Chapter 4: People's Republic of China

Chinese Field Epidemiology Training Program (CFETP)

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1. Introduction

Field epidemiology training is a highly recognized epidemiology training model which is extensively advocated and promoted in international public health. Currently, such training programs have been established in over 30 countries, including the Epidemic Intelligence Service (EIS) in USA., the Masters of Applied Epidemiology Program in Australia, the Public Health Schools Without Walls in Africa, and similar programs in Canada and other countries and areas, which form the TEPHINET, Training Programs in Epidemiology and Public Health Interventions Network.

On 15 October 2001, representatives and experts from WHO, UNICEF, Ministry of Health, and the Chinese Academy of Preventive Medicine (presently known as China CDC) arrived together at the Ministry of Health to witness the establishment of the Chinese Field Epidemiology Training Program (CFETP).

During the first three years after the establishment of CFETP, WHO and UNICEF each provided USD 200,000 to support the program annually and invited international experts to China to assist in the training of CFETP officers. In 2004, CFETP became a permanent department under China CDC which provides regular financial support to the program. In addition, since 2004, CFETP started close collaborations with US CDC which is providing financial support as well as senior epidemiologists stationed in China as expatriate resident advisors.

Since its establishment in 2001, CFETP has recruited 98 officers in eight annual cohorts from national, provincial, and city disease control agencies, covering 28 provinces, autonomous regions and municipalities. Sixty-nine officers of the first six cohorts have already graduated. The current officers in training include 13 second-year officers in cohort 7 and 16 first-year officers in cohort 8. After CFETP graduates returned to their original agencies, they have been assigned to key positions and become important assets in disease prevention and control in their organizations.

2. The Good Practice

2.1 Training Objectives:

(1) To train high-level field epidemiology talents and core disease prevention and control staff who are willing to work domestically, and equip them with the "Eight Competencies and Four Spirits", which are the hallmark of CFETP;

(2) To promote more effective and efficient surveillance and emergency response systems nationally and locally;

(3) To enhance international communications and collaborations of field epidemiology programs.

The Eight Competencies:

- Ability to independently organize complicated field epidemiology investigations in times of emergent public health incident;
- Ability to prepare and implement a work plan for disease control in times of a major natural disaster;
- Ability to design, analyze and evaluate disease surveillance systems;
- Ability to provide evidence-based recommendations to decision-makers, and to communicate with news media and the public;
- Ability to acquire, analyze and utilize information;
- Ability to apply for, plan, implement and manage programs;
- Ability to prepare investigation reports and academic papers, and to communicate scientific findings orally;
- Ability to organize technical training and consultations.

The Four Spirits:

- DEDICATION to public health and serve China;
- TEAMWORK among CFETP officers and with other colleagues;
- EXPLORATION of public health problems with scientific rigor;
- COMMITMENT to truth and integrity.

2.2 Recruitment of CFETP Officers

CFETP recruits high-level talents with 3-5 years of public health experiences from public health agencies throughout China. The minimum educational requirement is a bachelor's degree in medicine; however, with the increasing reputation and publicity of CFETP in recent years, more and more talents with PhD, Master of Epidemiology, and Master of Public Health degrees are joining CFETP.

The recruitment process includes four phases: agency's recommendation, program review of the application, written examination, and in-person interview. First, the applicant should be strongly recommended by an agency, and the agency should promise to keep the candidate's position and benefits, so that the candidate is guaranteed for a job after graduation from the program. The purpose of the written examination is to screen for the candidate's qualifications, including his/her understanding on basic concepts of epidemiology, and ability to analyze and solve public health problems. The in-person interview is intended to assess the candidate's overall qualifications and abilities.

This unique recruiting process ensures that the incoming officers have working experiences and ability to think quickly, as well as various capabilities to solve complicated and difficult public health problems.

2.3 Two Years of "Learning Through Work"

The CFETP training lasts for two years, starting with a two-month core course instructed by domestic and international experts from the fields of epidemiology, clinical medicine, public health, health statistics, microbiology, etc. During the core course, officers learn methods and concepts of epidemiology through a large number of case studies, and designing and conducting short and rapid field investigations by applying what they have learned from lectures. The core course is a unique and effective prelude to the "Learning through Work" model of building applied epidemiologic capabilities at CFETP.

