**MEDICAL TELEPARASITOLOGY FOR LABORATORY DIAGNOSIS**

**OF PARASITIC INFECTIONS IN THE PHILIPPINES**

**STANDARD OPERATING PROCEDURES**

**(Draft)**

**TABLE OF CONTENTS**

List of Abbreviations i

Definition of Terms ii

1. Introduction 1
   1. Background and Rationale of the Medical Teleparasitology Project 1
   2. Conceptual Framework of Medical Teleparasitology Project 3
   3. Objectives of the Medical Teleparasitology Project 3
2. Components of the Medical Teleparasitology Project 4
   1. People 4
      1. Patient 4
      2. Medical Technologists/Microscopists 4
      3. Diagnostic Parasitology Expert Pool 4
   2. Application Technology 4
      1. Hardware 4
      2. Software 5
   3. Telecommunication and Network Links 5
3. Operations 6
   1. Project Governance Framework 6
   2. Project Team 7
   3. Medical Teleparasitology System 7
      1. Levels of Medical Teleparasitology Centers 7

a. Peripheral Laboratory 7

b. Referral Center 8

* + 1. Reference Scheme 8
    2. Mapping of Parasitic Infections 9
    3. Image Bank 9
  1. Information Management 9
  2. Collaborating Agencies 9

1. Department of Science and Technology 9

2. Department of Health 10

3. Academic Institutions 10

4. Local PAMET Chapter 10

5. Future Collaboration 10

1. Capacity Building 10
   1. Selection of Participating Laboratory Staff 10
   2. Training Module Design 11
   3. Continuing Education 11
2. Monitoring and Evaluation 11
3. Scope and Limitations 14
4. Ethical Considerations 14
5. References 15
6. Annexes
   1. Rapid Assessment Forms 17
   2. Training Course Syllabus 20
   3. Screen Shot of Referral Forms 23
   4. Screen Shot of Result Forms 24

**LIST OF ABBREVIATIONS**

CAR Cordillera Administrative Region

CDC Centers for Disease Control and Prevention

CHITS Community Health Information Tracking System

CHO City Health Office

DLSU De La Salle University

DOH Department of Health

DOH RO CAR Department of Health Regional Office Cordillera Administrative Region

DOH RO XI Department of Health Regional Office XI

DOP Department of Parasitology

DOST Department of Science and Technology

DP Diagnostic Parasitology

DPCB Disease Prevention and Control Bureau

EPL Emerging Parasitoses Laboratory

ICT Information and Communications Technology

IDO Infectious Disease Office

KMITS Knowledge Management and Information Technology Service

MHO Municipal Health Officer

MT Medical Technologist

MTP Medical Teleparasitology

NIH National Institutes of Health

NTHC National Telehealth Center

NTD Neglected Tropical Diseases

NTDIS Neglected Tropical Diseases Information System

PAMET Philippine Association of Medical Technologists Inc.

PCHRD Philippine Council for Health Research and Development

PGH Philippine General Hospital

PHO Provincial Health Office

RAS Rapid Assessment Survey

RC Referral Center

RD Regional Director

RHU Rural Health Unit

RM Regional Microscopist

UP-CPH University of the Philippines College of Public Health

UPLB University of the Philippines Los Baños

UPM University of the Philippines Manila

UPMREB University of the Philippines Manila Research Ethics Board

WHO World Health Organization

**DEFINITION OF TERMS**

|  |  |
| --- | --- |
| Computer Terminal | a desktop or laptop that is able to recognize, convert, store, and send digital images captured by the Image Capture Device |
| Diagnostic Parasitology | refers to the reliable diagnosis of parasitic infections through accurate identification of eggs/larvae/cysts/trophozoites and adult worms in stool or other specimens using standardized techniques, and instruments or equipment in good condition by a well-trained medical technologist/microscopist |
| Digital Image | all images of microscopic view of the specimens uploaded in the system by the referring medical technologist/microscopist |
| Expert Pool | a group of diagnostic parasitologists with expertise and noteworthy academic and clinical experience who receives digital images and confers to come up with a confirmatory diagnosis |
| Hardware | includes the image capture device, computer terminal, and server necessary for the Medical Teleparasitology Project to function |
| Human Parasite Image Bank | the collection of human parasite images in the Medical Teleparasitology System which can be accessed by the public and can be used for reference, teaching, and training |
| Image Capture Device | any gadget with camera (e.g. cellular phone, tablet) and/or digital camera with at least 0.8 megapixels that is able to store, transfer and/or send digital images |
| Local Accession Code  Medical Parasitology | the characters and/or numbers assigned to a specimen mainly used to maintain patient confidentiality  the branch of medical sciences dealing with organisms (parasites) which live temporarily or permanently, concerned primarily with human beings and their medical significance, as well as their importance in human communities. |
| Medical Teleparasitology Network | a group of medical technologists/microscopists and diagnostic parasitologists who are members of the Medical Teleparasitology System |
| Medical Teleparasitology Project | an information and communications–based Diagnostic Parasitology that links medical technologists in peripheral laboratories to expert parasitologists for accurate and timely diagnosis of parasitic infections |
| Medical Teleparasitology System | refers to the information and communications – based application technology consisting of the software and database linked into the Medical Teleparasitology Network |
| Neglected Tropical Diseases  Referral Center | medically diverse group of infections caused by a variety of pathogens such as viruses, bacteria, protozoans, and helminthes (WHO, 2013)  the academic institution (University of the Philippines Manila), that gives the final diagnosis of referred cases through the members of the expert pool |
| Peripheral laboratory | any general clinical laboratory whether institution-based or free-standing in the regional, provincial, city, municipal, district, or rural health unit located in the regions targeted by the project |
| Rapid Assessment Survey | survey accomplished by the medical technologists prior to the Diagnostic Parasitology and Medical Teleparasitology training to gather baseline information on diagnostic capacity and endemicity of parasitic infections |
| Server | a cloud-based storage device that will house all the data collected by the system |
| Software | an organized operating system or application that will provide the infrastructure for referral of digital images from the peripheral laboratories to the Referral Center, feedback of results to the end-users, and epidemiological mapping of referred and confirmed cases |
| Telehealth | includes surveillance, health promotion and public health functions. It is broader in definition than telemedicine as it includes computer-assisted telecommunications to support management, surveillance, literature and access to medical knowledge (WHO, 2014) |
| Telemedicine | the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities (WHO, 2010) |

**MEDICAL TELEPARASITOLOGY FOR LABORATORY DIAGNOSIS OF PARASITIC INFECTIONS IN THE PHILIPPINES**

**STANDARD OPERATING PROCEDURES**

# Introduction

## Background and Rationale of the Medical Teleparasitology Project

The Philippines is endemic for a number of parasitic infections, many of which are considered as Neglected Tropical Diseases (NTDs) that affect mostly the poor in underserved communities. These infections include soil-transmitted helminthiases (ascariasis, trichuriasis*,* and hookworms), food-borne helminthiases (paragonimiasis, heterophydiasis, echinostomiasis, intestinal capillariasis, taeniasis, etc.), schistosomiasis, and lymphatic filariasis (Belizario *et al.*, 2007; DOH, 2009).

