direct and guide relevant agencies to develop regulations on the use of antibiotics, list of antibiotics, antibiotic residues limits used in livestock, poultry, aquaculture and cultivation. Inspection, testing and monitoring the use of antibiotics in livestock, poultry, aquaculture and cultivation.

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