During the subsequent 20 months of "learning through doing", officers will participate in a variety of public health investigations at the CFETP training bases at the state, provincial and city levels, and participating in emergency public health responses at the national level as a systemic field epidemiology training, in which they can maximize their opportunities to apply epidemiology theories.

This training model is based on the philosophy that training serves practice, and practice serves public health problem-solving.

Additionally, CFETP provides web-based training via platforms such as Wimba, to ensure officers at different locations are accessible to consultants from supervisors of CFETP. The officers can also submit their own reports via this network to solicit comments.

2.4 Areas of Practices

Since its establishment in October 2001, CFETP has expanded its work from infectious diseases to chronic diseases, poisonings, disaster response, and environmental public health issues. It has also started to collaborate with agriculture departments on zoonotic diseases.

2.5 Qualifications of Instructors

Thered are three types of CFETP instructors: permanent instructors, field-based instructors, and temporary part-time instructors.

(1) Permanent instructors include the three Chinese instructors and two international expert advisors. They are responsible for teaching and providing guidance on field investigations.

(2) Field-based instructors include CFETP graduates and experts from field training bases with experiences on field investigation. They are working collectively on training the officers at the field bases.

(3) The program also enlists various domestic and international experts as temporary or part-time instructors in teaching and reviewing of officers' investigation reports.

CFETP fully utilizes the knowledge bank of domestic and international experts as a team of well-qualified instructors to ensure high-quality training.

3. Benefits and Outcomes

Since 2001, CFETP officers have participated in hundreds of field investigations on emergency public health events, and conducted a large number of surveillance data analysis projects and special epidemiologic studies. Many of their recommendations based on their investigations have been adopted by the government, and have had positive influence on their decision-making. Since October 2001, CFETP officers have published a total of 73 journal articles, including 68 articles in domestic journals and five in international journals.

CFETP Activities: October 2001 to September 2008

Category	Number
Investigation on Emergency Public Health Event	361
Surveillance Data Analysis and Evaluation	196
Special Epidemiologic Study	115
Training	93

3.1 Confronting the SARS Challenge: the First Success Story

In the spring of 2003 when an outbreak of SARS occurred in China, Professor Zeng led the young CFETP team to the front line of investigation and control of this outbreak. The officers of cohorts 1 and 2, who were still in training, conducted a large amount of field investigations on SARS. They tracked the spread of the disease and made an important conclusion that SARS was not infectious during the incubation period. They also analyzed the data concurrently on the epidemic situation, devised technical plans to contain the disease, and coordinated the complicated case reporting process. Through their arduous efforts, they were able to provide important scientific evidence to decision-makers for effective disease control. Based on the scientific evidence they collected, CFETP instructors and officers edited various manuals for SARS control, which were distributed to the professionals at the frontline of disease control, contributing to the containment of the outbreak. As a consultant for the Capital United Headquarters for SARS Prevention and Treatment, Professor Zeng Guang recommended that hospitals be closed, and patients be transferred to suburban areas. These recommendations were adopted by the headquarters, which contributed greatly to the timely control of SARS epidemic in Beijing.

This first success story in combating the SARS epidemic earned CFETP a great reputation among public health colleagues in China and around the world. People started to liken CFETP to the famed Huangpu Military Academy.

3.2 Earthquake Relief and Rescue After Wenchuan Earthquake in Sichuan

At 14:28 on 12 May 2008, a massive earthquake measuring 8.0 Richter scale in magnitude occurred in Wenchuan, Sichuan Province, causing tens of thousands of deaths and injuries, widespread building collapses, road destruction, power and transportation disruptions, as well as other massive economic loss. Immediately after the earthquake, China CDC distributed teams to the disaster area, and CFETP responded to the disaster by sending 21 officers to the disaster area to provide assistance to local agencies on disease prevention. As CFETP officers overcame numerous difficulties and worked diligently, their work was highly appreciated and praised by colleagues at China CDC and in the disaster area. One of the officers was given the "National March 8 Red Banner Pacesetter Award", one of the most prestigious honors that can be earned by a Chinese woman. In addition, three of the officers joined the Chinese Communist Party on site.