There have been previous reports of misdiagnoses of these infectious diseases of poverty, resulting in the delay of treatment of patients and continuing morbidity. Thus, such remains a significant public health concern. Schistosomiasis, for example, was initially misdiagnosed before it was reported in newly-described endemic provinces of Cagayan and Negros Occidental in the past few years. Another example includes several cases of a “mystery disease” that resulted in 12 deaths in Monkayo, Compostela Valley where they suspected capillariasis and was confirmed when a local medical technologist sent a stool specimen to the University of the Philippines Manila (UPM). An outbreak of intestinal capillariasis in Compostela Valley was eventually confirmed through an investigation by a group of experts from the Department of Health (DOH) and UPM. Consequently, this suggested the need for serious efforts in developing the proficiency of laboratory diagnosis, especially in government health facilities where the poor and marginalized sectors are likely to consult (Belizario *et al.*, 2000). In Zamboanga del Norte, there were more than 70 deaths recorded due to misdiagnosis and 4.9% of those examined in a parasitologic survey were confirmed to have capillariasis (Belizario *et al.*, 2010). Another incident was reported in Siargao Island, Surigao del Norte where a local health staff misdiagnosed and reported *Echinostoma malayanum* (intestinal fluke) as *Fasciola hepatica* (liver fluke) due to a general lack of knowledge in the characteristics of this particular parasite (Belizario et al., 2007).

Appropriate medical management of parasitic infections by a health professional largely depends on accurate and timely diagnosis through microscopy and other laboratory techniques. However, most peripheral laboratories in the Philippines, especially those in the local health units, lack the necessary expertise for accurate diagnosis of less common parasitic infections which are emerging or re-emerging. While the expertise is available in certain referral centers like the UPM, health professionals in their respective localities who encounter difficulties in diagnosis do not have the benefit of a referral mechanism, where, these parasitic infections are either misdiagnosed and mismanaged, or left undiagnosed and untreated. The use of information and communications-based referral system can provide an opportunity for these local health professionals to link with the experts in the referral center without requiring the experts to travel to the countryside. This referral system therefore results not only in accurate and timely diagnosis but also in improving the diagnostic capacity of laboratory personnel.

Medical Teleparasitology is a type of telehealth, which is defined as the delivery of healthcare services in remote areas using information and communication technologies (ICT) for the exchange of information for the diagnosis, treatment, and prevention of disease, research and evaluation, and continuing education of healthcare providers (WHO, 1998). It also aims to develop a database of the cases referred to the system that will map out the distribution of parasitic infections in the Philippines. This will be helpful in providing quality data and evidence for advocacy and policy formulation for the control and prevention of parasitic infections.

Telehealth encompasses telemedicine, which is according to WHO, the delivery of health care services to places where distance is a critical factor using computer-assisted telecommunications to support management, surveillance, literature and access to medical knowledge (WHO, 2014). Several studies have already demonstrated the utility of telemedicine especially in less-economically developed countries by helping reduce the costs of travel and improve the quality and accessibility of healthcare (Kifle *et al.*, 2006; Chanussot-Deprez, 2008; Vassallo *et al.*, 2001; Mishra, 2003; Froelich *et al.*, 2009). Telemedicine programs have also been shown to help motivate health professionals to remain in rural practice because of the availability of professional support and opportunities for continuing professional development (Gagnon *et al.*, 2006). Furthermore, telemedicine has been used to aid in epidemiological surveillance through the improvement of network databases and tracking of reported cases (Martinez *et al.*, 2005; WHO, 2009).

Only a few models for teleparasitology exist in the literature. The German Armed Forces, for example, used telemedicine, which included a teleparasitology component, in providing immediate diagnosis of parasitic diseases acquired by German soldiers during missions outside of the country through a module consisting of a special equipment, camera, and software that transmits high-quality images of microscopic specimens (Scheid, 2007). Another study demonstrated the use of e-mail in sending photomicrographs for the diagnosis of malaria in remote areas which resulted in a sensitivity of 98 to 100% (Murray, 2006). Centers for Disease Control and Prevention (CDC) has been utilizing DPDx, a web site that strengthens parasitic infection diagnosis through an interactive and rapid exchange of information with an online support of a diagnostic reference resources (CDC, 2014).

The UP College of Public Health Department of Parasitology (UP-CPH-DOP) offers intensive training course in Diagnostic Parasitology. It takes a leading role in teaching of research on parasitic diseases and their control, as well as in capacity development in diagnosis of parasitic infections. The Emerging Parasitoses Laboratory (EPL) has been established at the UP Manila-National Institutes of Health (UPM-NIH) that responds to referrals from various infectious disease specialists, hospitals and diagnostic facilities. The laboratory complements the existing capacity in the UP CPH and Philippine General Hospital (PGH) wherein trained staff are supervised by experts who have the academic background and training and have likewise been tapped to provide technical support at the local and national levels. In the Philippines, the National Telehealth Center at the UPM-NIH was established in 1998 to promote the use of ICT in improving healthcare delivery. The center manages referrals from more than 40 doctors in remote areas around the Philippines, linking them to more than 600 experts based at the PGH. The center has carried out three telemedicine projects, namely, Community Health Information Tracking System (CHITS), E-learning for Health, and SMS Telemedicine (Marcelo, 2009). So far, none of these applications have proposed the use of teleparasitology for the diagnosis of parasitic infections in remote areas in the Philippines.

## Conceptual Framework of the Medical Teleparasitology Project

**Diagnostic Parasitology Using Information and Communications Technology**

Training and Reference, Diagnostic Assistance, and Continuing Education

Technology

Network

People

**Correct Diagnosis**

Database, Mapping, and Surveillance

Quality Data and Evidence for Advocacy, Planning, and Policy

Formulation

**Control and Prevention of Parasitic Infections**

## Objectives of the Medical Teleparasitology Project

The Medical Teleparasitology Project aims to develop and demonstrate the feasibility of a referral system that links peripheral laboratories with selected regional diagnostic referral centers without necessarily requiring the physical presence of the experts in the said localities. Its significance includes providing the opportunity for:

1. Correct and timely diagnosis of parasitic infections preventing cases of misdiagnoses and allowing appropriate and correct management of patients especially in far-flung and underserved areas;
2. A feedback mechanism for referring parties who are part of the network to share their microscopy and laboratory findings, express opinion, and communicate with experts in the field (and vice versa);
3. Capacity building of laboratory personnel as referring parties;
4. Support for the Neglected Tropical Disease Information System (NTDIS) currently being developed by the Department of Health through a database of all referred cases that will be utilized in mapping parasitic infections in the Philippines; and
5. An updated data and generation of new information that will be used to improve current guidelines and policies on NTD control and contribute to global discussions on the diagnosis of parasitic infections.

The objectives of the Medical Teleparasitology Project are divided into three phases.

* + - 1. **Baseline Assessment of Diagnostic Capacity of Laboratory Staff and Endemicity of Parasitic Infections**
  1. To describe the diagnostic capacity on parasitic infections of local laboratory personnel in selected regions in the Philippines
  2. To describe the endemicity and relative frequency of parasitic infections in selected regions in the Philippines
     + 1. **Development of the Medical Teleparasitology System**
          1. To develop a Medical Teleparasitology System for the laboratory diagnosis of parasitic infections
  3. To develop a teleparasitology database and a distribution map of referred cases of parasitic infections to augment the Neglected Tropical Disease Information System (NTDIS) of the Department of Health

**3. Implementation of the Medical Teleparasitology System**

1. To demonstrate the feasibility and utility of the Medical Teleparasitology System
2. To assess improvements in the diagnostic capacity of laboratory personnel participating in the system
3. To describe an update on the endemicity and relative frequency of parasitic infections in selected regions in the Philippines using Medical Teleparasitology System

# Components of the Medical Teleparasitology Project

## People

### Patient

This includes all patients with signs and symptoms of a possible parasitic infection that requires laboratory microscopy for diagnosis, especially on individuals living in underserved and far-flung areas with a known and/or high endemicity of parasitic infections.

