

# Comparative Study on Antimalarial Medicines' Quality and Source in the Mekong Sub-region, and Follow up on Other Program Activities in Vietnam

Ho Chi Minh City, Vietnam

October 24-25, 2012

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## *Trip Report*

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## **Promoting the Quality of Medicines**

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PROMOTING THE QUALITY OF MEDICINES

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## Executive Summary

PQM held a training workshop entitled “Comparative Study on Antimalarial Medicines’ Quality and Source in Cambodia, Laos, Thailand, and Vietnam: Sampling Protocol, Testing Methodology, and Data Reporting” October 24-25, 2012 in Ho Chi Minh City, Vietnam. This workshop kicked off the comparative study between existing medicine quality monitoring (MQM) sites and non-MQM sites to obtain evidence-based data on the quality and source of antimalarials (and highly suspected essential antibiotics) in “hot spot” zones. This study aims to evaluate the progress and impact of MQM activities in the region.

Twenty trainees from national malaria control programs, official medicines quality control labs, and medicines regulatory agencies of Cambodia, Laos, Thailand, and Vietnam attended the workshop. Trainees participated actively in the workshop, provided insightful information for the successful implementation of the comparative study, and developed a protocol and detailed budgets for the study at country levels. The goals and objectives, study design and methods, roles and responsibilities of study teams, site selection, sampling, testing, reporting, and timelines of the study were agreed upon.

During the trip to Vietnam, the PQM team took the opportunity to hold meetings with key partners such as the Institute of Malariology, Parasitology, and Entomology, Ho Chi Minh (IMPE HCM), Institute of Drug Quality Control Ho Chi Minh (IDQC HCM), and National Institute of Drug Quality Control (NIDQC). Additionally, a teleconference with the World Bank, arc2lab, and National Health Product Quality Control Laboratory (NHQC) was arranged. Finally, meetings were held with the Thailand Bureau of Vector Borne Disease (BVBD), Kenan Institute Asia (K.I. Asia), and the Bureau of Drugs and Narcotics (BDN).



**Group photo of Workshop participants, October 24-25, Ho Chi Minh City, Vietnam**

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### **About PQM**

The Promoting the Quality of Medicines (PQM) program, funded by the U.S. Agency for International Development (USAID) and implemented by the United States Pharmacopeia (USP), is the successor of the Drug Quality and Information (DQI) program. PQM is USAID’s response to the growing challenge posed by the proliferation of counterfeit and substandard medicines. By providing technical assistance (TA) to developing countries, PQM helps build local capacity in medicines quality assurance systems, increase the supply of quality medicines to priority USAID health programs, and ensure the quality and safety of medicines globally. This document does not necessarily represent the views or opinions of USAID or the United States Government. It may be reproduced if credit is given to PQM and USP.

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- Country participants from Cambodia, Laos, Thailand, and Vietnam for providing their invaluable insight throughout the workshop and agreeing to conduct the comparative study of antimalarials
- Dr. Wayne Stinson, Regional Malaria Advisor, President's Malaria Initiative (PMI)-United States Agency for International Development (USAID)/Regional Development Mission for Asia (RDMA)
- Ms. Sharlene Bagga-Taves, Health Officer, Office of Public Health, USAID/RDMA
- Dr. Aye Aye Thwin, Director, Office of Public Health, USAID/RDMA
- Mr. Christopher Barrett, Deputy Director, Office of Public Health, USAID/RDMA
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- PQM's administrative and editorial staff for their assistance

## ACRONYMS

BDN	Bureau of Drugs and Narcotics, Thailand
BA/BE	Bioequivalence/bioavailability
BVBD	Bureau of Vector Borne Disease, Thailand
DQI	Drug Quality and Information Program
GMS	Greater Mekong Subregion
HSSP2	Second Health Sector Support Program
IDQC HCM	Institute of Drug Quality Control, Ho Chi Minh
IMPE HCM	Institute of Malariology, Parasitology and Entomology, Ho Chi Minh
K.I. Asia	Kenan Institute Asia
MQM	Medicines Quality Monitoring
NIMPE	National Institute of Malariology, Parasitology, and Entomology
NHQC	National Health Products Quality Control Laboratory, Cambodia
NIDQC	National Institute of Drug Quality Control, Vietnam
NOMCOL	Network of Official Medicine Control Laboratories
OI	Opportunistic Infection
PMI	President's Malaria Initiative
PQM	Promoting the Quality of Medicines Program
QA	Quality Assurance
QC	Quality Control
RDM/A	Regional Development Mission for Asia, USAID
TA	Technical Assistance
USAID	United States Agency for International Development
USP	United States Pharmacopeia
WB	World Bank
WHO	World Health Organization