On 12 June 2008, CFETP officers, led by instructors, went to the severe disaster areas in cities of Mianyang and Deyang of Sichuan Province to carry out field investigations. They visited medical stations, health centers in the severely affected towns and villages and in settlement places to evaluate medical aid provided to the displaced populations, and to assess the routine immunization activities for the children. Based on their findings, they raised the awareness on potential problems of diseases, drinking water, food, children's routine immunization, treatment of trash and feces, etc. The team carefully studied the challenges of the two cities in regard to public health and disease prevention, and provided important recommendations on emergency response, resumption and improvement of public health and disease prevention services, and the long-term reconstruction of the public health system.

3.3 Investigation on EV71 Hand, Foot and Mouth Disease Outbreak

During March to May 2008, a large outbreak of hand, foot and mouth disease due to enterovirus 71 (EV 71) infection occurred in Fuyang City, Anhui Province. The outbreak spread rapidly, with many severe cases and dozens of deaths reported. The Ministry of Health and China CDC made every effort to contain this outbreak, and sent clinical, epidemiologic, laboratory, and pathological teams to assist the local agencies with the diagnosis, treatment, epidemiologic investigation and disease control activities.

In order to provide scientific evidence to decision-makers for effective prevention and control of this disease, Professor Ma Huilai led several CFETP officers and joined the China CDC team to conduct an epidemiologic investigation on the risk factors for EV 71 transmission in Fuyang City. The officers reviewed published research papers, collected and analyzed the surveillance data, and thoroughly discussed and refined the research design. In about a month, the investigation team conducted a case-control study on risk factors for the transmission of the disease, a study on factors affecting the spread of hand, foot and mouth disease in kindergartens, and a study on factors related to severe and fatal EV71 infection.

During the "Forum on Hand, Foot and Mouth Disease in Asian Pacific Region" in Singapore on 22-23 August 2008, Professor Ma Huilai represented CFETP to give a presentation on "Risk Factors for Transmission of Hand, Foot and Mouth Disease during Confirmed Enterovirus 71 Outbreaks in China, 2008", which was greatly appreciated and praised by seminar participants. Once again, CFETP scored high on the international stage.

3.4 Response to Ice and Snow Disaster in Southern China

In January 2008, a rare disaster due to frozen rain, snow and ice occurred in southern China, which lasted for a long time, affected a large area, and caused a great damage to health and economic development in southern China. CFETP sent four officers to join China CDC's public health response team to assess the public health impact of the snow disaster and the effectiveness of the disaster rescue and relief efforts, and to provide recommendations on how to improve disaster response. Since the initial investigation revealed that bone fracture, premature delivery and carbon monoxide poisoning were elevated, CFETP officers went into the disaster area again to conduct studies on the risk factors for these conditions. The findings from their investigation had provided important scientific evidence for prevention strategies for this kind of disasters.

3.5 Investigation of the Methotrexate Incident

In July 2007, hospitals in Guangxi, Shanghai and other places reported successive cases of adverse drug reactions. The main clinical manifestations included crura pain, hypodynamia, and difficulty in walking, which manifested after intrathecal injection of methotrexate. Professor Zeng Guang took up the great challenge and led an investigation team, consisting of epidemiologists, pharmacologists, physicians, and CFETP instructors and officers, to the outbreak areas to carry out an investigation. Based on the results of the investigation and rigorous logical thinking, they determined that the adverse drug reaction was not related to the diseases under treatment, disease course or treatment regimes. Instead, the reactions appeared to be related to specific batches of the drug. However, initial investigations of the raw materials and production process of suspected drugs, and even the animal experiment, yielded no helpful clue. Many conjectures were proposed, and the consensus was that the problem might be related to the hospitals. In this crisis mode, Professor Zeng Guang as the leader of the investigation team suggested to the Ministry of Health and the State Council three times to conduct further investigation and control efforts. This suggestion was accepted and the investigations continued. Meanwhile, new findings showed that another anti-tumor drug, cytarabine, also caused the same kind of adverse reactions. Hence, a refined hypothesis was proposed that the same dangerous substance might contaminate both drugs during their production processes, causing the adverse reactions. CFETP teams went to Shanghai, Hebei and Yunnan and other provinces to investigate this hypothesis. By using their data and undisputable logic, they showed that vincristine must be the substance responsible for this outbreak. Afterwards, the Chinese National Institute for the Control of Pharmaceutical and Biological Products, the