### Medical Technologist/Microscopist

This refers to licensed medical technologists/microscopists working in a government general clinical laboratory whether institution-based or free standing specifically those assigned in the clinical microscopy section or those routinely performing laboratory microscopy. They must have undergone the training course in Diagnostic Parasitology and Medical Teleparasitology conducted by the University of the Philippines Manila Referral Center and should have been issued a certificate of completion.

* 1. **Diagnostic Parasitology Expert Pool**

This refers to a group of diagnostic parasitologists with expertise and noteworthy academic and clinical experience who receives digital images and confers to come up with a confirmatory diagnosis of the referred cases.

The members of the Diagnostic Parasitology expert pool shall have the following responsibilities: 1) provide timely confirmatory diagnosis of referred cases by medical technologists/microscopists in peripheral laboratories; 2) respond to online queries and participate in an online discussion of cases, as necessary; 3) attend scheduled quarterly meetings at the University of the Philippines Manila Referral Center or whenever necessary; and 4) provide suggestions and feedback in improving the Medical Teleparasitology System.

## Application Technology

### Hardware

Hardware includes the image capture device, computer terminal, and server necessary for the Medical Teleparasitology System to function.

1. Image Capture Device

This refers to any gadget with camera (e.g. cellular phone, tablet) and/or a digital camera with at least 0.8 megapixels that is able to store, transfer and/or send digital images.

1. Computer Terminal

This refers to a desktop or a laptop that is able to recognize, convert, store, and send digital images captured by the Image Capture Device.

1. Server

This refers to the cloud-based storage device that will house all the data collected by the system.

### Software

The software for the Medical Teleparasitology System will provide the infrastructure for referral of digital images from the peripheral laboratories to the Referral Center, feedback of results to the end-users and patients, epidemiological mapping of referred and confirmed cases. A database linked to this program is developed by the National Telehealth Center. NTHC is currently housing the server of the system using <http://mtp.telehealth.ph/>.

The system involves transmission and storage of confidential patient information which shall occur over the secured network. The network will be adequately encrypted to provide secure station for receiving diagnostic reports. Verifiable digital signatures will be used to maximize security of the program. It ensures reasonable privacy and confidentiality by security measures which include program and user authentication, activity logs, access restriction and archiving.

The system undergoes alpha and beta tests. Alpha test improves the quality of the system by identification of bugs, errors, crashes, missing documents and features of the test engineers or website developers and project staff. Alpha test ensures beta readiness because most identified issues are fixed, added, removed or changed based on the feedback of the initial users. This is done toward the end of the development phase prior to its use in the field.

Beta test on the other hand, is done to improve the quality of the system, to integrate the inputs of the end-users (medical technologists, members of the expert pool, and the administrators) prior to its launching. Beta test ensures further identification of bugs and crashes but is expected that most document features are already complete.

The diagnostic parasitologist, consulting medical technologist and all other persons using the program (administrators, assistants, etc.) shall be adequately authenticated to the system. This authentication involves at the minimum a user name and password which will be assigned during the training. All access to the program shall be logged and reviewed on a regular basis by a computer technician. Review will be properly documented. Whenever necessary, the program will authenticate itself unambiguously to all users, for example, using a third party certificate and private key.

The program shall also have an adequate back up and archive mechanism in cases of computer failures or website crash.

## Telecommunication and Network Links

Telecommunication and network links such as the internet, telephone and mobile phone lines will be used to link peripheral laboratories to the Referral Center. There will be an immediate referral of unknown or unsure specimen findings to the Referral Center. Further, they will also be used to share electronic images from one laboratory to another for discussion and continuing education. The Medical Teleparasitology System will also be utilized in the mapping of parasitic infections using the monthly reports of peripheral laboratories to the Referral Center.

# Operations

# 

## Project Governance Framework

DOH, PHO, CHO, and RHU Laboratories

Hospital Laboratories

Technical Working Group

*(E-Health TWG, DOST-PCHRD, DOH-DCPB, DOH-KMITS, UPM, Independent Experts and Partners)*

UP Manila Project Team

*UPM-NTD Study Group and Expert Pool,*

*UPM National Telehealth Center*

DOH Regional Directors

Provincial Health Officers,

Provincial DOH Officers, and Municipal Health Officers

Chiefs of Hospitals

(Regional, Provincial, City, Municipal and District)

1. **Project Team**

Expert Pool of Parasitologists\*

Department of Parasitology\*\*

Project Leader

Diagnostic Parasitology

*Dr. Vicente Belizario, Jr.*

Research Associate

*Dr. Rodelia Pascua*

Research Associate

*Dr. Patrick Sylim*

Research Assistants

*Mr. Roy Dahildahil*

*Mr. Herschel Don Go*

Program Developer

*Mr. Wayne Manuel*

Regional Program Coordinator

\*Expert Pool *Dr. Elia Cabrera (UP-PGH)*

*Dr. Florencia Claveria (DLSU)*

\*\* Department of Parasitology

*Dr. Arlene Bertuso (UPM-CPH)*

Department of Health

Regional Office

Regional Director

Co-Project Leader

Information and Communications Technology

*Dr. Portia Marcelo*

## C. Medical Teleparasitology System

### 1. Levels of Medical Teleparasitology Centers

### Peripheral Laboratory

A peripheral laboratory is any government general clinical laboratory whether institution-based or free-standing in the regional, provincial, city, municipal, district, or rural health unit located in the regions targeted by the project. The peripheral laboratory must have available supplies and equipment necessary for diagnostic parasitology, available gadgets with camera (e.g. cellular phone, tablet) and/or digital camera, and internet service and/or power supply. The medical technologist/microscopist in the peripheral laboratory must have undergone the training on Diagnostic Parasitology and Medical Teleparasitology in order to utilize the system. The peripheral laboratory has the following responsibilities:

1. Receives, processes and examines under the microscope samples received for Diagnostic Parasitology;
2. Takes digital images of samples examined under the microscope and provides preliminary diagnosis of cases prior to sending the images;
3. Accurately fills out the referral forms with the local accession code assigned, location of the facility receiving the consult and details of the referred case;
4. Forwards to the Referral Center all digital images in a timely manner;
5. Ensures that all appropriate and relevant clinical information are conveyed to the Referral Center;
6. Close the referral once the diagnosis is confirmed by the Referral Center
7. Sends monthly report of known parasitic infections diagnosed in the laboratory.

### Referral Center

The referral center for the Medical Teleparasitology System will be the University of the Philippines Manila. Final diagnosis of referred cases will be made by the Referral Center through the members of the expert pool of Diagnostic Parasitologists.

The University of the Philippines Referral Center has the following responsibilities:

* + - * 1. Receives all digital images sent for confirmatory diagnosis by the peripheral laboratories;
        2. Screens all digital images received for confirmatory diagnosis;
        3. Stores all digital images received for confirmatory diagnosis in the database;
        4. Forwards to the peripheral laboratory the confirmatory diagnosis of digital images received in a timely manner.

**Reference Scheme**

A referral will be made when local medical technologists from peripheral laboratories encounter difficulties and/or wish to seek clarification and/or confirmation regarding a diagnostic finding through the Medical Teleparasitology System.

First, specimen received will be processed and examined in the laboratory and will be encoded into the database with a local accession code assigned to maintain patient confidentiality. An electronic referral form will be filled out to provide information on age, gender, barangay, municipality, and province including chief complaint and the initial laboratory diagnosis. The brief patient history field is optional. This will take around 30 minutes to 90 minutes (1 hour and 30 minutes) depending on the stain and laboratory technique being used.

## Then, the electronic referral form accomplished by the medical technologist will be submitted to the Referral Center with an attached image of the sample which is properly labeled, containing the specimen used, diagnostic technique performed, objective/

## magnification of the microscope, resolution and magnification of the camera used. In the remarks field, the patient will type in the model of the image capturing device. This is estimated to be 15-20 minutes.