## Background

The Promoting the Quality of Medicines (PQM) program has been providing technical assistance (TA) to the Greater Mekong Subregion (GMS) since 2002. In the GMS, activities have focused on continuing and maintaining the effective medicines quality monitoring (MQM) sampling and testing techniques used to obtain evidence-based data to support decision-making and enforcement action; building the capacity of national quality control laboratories (NQCLs) in quality assurance/quality control (QA/QC) of medicines toward compliance with ISO 17025:2005 and/or World Health Organization (WHO) prequalification standards; improving the practices of local pharmaceutical manufacturers for priority antimalarials; and raising awareness of poor-quality medicines among the general public, as well as among healthcare providers, the pharmaceutical industry, and retailers.

In order to evaluate the progress and impact of MQM activities in the region, the PQM program aims to conduct a comparative study between existing MQM sites and areas not covered under the MQM program, using random sampling to obtain evidence-based data on the quality and source of antimalarials (and highly-suspected essential antibiotics) in “hot spot” zones. The main focus of this study will be in the areas along the borders between Cambodia and Thailand; between Cambodia and Vietnam; between Thailand and Myanmar; and in Laos. The sampling will focus on artemisinin-derivatives, monotherapy products, and some commonly found poor-quality antibiotics from health facilities, distributors/wholesalers, retail pharmacies, and clinics in both the public and private sectors.

## Purpose of Training Workshop

The main objectives of the workshop “Comparative Study on Antimalarial Medicines’ Quality and Source in Cambodia, Laos, Thailand, and Vietnam: Sampling Protocol, Testing Methodology, and Data Reporting” were:

- Introduce relevant staff from Cambodia, Laos, Thailand, and Vietnam to the comparative study of availability, quality, and source of antimalarials
- Train relevant staff on survey sampling methods (random sampling in particular) and testing and reporting procedures
- Agree on a study protocol and procedures for successful implementation of the project
- Create study teams and agree on roles/responsibilities, implementation plan, and timeline

## Overview of Activities

Item	Description
Venue/Location	Renaissance Riverside Hotel Saigon, Ho Chi Minh City, Vietnam
Organizers	PQM and Institute of Malariology, Parasitology, and Entomology, Ho Chi Minh (IMPE HCM)
Sponsor	PMI through USAID/RDMA
Trainers and Facilitators	<ul style="list-style-type: none"><li>• Dr. Souly Phanouvong, PQM</li><li>• Dr. Roman Perez Velasco, PQM</li><li>• Dr. Vuong Tuan Anh, PQM</li><li>• Ms. Siv Lang, PQM</li></ul>
Agenda	See Agenda in Annex 1 for detailed information
Trainees	20 trainees from national malaria control programs, official medicines quality control labs, and medicines regulatory agencies of Cambodia, Laos, Thailand, and Vietnam. See Participant List in Annex 2.
Opening Ceremony	<ul style="list-style-type: none"><li>• Dr. Le Truong Son, IMPE HCM</li></ul>

	<ul style="list-style-type: none"> <li>• Mr. Nguyen Anh Dao, USAID/Vietnam</li> <li>• Dr. Souly Phanouvong, PQM</li> </ul>
Modules	<ul style="list-style-type: none"> <li>• Study methodology, sampling methods and techniques</li> <li>• Medicines screening and testing protocols</li> <li>• Data reporting</li> </ul>
Closing Ceremony	<ul style="list-style-type: none"> <li>• Dr. Souly Phanouvong, PQM</li> <li>• Dr. Le Thanh Dong, IMPE HCM</li> <li>• Mr. Nguyen Anh Dao, USAID/Vietnam</li> </ul>
Equipment Provided	See Annex 3 for a detailed list of supplies/reagents/equipment that are considered necessary to conduct the comparative study
Conclusion	The attendees actively participated in the workshop, provided insightful information for the successful implementation of the comparative study, and developed detailed budgets for the study at a country level. A draft study protocol was developed.
Next Steps	In the weeks following the workshop, all participants will report on the workshop outcomes to their superiors and help obtain buy-in and approval from their respective authorities.

### Workshop Materials and Presentations

The PQM workshop presentations, draft protocol, and other working documents from the workshop can be obtained by contacting Dr. Souly Phanouvong at [sxp@usp.org](mailto:sxp@usp.org).