Shanghai Institute for Food and Drug Control, and the Chinese Center for Disease Control and Prevention, all found vincristine residue of the specific batches was associated with the adverse reaction. The hypothesis was finally proven, and the cause of a significant public health incident was detected.

3.6 Pneumonic Plague Investigation in Yunnan

In the winter of 2005, several severe pneumonia cases of unknown cause occurred in Yunnan Province. Although the outbreak was quickly contained, the cause for the disease remained unknown. Since the initial laboratory testing and expert consultation eliminated SARS, avian influenza, legionella or *Versinia pestis* infections, the investigation was deadlocked. As recommended by Professor Zeng Guang, Luo Huiming, a cohort 1 CFETP graduate led a team to carry out a thorough field investigation. Following a rigorous protocol, they formulated the case definition, conducted case finding, and described the characteristics of the disease. After rigorous logical thinking and consultation by domestic and international experts, the CFETP investigation team proposed that the disease was likely to be primary pneumonic plague, despite the fact that plague had been "completely ruled out" by the initial laboratory testing. Soon afterwards, follow-up testing by national and provincial laboratories identified the F1 plague antibody in six serum samples from three of the pneumonia patients, demonstrating that the etiology was indeed pneumonic plague.

4. Insights and Lessons

To improve the collaboration between Chinese Center for Disease Control and Prevention and the China Animal Disease Control Center, and promote the emergency response and investigation of zoonotic disease, CFETP conducted a training session on emergency response to zoonotic disease epidemic, in collaboration with the Animal Disease Control Center under the Ministry of Agriculture. The training session was held during 22-26 June 2008 in Beijing. Qi Xiaoqiu, Director of the Disease Control Bureau, Ministry of Health; Wang Yu, Director of China CDC; Deputy Director of the Veterinary Bureau, Ministry of Agriculture; Director and Deputy Director of the Animal Disease Control Center attended the opening ceremony. More than 130 people participated in the training session.

Although this training session was the first collaboration between China CDC and the Animal Disease Control Center, it was very effective and successful. Experts from China CDC, and Animal Disease Control Center gained much needed knowledge and skills to carry out investigations on zoonotic disease outbreaks.

The training session also provided opportunities for professionals from both fields to communicate and learn from each other. Many attendees expressed their desires to work together on outbreak investigations of zoonotic diseases as conclusion of the training session.

5. Recommendations for Adaptation

Chinese Field Epidemiology Training Program is a classical field-based training program in applied epidemiology and public health. For the countries with limited source or specific purpose of training, the following key points probably are very useful.

(1) Clarify the mission and purpose of training which is important in determining the period of training. For example, if the training program aims to develop comprehensive competencies for strengthening abilities in response to acute problems, scientific basis for program and policy decisions, surveillance systems improvement and communication of epidemiologic information, the program may need longer duration like two years. However, if the training just intends to strengthen one aspect of those competencies, one year or less time period may be appropriate.

(2) Conduct mentor orientation training which could provide continuous guidance to the officers or trainee on study design, methods, questionnaire development, filed implementing and data analysis for urgent investigation and planned study.

(3) Develop the field sites for field assignment of trainee. Vitally, the primary goal of an FETP is to improve the health of population by providing essential public health services, and thus, the term "officer" is an appropriate title for their recognition by the local people, rather than describing them as "trainee".

(4) Track and evaluate the performance of trainee which is important to obtain budget for sustainable development.