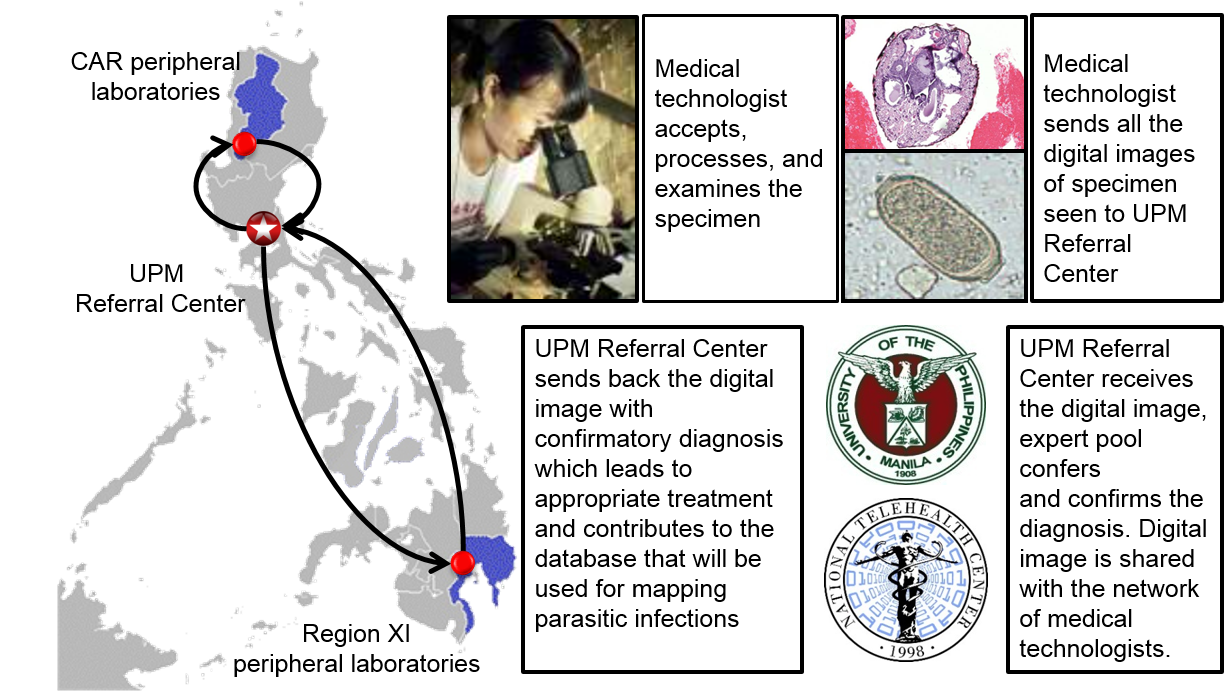
One Medical Teleparasitology Project Staff will be assigned per week to check if there are referrals and prompt the parasitologist-on-duty through email and SMS. This will take around 15 minutes.

One member of expert pool (parasitologist-on-duty) will be assigned per week to ensure that all cases being referred in the system gets an appropriate response within the next 24 hours; except if the succeeding day is a weekend or a non-working holiday. The assigned member of the expert pool will get notification through text and/or email if there are pending referrals that need their response, administered by the Medical Teleparasitology staff. In these cases, the response to the referred cases should be made available the following working day.

The members of the expert pool shall have the access to all cases or referrals made by the medical technologists and may give their comments regarding the case or referral. This is only shared among them and not to the medical technologists to avoid duplication or miscommunication. Only the assigned member of the expert pool for the particular week can respond that is visible to the medical technologist and will be responsible to give the final laboratory diagnosis. The referred case will then be closed by the medical technologist. The estimated time taken by the parasitologist-on-duty to respond to all the referrals and closing of the case by the medical technologist is 20-22 hours.

## A monthly report of known parasitic infections diagnosed in the laboratory will be sent by the trained medical technologists based on the cases referred per facility. The data gathered will be used for the parasitological mapping per facility. Any medical technologist in the peripheral laboratory can submit monthly report through the monthly report form included in the system. If one medical technologist has already submitted the monthly reporting of their facility, the monthly report form is disabled to the other medical technologists in the same facility. Data on the parasitic infections reported at the local health units will be used to provide a baseline assessment of the endemicity of parasitic infections.

The estimated turn-around-time (TAT) of the whole reference scheme is 24 hours which involves laboratory processing and examination, making referral by uploading the digital image, processing of request, and feedback from UPM Referral Center.



Medical technologist accepts, processes, and examines the specimen

Medical technologist sends all the digital images of specimen seen to UPM Referral Center

Trained medical technologists in the peripheral laboratories send monthly report of known parasitic infections diagnosed by the trained medical technologists that will be used for mapping parasitic infections

5

4

3

2

1

UPM Referral Center sends back the digital image with confirmatory diagnosis which leads to appropriate treatment and contributes to the database that will be used for mapping parasitic infections

UPM Referral Center receives the digital image, parasitologist confers and confirms the diagnosis, then digital image is shared within the network of medical technologists

In summary:

|  |  |
| --- | --- |
| **STEPS** | **TIMEFRAME** |
| 1. Specimen processing and examination | 30-90 minutes (1 hour and 30 minutes) |
| 2. Submission of specimen to the system | 15-20 minutes |
| 3. Triage of specimen | 15 minutes |
| 4. Response and confirmatory diagnosis submission to the referring medical technologist and closing of the referral case | 20-22 hours |
| TOTAL | 24 hours |

**Medical Technologists MTP Online Forum**

## A medical technologist forum is an interactive online meeting that will serve as a venue for the medical technologist to post a case/referral that can be accessed by all medical technologists in the system. Other medical technologists can make comments and submit their diagnosis on the referred cases posted. The Neglected Tropical Disease (NTD) team can also post a case/referral.

**Mapping of Parasitic Infections**

The data gathered including the baseline data on the endemicity of parasitic infections from the Rapid Assessment Survey (RAS) forms will be included in the existing database of the Medical Teleparasitology System. The data that will be gathered from all the referred cases in the municipality/barangay level sent by the medical technologists will be used to map the parasitic infections in the Philippines. The results will be used to update the database of parasitic infections in the selected regions. The relative frequency and distribution of parasitic infections in the Philippines will be posted in the system which can be accessed by the public. Users can therefore access two parasitological maps or summary: number of cases reported in their laboratory (facility-based reporting), and number of referred cases in the system (municipality/barangay level reporting).

**Human Parasite Image Bank**

All the images from the peripheral laboratories and from academic institutions or other joining organizations will be collected in a database known as the Human Parasite Image Bank. Each digital image contains information on the type of specimen, diagnostic technique and stain used, magnification of the microscope used, the parasite present in the specimen, and the municipality and/or region the digital image was taken.

These images may be used by participating organizations or institutions and may be accessed by the public as reference material for continuing education.

## Information Management

## All information including electronic referral forms, digital images and monthly reports sent by the medical technologists to the Referral Center will be archived at the Referral Center. The diagnostic parasitologists, consulting medical technologists and all other persons using the system (administrators, assistants, etc) shall be adequately authenticated to each other and to the system. This authentication involves user name, password and other identifiers which will be assigned during the training. All access to the system shall be logged and reviewed on a regular basis by a computer technician. Review will be properly documented.