**Above: Overview of the workshop**

**Right: Closing remarks by Mr. Nguyen Anh Dao, USAID/Vietnam, with Dr. Le Thanh Dong, IMPE HCM, and Dr. Souly Phanouvong, PQM**

## **Additional Activities**

### ***Meeting at IMPE HCM – October 22, 2012***

Participants: Dr. Dr. Le Thanh Dong, HCM IMPE; Dr. Trinh Ngoc Hai, HCM IMPE; Dr. Souly Phanouvong, PQM; Dr. Román Pérez Velasco, PQM

The PQM team gave updates on the PQM program in Vietnam, discussed the training workshop and comparative study, and received a guided tour of HCM IMPE labs.

PQM can help IMPE HCM with TA to intensify MQM activities of antimalarials in the border provinces with Cambodia, especially Binh Phuoc, where there has been great concern about resistance to artemisinin-derivative products. In addition, counterfeit artesunate has been detected in this area. The PQM team recommended convening a face-to-face meeting among all relevant authorities and pharmacy outlets in Binh Phuoc to educate them on medicines quality. PQM and IMPE HCM will draft a strategy together and plan a joint visit to Binh Phuoc in the coming months (possibly January 2013) to assess the situation.

### ***Meeting at Institute of Drug Quality Control Ho Chi Minh (IDQC HCM) – October 22, 2012***

Participants: Ms. Truong Thi Thu Lan, Ms. Nguyen Thanh Ha, Ms. Nguyen Thi Anh, Ms. Tran Thi Thu Ha, Ms. Trinh Hoang Duong, and Ms. Vu Tran Viet Anh, IDQC HCM; Dr. Souly Phanouvong and Dr. Román Pérez Velasco, PQM

The objectives of this meeting were as follows:

- Introduce IDQC HCM, their quality management system, and development strategy
- Give updates on PQM program in Vietnam
- Tour IDQC HCM labs
- Discuss PQM TA to IDQC HCM towards WHO prequalification, including scope and potential expansion of ISO/IEC 17025 accreditation
- Discuss the Network of Official Medicine Control Laboratories (NOMCOL), a USP initiative

The PQM team proposed that IDQC HCM work towards being a partner in conducting bioavailability/bioequivalence (BA/BE) tests, especially of anti-tuberculosis medicines and antimalarials. PQM requested a list of the 35 products they already test and the testing protocol employed so as to assist the Institute in becoming WHO prequalified. Other areas for potential collaboration requested by the IDQC include:

- Enhancing IDQC HCM's scope of ISO/IEC 17025
- IDQC HCM joining NOMCOL-Asia
- IDQC HCM testing antimalarial and antibiotic samples from other countries
- Involving IDQC HCM in Opportunistic Infection (OI) and comparative studies
- PQM training IDQC HCM staff in priority needs

Next Steps:

- USP will send invitation letters to IDQC HCM by the end of November 2012 to attend the inaugural NOMCOL-Asia meeting scheduled for February 2013
- PQM and IDQC will keep in touch on OI testing and comparative study samples and agree on fees for services

- By December 2012, IDQC HCM will submit training needs to PQM for consideration

***Teleconference with the World Bank – October 23, 2012***

Participants: Ms. Pema Lhazom and Mr. Rajiv Aggarwal, World Bank (WB); Mr. Christian Schnitzer and Mr. Dirk Louw, Arc2lab; Mr. Prav Chheang Hor, National Health Product Quality Control Laboratory (NHQC); Dr. Souly Phanouvong, Dr. Elaine Yuan, Ms. Siv Lang, and Dr. Román Pérez Velasco, PQM

At USAID/Cambodia’s recommendation, PQM conducted a teleconference with the WB, Arc2lab, and NHQC to gain a clearer understanding of roles and responsibilities regarding the NHQC’s new building, specifically that it is constructed to comply with ISO 17025:2005 accreditation standards.

PQM explained that USAID is still finalizing the budget allocations; a decision should be reached by December. PQM also emphasized the need for not duplicating efforts and suggested clearly identifying each party’s responsibilities.

During the discussion, PQM obtained the commitment of the WB team to hold a face-to-face meeting among relevant stakeholders in the third week of December 2012 in order to discuss the WB’s funding assistance. The WB team indicated that they will not be able to cover the cost of that meeting in December.