## Collaborating Agencies

* 1. **Department of Science and Technology-Philippine Council for Health Research and Development (DOST-PCHRD)**

The Department of Science and Technology-Philippine Council for Health Research and Development (DOST-PCHRD) will be funding the implementation of the project through the Grants-in-Aid (GIA) Funds of the DOST. It will provide technical assistance relevant to the achievement of the project objectives and will provide other forms of assistance to the project in coordination with other government agencies in matters requiring their attention or cooperation in so far as these are relevant to the project and within the capability of the PCHRD. It will also provide a server that will house the Medical Teleparasitology System.

* 1. **Department of Health (DOH)**

## The Department of Health Central and Regional Offices will serve as co-implementers of the Medical Teleparasitology Project. Two regions namely the Cordillera Administrative Region (CAR) and Region XI have been selected to be pilot sites of this project which can potentially become the basis for a nationwide implementation through a national program. The Regional Director will serve as the counterpart of the Project Leader and will assist in the implementation of activities related to the project. Memorandum of Understanding will be signed to formalize the collaboration.

## 

## For the first year of implementation, the DOH-RO will help out in inviting medical technologists/microscopists from local health units for training. The DOH-RO will also facilitate the administration of RAS forms which will be used to screen prospective training participants. For the succeeding year, the DOH-RO may assume the responsibility of the implementation of the project as agreed upon by both parties. The University of the Philippines Manila will provide technical assistance related to training.

## Academic Institutions

## 

## Academic institutions in the selected regions will also be invited to participate in the Medical Teleparasitology Project. The academic institutions namely Davao Medical School Foundation, Inc. (DMSF Inc.) in Davao City and Saint Louis University (SLU) in Baguio City will be the venue for the three-day training course on Diagnostic Parasitology and Medical Teleparasitology with the intent of developing it as possible regional training sites for the project. In the future, the academic institution may also serve as a possible base of a local pool of experts in Diagnostic Parasitology linked with the Referral Center.

## Local PAMET Chapter

## 

## The Philippine Association of Medical Technologists, Inc. (PAMET, Inc.) Local Chapter will help out in information dissemination and encourage participation of local medical technologists in the system. In the future, they may also co-sponsor the Diagnostic Parasitology and Medical Teleparasitology training and offer it alongside the other trainings that they provide for medical technologists as part of continuing education.

5. **Future Collaboration**

Future collaboration shall be explored with other institutions or organizations such as Philippine Association of Schools of Medical Technology (PASMETH), Philippine Council for Quality Assurance in Clinical Laboratories (PCQACL), and Philippine Society of Parasitology, Inc. (PSP).

# Capacity Building

# Selection of Participating Laboratory Staff

The effectiveness and accuracy of Medical Teleparasitology depends critically on the skill and judgment of the medical technologists. A Rapid Assessment Survey (RAS) will be conducted in collaboration with the two DOH Regional Offices. Submission of the RAS forms is a prerequisite for inclusion in the training. The RAS forms will be deployed to all of the provinces of the two pilot regions to be accomplished by local medical technologists. The forms will also be made available electronically to facilitate faster distribution and collection. The accomplished RAS forms noted by their Provincial Health Officer (PHO) or City Health Officer (CHO) or Municipal Health Officer (MHO) will be sent back to the DOH Regional Offices to be noted by the Regional Director then to UPM for screening. The list of participants for the training will be finalized by UPM and will be forwarded to the Regional Office with the drafted letter of invitation for the training.

Selected medical technologists from the peripheral laboratories will undergo a three-day training course on Diagnostic Parasitology and an orientation on Medical Teleparasitology to be conducted by UPM-CPH and NTHC in collaboration with DOH-RO and the other mentioned agencies. The participants who satisfactorily completed the training will be included in the Medical Teleparasitology Network.

# Training Module Design

The training will consist of a three-day course on Diagnostic Parasitology and Medical Teleparasitology. This training aims to review the procedures in Diagnostic Parasitology and orient on how the Medical Teleparasitology System works. The specific objectives of the training are:

1. To describe the epidemiology of intestinal parasitic infections in the Philippines
2. To describe measures for control and prevention of intestinal parasitic infections
3. To describe and perform laboratory procedures for diagnosis of intestinal parasites in stool specimens
4. To identify intestinal parasites in stool specimens
5. To describe quality assurance in diagnosis of intestinal parasitic infections
6. To describe Medical Teleparasitology System and its application to Diagnostic Parasitology
7. To demonstrate the utilization of Medical Teleparasitology System

The training will include lectures on epidemiology, control and prevention of intestinal parasitic infections in the Philippines, laboratory diagnosis of intestinal parasites in stool specimens, quality assurance in diagnosis of intestinal parasitic infections in the form of didactics, laboratory sessions, theoretical and practical examinations. There will also be lectures on Telemedicine and Teleparasitology, ethical considerations in eHealth and Telemedicine and a simulation of the Medical Teleparasitology System using the actual website.

# Continuing Education

# Aside from referring unknown specimen to the Referral Center, the trained medical technologists in the peripheral laboratories will send monthly report of known parasitic infections they have examined. All the images from these peripheral laboratories and from other joining organizations or academic institutions will be deposited in a database or the Image Bank. These images may be used by participating organizations or institutions as reference. Monthly case studies with diagnostic quizzes will be done using the materials obtained in the Image Bank for continuing education of those who are part of the network.

# Monitoring and Evaluation

As part of monitoring and evaluation of project, beta testing of the system was done through the participation of the trained medical technologists two weeks after the training on Diagnostic Parasitology and Medical Teleparasitology. There are 23 participating peripheral laboratories, 33 medical technologists who received Diagnostic Parasitology training with 49 referrals sent and received through the system. Out of these 49 referrals, there were only 11 referrals with completely filled-out forms. Most of the items like patient information, age, barangay, specimen, diagnostic technique, and/or magnification were not filled out. The system was updated wherein the user is now prompted to fill out the item and making the item as required information. Some medical technologists do not include their initial diagnosis on the parasite. This item is not required but the medical technologists are highly encouraged to submit their initial diagnosis. There are 16 referrals with responses from expert pool. Nine out of 16 were initially misdiagnosed by the referring medical technologists. Five out of 16 were correctly diagnosed and two cases need additional information wherein the expert pool asked for more information (e.g. unclear image, no uploaded image seen) but the referring medical technologists were not able to reply. There were 27 monthly reports received but only four reports were completely filled-out. Please refer to Annex E for the beta testing update matrix.

The system was launched the week after the beta testing. Same parameters were used in the beta testing. However, it was noted that there was a low response from the medical technologists for some reasons like problems with access to a stable internet connection and holiday break. Please refer to Annex F for the implementation updates.

The Medical Teleparasitology Project shall be implemented by the regional centers for one year. Through the Medical Teleparasitology System, referring parties will be able to access the database, share their digital images, express their respective opinion, and communicate with experts.

The following indicators will be used for monitoring and evaluation of the project’s feasibility and utility:

Table 1. Indicators of Parasite Infection Endemicity

|  |  |  |  |
| --- | --- | --- | --- |
| **Objectives** | **Indicators** | **Means of Verification** | **Expected Outputs** |
| 1. To describe the endemicity and relative frequency of parasitic infections in selected regions in the Philippines | Incidence and prevalence of parasitic infections | Laboratory records of parasitic infections  Sentinel surveillance data | Baseline data on endemicity and relative frequency of parasitic infections in selected regions |
| 2. To describe an update on the endemicity and relative frequency of parasitic infections in selected regions in the Philippines using Medical Teleparasitology | Incidence and prevalence of parasitic infections | Laboratory records of parasite infection forwarded to the MTP System | Updated data on endemicity of parasitic infections in the selected regions |

Table 2. Indicators for Feasibility and Utility of the Medical Teleparasitology Project

|  |  |  |  |
| --- | --- | --- | --- |
| **Objectives** | **Indicators** | **Means of Verification** | **Expected Outputs** |
| 1. To develop a Medical Teleparasitology System for the laboratory diagnosis of parasitic infections | Meetings and workshops of project team and TWG | Minutes of meeting/ summary and resolutions | * Conceptual Framework * Referral System * List of expert parasitologist * Established collaboration with different sectors (i.e. DOH, PAMET) * Manual of Procedures * Policy formulation |
| 2. To develop a Medical Teleparasitology database and a distribution map of referred cases of parasitic infections in support of the NTDIS of DOH | No. and types of cases of parasitic infections reported by participating laboratories | Laboratory records | Medical Teleparasitology System |
| Identified places of origin of cases received | MTP System | Distribution map of parasitic infections |
| 3. To demonstrate the feasibility and utility of the Medical Teleparasitology System | No. of participating peripheral laboratories | MTP System | List of participating laboratories |
| No. of medical technologists receiving diagnostic parasitology training | MTP System | List of medical technologists participated in the training |
| No. of referrals sent and received through the system | MTP System | Monthly statistics |
| No. of advocacy meetings conducted | Minutes of meetings/summary and resolutions | Increase in the level of awareness of medical technologists, medical doctors, other health professionals, and the public on the availability of the service |
| No. of advocacy meeting attendees | Minutes of meetings/summary and resolutions | Increase in the number of online members of the MTP system |

Table 3. Indicators for Diagnostic Capacity of Medical Technologists

|  |  |  |  |
| --- | --- | --- | --- |
| **Objectives** | **Indicators** | **Means of Verification** | **Expected Outputs** |
| 1. To describe the diagnostic capacity on parasitic infections of local laboratory personnel in selected regions in the Philippines | No. of correct answers in the written and practical examinations | Pre-test | Baseline diagnostic capacity for parasitic infections of local laboratory staff |
| 2. To assess the improvement in the diagnostic capacity of laboratory personnel participating in the referral system | No. and types of cases/proportion initially misdiagnosed | MTP System | No. of cases misdiagnosed |
| No. and types of cases/proportion correctly diagnosed | MTP System | No. of cases correctly diagnosed |
| No. of correct answers in the online exam | Test Results | Improvement on the diagnostic capacity for parasitic infection of local laboratory staff six months after |
| No. of medical technologists/ proportion with correct diagnosis of shared images | MTP System | No. of cases correctly diagnosed |

## 

# Scope and Limitations

The Medical Teleparasitology Project is limited only to human parasitic infections that can be diagnosed through microscopic examination of sputum, stool, urine, tissue, blood, and fluids. These parasitic infections include selected Neglected Tropical Diseases such as but not limited to soil-transmitted helminthiases (ascariasis, trichuriasis*,* and hookworms), food-borne helminthiases (paragonimiasis, heterophydiasis, echinostomiasis, intestinal capillariasis, taeniasis, etc.), schistosomiasis, and lymphatic filariasis.

# Ethical Considerations

The protocol for the Medical Teleparasitology Project will be submitted to the University of the Philippines Manila Research Ethics Board (UPMREB) for ethical review to ensure adherence to ethical guidelines and principles. Confidentiality of patient information will be ensured through anonymization of data during the referral through the use of local accession codes. Findings will be relayed to the referring parties in a timely manner to ensure appropriate treatment of patients. The network will be adequately encrypted to provide secure station for receiving diagnostic reports. Verifiable digital signatures will be used to maximize security of the system. Teleparasitology ensures reasonable privacy and confidentiality by security measures which includes System and User Authentication, Activity logs, Access Restriction and Archiving.

An informed consent form will be incorporated in the Rapid Assessment Survey (RAS) form indicating the background and objectives of the study, and the plan for utilization of results. The confidentiality of all information gathered will be stated in the consent form. Patient anonymity will be ensured. An enclosed letter to the Regional Director (RD) as an expression of the medical technologists to be included in the training will also be included in the RAS form. Likewise, the voluntary participation and the right of the participants to withdraw from the interview at any time without any reason and at no cost will be emphasized in the consent forms. Healthcare providers of patients diagnosed with parasitic infections will be notified and/or referred to the nearest local health unit for appropriate treatment. Lastly, results will be communicated to stakeholders in the participating regions through the most appropriate fora.

**REFERENCES**

Belizario VY, de Leon WU, Esparar DG, Galang JM, Fantone J, Verdarero C (2000). Compostela Valley: A New Endemic Focus for *Capillariasis philippinensis*. *Southeast Asian Journal of Tropical Medicine*; 3:478-481.

Belizario VY, Totañes FI, de Leon WU, Migriño JR, Macasaet LY (2010). Intestinal capillariasis, Western Mindanao, the Philippines. *Emerging Infectious Diseases*; 16(4):736-8.

Belizario VY, Geronilla GG, Anastacio MM, de Leon WU, Suba-an AP, Sebastian AC, Bangs MJ. (2007). Echinostoma malayanum infection, the Philippines. *Emerging Infectious Diseases.* www.cdc.gov/eid. Vol. 13

Chanussot-Deprez C. (2008). Telemedicine in wound care. *International Wound Journal*; 5:651-654.

Department of Health. (2009). Philippine Map on Malaria and Neglected Tropical Diseases. *Filariasis Mass Drug Administration Coverage.*

Froelich W. (2009). Case Report: An example of international telemedicine success (26). *Journal of Telemedicine and Telecare*, 15(4):208-210.

Gagnon MP, Duplantie J, Fortin JP, Landry R. (2006). Implementing telehealth to support medical practice in rural/remote regions: what are the conditions for success? *Implementation Science*, 1:18.

Kifle M, Mbarika V, Datta P. (2006). Telemedicine in sub-Saharan Africa: The case of teleophthalmology and eye care in Ethiopia. *Journal of the American Society for Information Science & Technology,* 57(10):1383–1393.

*Laboratory Identification of Parasitic Diseases of Public Health Concern.*(2014). Retrieved October 2014, from Centers for Disease Control and Prevention: http://www.cdc.gov/dpdx/

Marcelo A (2009). Report of Pregnancy by Short Messaging System (SMS): a Strategic Data Point (SDP) in the Philippine National Health Information System.

Marcelo A. (2009). Telemedicine in developing countries: Perspectives from the Philippines. In: Wootton R, Patil N, Scott R and Ho K, editors. Telehealth in the Developing World. *United Kingdom: Royal Society of Medicine Press Ltd*., p. 27-33.

Martinez A, Villaroel V, Seoane J, del Pozo F. (2005). Analysis of information and communication needs in rural primary health care in developing countries. *IEEE Transactions on Information Technology in Biomedicine,* 2005, 9(1):66–72.

McGarvey ST, Aligui G, Graham KK, Peters P, Olds GR, Olveda R. (1996). Schisotosomiasis japonica and childhood nutritional status in northeastern Leyte, the Philippine. *American Journal of Tropical Medicine and Hygiene*; 54:498 502.

Mishra A. (2003). Telemedicine in otolaryngology (an Indian perspective). *Indian Journal of Otolaryngology and Head and Neck Surgery,* 55(3):211–212.

Murray MCK, Rupal CPT, Mody M, Dooley D, Duane LTC, Hospenthal R, Horvath L, Kimberly MAJ, Moran A, Muntz R. (2006). The Remote Diagnosis of Malaria Using Telemedicine or E-mailed Images. *Military Medicine*; 171, 12:1167-1171.

## Scheid P, Lam D, Thömmes A, Zöller L. (2007). Telemicrobiology: A Novel Telemedicine Capability for Mission Support in the Field of Infectious Medicine. Telemedicine and e-Health., 13(2): 108-117. doi:10.1089/tmj.2007.0043.