**Next Steps:**

- It was tentatively agreed that the Arc2lab consultant and PQM staff visits will take place in December 2012 in conjunction with the WB implementation support mission (this is subject to budget availability)
- PQM will keep WB informed on the budget so that the WB can help consult with the MOH on funding possibilities from the Second Health Sector Support Program (HSSP2).

***Meeting with Vietnam National Institute of Drug Quality Control (NIDQC) at Renaissance Riverside Hotel Saigon – October 24, 2012***

Participants: Dr. Nguyen Dang Lam, NIDQC; Dr. Souly Phanouvong, Dr. Vuong Tuan Anh, and Dr. Román Pérez Velasco, PQM

The PQM team provided an update on program activities in Vietnam and also described NOMCOL. NIDQC updated PQM on the advanced status of the OI survey and the interest of NIDQC’s Vice Director to be part of NOMCOL-Asia. In addition, Dr. Lam requested that NIDQC be informed of upcoming training workshops regarding medicines QA/QC.

***Meeting with Thailand Bureau of Vector Borne Disease (BVBD) and Kenan Institute Asia (K.I. Asia) – October 26, 2012***

Participants: Dr. Wichai Satimai, Ms. Sansanee Rojanapanas, and Ms. Suravadee Kitchakarn, BVBD; Ms. Jiranya Ratchinda, K.I. Asia; Dr. Souly Phanouvong and Dr. Roman Perez Velasco, PQM

The main issues discussed were:

- PQM program in the region, with a focus on Thailand
- PQM activities on Global Fund Round 10 antimalarial quality monitoring
- Regional anti-tuberculosis medicine manufacturers’ workshop in early 2013
- K.I. Asia's proposal to request an extension from the Global Fund

BVBD showed their commitment to prioritize the antimalarial quality project and support its smooth implementation by hiring and dedicating a focal support person and exploring ways to complement the limited budget for confirmatory testing. With regard to second-line anti-tuberculosis medicine manufacturers, BVBD recommended contacting the Government Pharmaceutical Organization of Thailand. A new memorandum of collaboration could be signed, if needed.

Minilab<sup>®</sup> testing results conducted at the Office of Disease Prevention and Control were presented. As of October 23, a total of 572 samples have been tested (artesunate - 102 samples; mefloquine - 100 samples; chloroquine - 141 samples; primaquine 5 & 15 mg - 55 samples; quinine - 126 samples; and unknown - 3 samples).

Dr. Phanouvong raised a concern regarding the budget, since the Thailand Bureau of Drugs and Narcotics (BDN) increased their testing fees. PQM may need to request additional funding.

He also recommended that, although antimalarials may be produced by the same manufacturer or distributed with the same lot number, there are many factors which affect medicine quality, including storage systems. Therefore, he recommended testing all 55 primaquine samples at BDN. If the budget does not allow for this, it would be acceptable to do grouping/customization of these samples, selecting proportionally at each level (e.g., warehouse, malaria clinic, etc.) where the samples were collected from. The criteria for triage are as follows: physical damage, then non-uniformity of shape, color, and other observations. A rough estimate of the number of primaquine samples triaged using this method would be 15/17. Taking this into account and estimating from the 30% of samples that remain to be collected, the total number of samples to be sent to BDN for testing would be in the range of 140–160.

Due to delays in sample collection, Minilab<sup>®</sup> testing in some districts, and BDN's overloaded work schedule, PQM asked that K.I. Asia request an extension of the implementing period and prepare the financial commitment report for this period.

Finally, the dissemination workshop will be postponed to early 2013.

#### ***Meeting with BDN – October 26, 2012***

Participants: Ms. Nidapan Ruangritinon, Dr. Wiyada Akarawut, Ms. Yaowalak Wattanapisit, Dr. Supanee Duangteraprecha, Ms. Sasida Yoosook, Ms. Witinee Kongsuk, and Dr. Boontarika Boonyapiwat, BDN; Dr. Souly Phanouvong and Dr. Roman Perez Velasco, PQM

The following points were addressed in this meeting:

- Test plan for Global Fund Round 10 in Thailand
- Test plan for comparative study samples from Thailand
- Potential cooperation to test samples from other countries (e.g. Myanmar)
- PQM support to BDN towards achieving WHO prequalification
- NOMCOL

After being informed that samples from the Global Fund Round 10 project would be sent to them for testing, BDN stated that they could accept a maximum of 140 samples, which could be analyzed by March 2013. PQM told BDN that a cut-off approach for the testing can be used. Also, it will be

sufficient to know if some active pharmaceutical ingredient is lacking; it will not be necessary to determine the actual content.