Vassallo DJ, Swinfen P, Swinfen R, Wootton R. (2001). Experience with a low-cost telemedicine system in three developing countries. Journal of Telemedicine and Telecare; 7 (Suppl 1):56-58.

WHO. (1998). A health telematics policy in support of WHO’s Health-For-All strategy for global health development: report of the WHO group consultation on health telematics, 11–16 December, Geneva, 1997.Geneva, World HealthOrganization.

WHO. (2010). Telemedicine: opportunities and developments in Member States: report on the second global survey on eHealth,Geneva, 2009. Geneva, World Health Organization.

**IX. ANNEXES**

**Annex A: Rapid Assessment Survey (RAS) Form**

**Medical Teleparasitology for Laboratory Diagnosis of Parasitic Infections in the Philippines**

Rapid Assessment Survey for Diagnostic Capacity

The University of the Philippines Manila - College of Public Health and the National Institutes of Health in collaboration with the Department of Science and Technology - Philippine Council for Health Research and Development (DOST-PCHRD) and the Department of Health (DOH) is currently implementing a project entitled “Medical Parasitology for Laboratory Diagnosis of Parasitic Infections in the Philippines”. The objectives of this project are to develop a referral system that medical technologists can use in selected areas in the Philippines, and to demonstrate its feasibility and utility for timely and accurate diagnosis of parasitic infections. It also aims to develop a database of the cases referred to the system that will map out the distribution of parasitic infections in the Philippines.

This Rapid Assessment Survey (RAS) aims to determine the capacity of peripheral laboratories in the diagnosis of parasitic infections. Results of this survey will be used as basis for planning towards more effective implementation of the Medical Teleparasitology System.

This survey is voluntary, and the information that you will provide will remain confidential. Only the members of the research team will be authorized to access the data collected from this study. Your participation will take only 10 minutes of your time. Please do not leave any items blank, unless otherwise specified. We are requesting you to answer the items as truthfully as you can. Submission of the accomplished form is a prerequisite for inclusion in the Diagnostic Parasitology and Medical Teleparasitology training to be held in Davao City/Baguio City later this year.

If you have questions or concerns, you may contact the Project Leader, Dr. Vicente Y. Belizario, Jr.

at (02) 523-5929 or the Project Research Associate, Dr. Rodelia C. Pascua at 09478184017 or email at [rodeliapascua@gmail.com](mailto:rodeliapascua@gmail.com). Thank you very much for taking the time to answer this questionnaire.

The Medical Teleparasitology Project Team

Dr. Vicente Belizario, Jr.

Dr. Portia Marcelo

Dr. Patrick Sylim

Dr. Rodelia Pascia

Mr. Roy Dahildahil

Mr. Wayne Manuel

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Designation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Number of years serving

in your current laboratory: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Municipality: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Province/Region: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q1. What type of laboratory are you working in?

|  |  |
| --- | --- |
| Regional Hospital or Medical Center  Laboratory  Regional Health Office Laboratory  Provincial Hospital Laboratory  Provincial Health Office Laboratory  District Hospital Laboratory | City Hospital Laboratory  City Health Office Laboratory  Municipal Hospital Laboratory  Municipal Health Office  or Rural Health Unit Laboratory |

Q2. Which of the following parasitological techniques are done in your laboratory? Check all that apply. Kindly estimate the number of laboratory request/s per week received for each item checked.

|  |  |  |  |
| --- | --- | --- | --- |
| Technique | No. of request/s  per week | Technique | No. of request/s  per week |
| Direct Fecal Smear | \_\_\_\_\_\_\_ | Kinyoun Staining | \_\_\_\_\_\_\_ |
| Kato-Katz/ Kato Thick  Method | \_\_\_\_\_\_\_ | NaOH Concentration  Technique | \_\_\_\_\_\_\_ |
| Formalin Ether Concentration Technique (FECT) | \_\_\_\_\_\_\_ | Thick and thin blood  Smears  Others (Please specify.) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_ |

Q3. From 2012 to 2014, were there cases of any of the following parasitic infections reported in your laboratory? (Please check all that apply.)

|  |  |  |
| --- | --- | --- |
| *Ascaris lumbricoides* | Fasciolid | *Entamoeba coli* |
| *Trichuris trichiura* | *Echinostoma* spp. | *Endolimax nana* |
| Hookworm | *Diphyllobothrium latum* | *Blastocystis hominis* |
| *Enterobius vermicularis* | *Hymenolepis diminuta* | *Cryptosporidium* spp. |
| *Capillaria philippinensis* | *Hymenolepis nana* | *Giardia lamblia* |
| *Schistosoma japonicum* | *Railletina garissoni* | *Wuchereria bancrofti* |
| *Paragonimus westermani* | *Taenia* spp. | *Brugia malayii* |
| Heterophyid | *Entamoeba*  *hystolytica/dispar* | Others (Please specify.)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

Q4. Do you have access to an existing referral system for parasitic infections that are difficult to diagnose?

Yes No I don’t know

Q4.1 If yes, to whom do you usually refer parasitic infections that are difficult to diagnose? Check all that apply.

Co-laboratory staff Laboratory supervisor Pathologist Regional microscopist Others (Please specify.)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q5. What is the estimated number of cases of parasitic infections seen in your laboratory per month?

|  |  |
| --- | --- |
| 1-10 cases per month | 31-40 cases per month |
| 11-20 cases per month | >40 cases per month |
| 21-30 cases per month | I don’t know |

Q6. What is the brand and model of the microscope currently used in your laboratory? (Please specify.):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q7. Do you have any gadget with camera (e.g. cellular phone, tablet) and/or a digital camera with at least 2 megapixels?

Yes No

Q8. Do you have a computer/laptop in your laboratory or at home?

Yes No

Q9. Does your computer/laptop have access to internet connection?

Yes No

Q10. What is/are your source/s of knowledge in diagnosing parasitic infections? (Check all that apply.) College Seminar/Training Journal Book Internet

Others (Please specify.) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q11. Which of the following parasitic infections are you most familiar with and are able to confidently identify? Please check all that apply.

|  |  |  |
| --- | --- | --- |
| *Ascaris lumbricoides* | Fasciolid | *Entamoeba coli* |
| *Trichuris trichiura* | *Echinostoma* spp. | *Endolimax nana* |
| Hookworm | *Diphyllobothrium latum* | *Blastocystis hominis* |
| *Enterobius vermicularis* | *Hymenolepis diminuta* | *Cryptosporidium* spp. |
| *Capillaria philippinensis* | *Hymenolepis nana* | *Giardia lamblia* |
| *Schistosoma japonicum* | *Railletina garissoni* | *Wuchereria bancrofti* |
| *Paragonimus westermani* | *Taenia* spp. | *Brugia malayii* |
| Heterophyid | *Entamoeba*  *hystolytica/dispar* | Others (Please specify.)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

Q12. Have you attended any formal training on Diagnostic Parasitology?

Yes No

Q12.1 If yes, please enumerate the training/s that you have attended in the last three years.

|  |  |  |
| --- | --- | --- |
| Training | Institution | Year |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_ |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_ |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_ |

Q13. Are you interested in participating in an online continuing education program on Diagnostic Parasitology?

Yes No

Q14. Are you interested in joining an online network of medical technologists on Diagnostic Parasitology?