The pricing for this testing would be reduced from approximately USD \$216/sample test to a flat rate of approximately USD \$160/sample test, since USP will provide the reference standards and columns needed. BDN showed interest in helping to test samples for the comparative study of antimalarials and a limited number of samples from Myanmar.

On another note, BDN is about to achieve WHO prequalification and is already ISO-accredited for High Performance Liquid Chromatography methods for both raw materials and finished products.

Also discussed were the possibility of signing a new memorandum of collaboration, extending the lab's ISO 17025 accreditation to other methods (such as dissolution or gas chromatography), and BDN's participation in NOMCOL-Asia.

Next Steps:

- BDN will test samples from Global Fund Round 10 by March 2013
- PQM will draft a memorandum of collaboration and send it to BDN to review by November 2012
- BDN will contact the PQM Quality Management Systems manager for continued support on BDN's pursuance of WHO prequalification



## Training Workshop Tentative Agenda

### Comparative Study on Antimalarial Medicines' Quality and Source in Cambodia, Laos, Thailand, and Vietnam: Sampling Protocol, Testing Methodology, and Data Reporting

#### Day 1 October 24

Time	Activity	Responsible
08:30-09:00	Registration	
09:00-09:15	Opening Remarks	Representative from IMPE HCM Souly Phanouvong, Manager Asia Programs, USP PQM
09:15-09:30	<ul style="list-style-type: none"> <li>Introduction of Participants</li> <li>Introduction to the training: objectives, expected outcomes and agenda</li> </ul>	ALL/Román Perez Velasco, USP PQM
09:30-10:00	<b>Group Photo &amp; Coffee/Tea Break</b>	ALL
10:00-10:30	<ul style="list-style-type: none"> <li>Current Medicines Quality Monitoring: strengths and weaknesses</li> </ul>	Souly Phanouvong, USP PQM
10:30-12:00	<ul style="list-style-type: none"> <li>Overview of the Comparative Study</li> <li>Sampling Protocol</li> <li>Sample handling, storage and documentation</li> </ul>	Souly Phanouvong, USP PQM
12:00-13:00	<b>Lunch</b>	ALL
13:00-14:00	Testing methods and procedures: <ul style="list-style-type: none"> <li>Agree on pharmacopeial monographs to be used</li> <li>Essential supplies needed to be used in the analysis</li> <li>Tests results reporting</li> </ul>	Souly Phanouvong, USP PQM
14:00-15:00	<ul style="list-style-type: none"> <li>Project monitoring and supervision</li> <li>Data reporting and management</li> <li>Technical report</li> </ul>	Souly Phanouvong, USP PQM
15:00-15:30	<ul style="list-style-type: none"> <li>Identify and agree on non-MQM sites, number of samples to be collected, analytical methods for samples, and lab supplies needed</li> <li>Discussion on methods and procedures</li> </ul>	ALL
15:30-16:00	<b>Coffee/Tea Break</b>	ALL
16:00- 16:45	<ul style="list-style-type: none"> <li>Set up survey team(s) and define responsibilities/assignments</li> <li>Each country discuss schedule for sample collection.</li> </ul>	ALL
16:45-17:00	Wrap-up of Day 1	USP PQM

#### Day 2 October 25

Time	Activity	Responsible
09:00-09:30	<ul style="list-style-type: none"> <li>Financial arrangements (receiving, dispatching, expense report)</li> </ul>	Souly Phanouvong, USP PQM
09:30-10:00	<b>Coffee/Tea Break</b>	ALL
10:00-11:30	<ul style="list-style-type: none"> <li>Action items: implementation plan and timeline</li> </ul>	ALL
11:30-11:55	<ul style="list-style-type: none"> <li>Wrap up of Day 2, next steps</li> </ul>	USP PQM
11:55-12:05	<ul style="list-style-type: none"> <li>Closing remarks</li> </ul>	Representative from IMPE HCM and USP PQM
12:05-13:30	<b>Farewell Lunch</b>	ALL

## Training Workshop Participant List

Annex 2

	Full name	Position	Organization	E-mail
1	Ms. Suravadee Kitchakarn	Public Health Technical Officer, Practitioner Level	Bureau of Vector Borne Disease, Thailand	kitchakarn@hotmail.com
2	Ms. Witinee Kongsuk	Pharmacist, Professional Level	Bureau of Drug and Narcotic, Thailand	witinee.t@dmsc.mail.go.th
3	Ms. Mam Boravann	Chief of PPM Unit	National Center for Malaria Control, Parasitology and Entomology (CNM), MoH-Cambodia	boravann@gmail.com
4	Mr. Prav Chheang Hor	Deputy Director	National Health Products Quality Control lab (NHQC), MoH-Cambodia	chheanghor@yahoo.com
5	Mr. Hun Huong	Drug Inspector	Department of Drugs and Food (DDF), MoH-Cambodia	huonghun@yahoo.com
6	Mrs. Keoboupphaphone Chindavongsa	Deputy Chief	Laboratory and Treatment Unit, Center for Malariology, Parasitology and Entomology (CMPE), Lao PDR	chinda07@gmail.com
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8	Dr. Bouxou Keohavong	Deputy Chief	Drug Control Division, Food and Drug Department (FDD), MoH, Lao PDR	kbounxou@yahoo.com
9	Associate Prof Ta Thi Tinh	Department of Malaria Treatment and Research	National Institute of Malariology, Parasitology and Entomology (NIMPE), Vietnam	tinhnimpe@yahoo.com
10	Dr. Bui Quang Phuc	Head of Department of Malaria Treatment and Research	NIMPE	
11	Mr. Nguyen Tuan Anh	Head of Laboratory of Herbal Medicines and Materials	National Institute for Drug Quality Control (NIDQC), Vietnam	nguyentuananh_vkn@yahoo.com
12	Ms Tran Thi Phuong Thanh	The Quality Management Div.	Drug Administration of Vietnam (DAV)	phuongthanh110@gmail.com
13	Mr. Pham Chi Thanh	Department of Planning and General Affairs	Institute for Drug Quality Control, Ho Chi Minh City (HCM IDQC), Vietnam	phamchithanhvkn@yahoo.com.vn
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## REFERENCE STANDARDS NEEDED FOR THE COMPENDIAL ANALYSIS

These are the reference standards (and the related compounds, where applicable) that are available, their prices and where they are from. Note that for the BP and CP monographs, we would be using USP and IP reference standards as there is no BP Chloroquine reference standard or CP reference standards available.

**USP**

Reference Standard	Monograph	Price (USD)
Chloroquine Phosphate (500 mg)	Chloroquine Phosphate tablets/HCl injection	\$204.00
Amodiaquine Hydrochloride (500 mg)	Chloroquine Phosphate tablets	\$204.00
Chloroquine Sulfate (500 mg)		\$204.00
Chloroquine Related Compound A (25 mg)		\$636.00
Endotoxin (10,000 units)	Chloroquine HCl Injection	\$204.00
Amoxicillin (200 mg)	Amoxicillin capsules	\$204.00
Artesunate (200 mg)	Artesunate tablets	\$204.00
Artemether (100 mg)	Artemether/Lumefantrine tablets	\$204.00
Artemether Related Compound A (15 mg)		\$636.00
Artemether Related Compound B (15 mg)		\$636.00
Lumefantrine (100 mg)		\$204.00
Lumefantrine Related Compound A (25 mg)		\$636.00
Cloxacillin Sodium (200 mg)	Cloxacillin Sodium tablets	\$204.00
Mefloquine HCl (100 mg)	Mefloquine HCl tablets	\$204.00
Primaquine Phosphate (200 mg)	Primaquine Phosphate tablets	\$204.00
Primaquine Related Compound A (15 mg)		\$636.00
Sulfadoxine (200 mg)	Sulfadoxine Pyrimethamine tablets	\$204.00
Pyrimethamine (200 mg)		\$204.00

**International Pharmacopeia**

Reference Standard	Monograph	Price (USD)
Artemether (100 mg)	Artemether injection	\$158.10
	Artemether tablets	
Artenimol (100 mg)	Artenimol (DHA) tablets	\$158.10
Artesunate (100 mg)	Artesunate tablets	\$158.10

**British Pharmacopeia**

Reference Standard	Monograph	Price (USD)
Chloroquine Sulfate (200 mg) – IP	Chloroquine Sulfate injection/tablets	\$198.90
Chloroquine Sulfate (500 mg) – USP		\$204.00

**Chinese Pharmacopeia**

Reference Standard	Monograph	Price (USD)
Quinine HCl Dihydrate (1 g) (USP)	Quinine 2HCl injection	\$204.00
Sulfadoxine (200 mg) (USP)	Sulfadoxine tablets	\$204.00