Yes No

This is the end of the survey. Thank you very much for taking the time to complete this questionnaire.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature over Printed Name

Medical Technologist/Microscopist

**Noted:**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Municipal/City/Provincial Health Officer/Chief of Hospital

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Regional Director

**Annex B. Training Course Syllabus**

**I. Introduction**

Appropriate and correct medical management of parasitic infections by a health professional largely depends on accurate and timely diagnosis through microscopy and other laboratory techniques. However, most peripheral laboratories in the Philippines, especially those in the local health units, lack the necessary expertise for accurate diagnosis of less common parasitic infections that are emerging or re-emerging. While the expertise is available in certain centers like the University of the Philippines Manila, health professionals in their respective localities who encounter difficulties in diagnosis do not have the

benefit of a referral mechanism. As a result, these parasitic infections are either misdiagnosed and mismanaged, or left undiagnosed and untreated.

This three-day training on Diagnostic Parasitology and Medical Teleparasitology will serve as capacity-building for the implementation of the Medical Teleparasitology for Laboratory Diagnosis of Parasitic Infections in the Philippines.

**II. Objectives**

1. To describe the epidemiology of intestinal parasitic infections in the Philippines
2. To describe measures for control and prevention of intestinal parasitic infections
3. To describe and perform laboratory procedures for diagnosis of intestinal parasites in stool specimens
4. To identify intestinal parasites in stool specimens
5. To describe quality assurance in diagnosis of intestinal parasitic infections
6. To describe Medical Teleparasitology System and its application to Diagnostic Parasitology
7. To demonstrate the utilization of Medical Teleparasitology System

**III. Lecture Topics**

1. Epidemiology and control of intestinal parasitic infections in the Philippines
2. Laboratory diagnosis of intestinal parasites in stool specimens
3. Quality assurance in diagnosis of intestinal parasitic infections
4. Medical Teleparasitology System and its application to Diagnostic Parasitology

**IV. Laboratory Activities**

1. Demonstration of laboratory procedures and intestinal parasites in preserved and fresh stool specimens
2. Exercises on Direct Fecal Smear (DFS), Kato thick, Kato-Katz and Formalin Ether Concentration

Technique (FECT)

1. Stool unknown
2. Demonstration and exercise on the utilization of the Medical Teleparasitology System for Diagnostic Parasitology

**V. Course duration**: 3 days

**VI. Evaluation**

1. Theoretical Examinations
   1. Pre-test
   2. Post-test
2. Practical Examinations (electronic images)
   1. Pre-test
   2. Post-test
3. Stool Unknown

**VII. Course Syllabus**

**Training on Diagnostic Parasitology and Medical Teleparasitology**

|  |  |  |  |
| --- | --- | --- | --- |
| **Time** | **Nov 19 (Wednesday)** | **Nov 20 (Thursday)** | **Nov 21 (Friday)** |
| 8:00 a.m. | Registration of Participants |  |  |
| 8:30 a.m. | Pre-test  Theoretical Examination  Practical Examination  (electronic images) | Lecture:  *Quality assurance in diagnosis of intestinal parasitic infections*  *Dr. Vicente Y. Belizario, Jr.* | Lecture:  *Medical Teleparasitology System: Diagnostic Parasitology using ICT*  *Dr. Patrick Sylim* |
| 9:30 a.m. | Opening Ceremony  Welcome Remarks:  Orientation to the Course  Introductions of Participants  Photo Opportunity |
| 10:00 a.m. | Break |
| 10:30 a.m. | Break | Practice identification of electronic images  *Mr. Roy Dahildahil* | Break |
| 10:45 a.m. | Lecture:  *Epidemiology, control and prevention of intestinal parasitic infections in the Philippines*  *Dr. Vicente Y. Belizario, Jr.* | *Medical teleparasitology System demonstration and return demonstration*  *Dr. Patrick Sylim* |
| 11:15 | Post-test  Practical Examination  (electronic images) |
| 12:00 p.m. | Lunch | Lunch | Lunch |
| 1:00 p.m. | Lecture:  *Laboratory diagnosis of intestinal parasites in stool specimens*  *Dr. Arlene Bertuso* | Practice Stool Unknown  *Ms. Myra Mistica* | Post test  *Medical Teleparasitology System Reference Scheme*  *Dr. Rodelia Pascua* |
| 2:00 p.m. | Laboratory Period:  *Mr. Roy Dahildahil and*  *Mr. Herschel Don Go*  Demonstration of laboratory procedures and intestinal parasites in preserved and fresh stool specimens   * Exercise on Direct Fecal Smear, Kato thick, Kato-Katz and Formalin Ether Concentration Technique | Post-test  Stool Unknown  *Ms. Myra Mistica* | Image Bank  *Mr. Herschel Don Go*  *Medical Teleparasitology System demonstration and return demonstration*  *Dr. Patrick Sylim* |
| 2:30 p.m. | Break |
| 3:00 p.m. | Closing ceremony  Thanksgiving prayer  Sharing of Insights from the Participants  Presentation by the Three Groups  Feedback from the Course Coordinator  Recognition of Outstanding Participants  Awarding of Certificates of ParticipationMessages from Partner Institutions  Closing Remarks |
| 3:30 p.m. | Break | Break |
| 4:00 p.m. | Continuation of laboratory period and return demonstration | *Capturing electronic images of intestinal parasites*  *Dr. Rodelia Pascua* | Adjournment |
| 5:00 p.m. |
| 5:30 p.m. | Adjournment | Adjournment |  |

**VIII. Resource Speakers and Project Staff**

1. Dr. Vicente Y. Belizario, Jr.

Professor and Project Leader

Department of Parasitology

College of Public Health

University of the Philippines Manila

625 Pedro Gil Street, Ermita, Manila 1000

Telephone number: (02) 523-5929 local 142

Email address: [vybelizario@upm.edu.ph](mailto:vybelizario@upm.edu.ph) ; [vbelizar@yahoo.com](mailto:vbelizar@yahoo.com)

2. Dr. Portia Grace Marcelo

Director and Co-Project Leader

National Telehealth Center

University of the Philippines Manila

3rd Floor IT Complex, Philippine General Hospital

Taft Ave., Ermita, Manila 1000

Telephone number: (02) 509-1003; (02) 218-5096

Email address: portiamarcelo@gmail.com

3. Dr. Arlene Bertuso

Chair

Department of Parasitology

College of Public Health

University of the Philippines Manila

625 Pedro Gil Street, Ermita, Manila 1000

Telephone number: (02) 523-5929 local 143

Email address: [augb8@hotmail.com](mailto:augb8@hotmail.com)

4. Ms. Myra Mistica

University Research Associate I

Department of Parasitology

College of Public Health

University of the Philippines Manila

625 Pedro Gil Street, Ermita, Manila 1000

Telephone number: (02) 523-5929 local 143

Email address: myraes@yahoo.com

5. Dr. Patrick Sylim

Research Associate

National Telehealth Center

University of the Philippines Manila

3rd Floor IT Complex, Philippine General Hospital

Taft Ave., Ermita, Manila 1000

Telephone number: (02) 509-1003 or (02) 218-5096

Email address: patrick.sylim@gmail.com

6. Mr. Wayne Manuel

Program Developer

National Telehealth Center

University of the Philippines Manila

3rd Floor IT Complex, Philippine General Hospital

Taft Ave., Ermita, Manila 1000

Telephone number: (02) 509-1003 or (02) 218-5096

Email address: [wdmanuel@gmail.com](mailto:wdmanuel@gmail.com)

7. Dr. Rodelia Pascua

Research Associate

Department of Parasitology

College of Public Health

University of the Philippines Manila

625 Pedro Gil Street, Ermita, Manila 1000

Telephone number: (02) 523-5929 local 142

Email address: rodeliapascua@gmail.com

8. Mr. Roy Dahildahil

Research Assistant

Department of Parasitology

College of Public Health

University of the Philippines Manila

625 Pedro Gil Street, Ermita, Manila 1000

Telephone number: (02) 523-5929 local 142

Email address: rodrick.dee@gmail.com

9. Mr. Herschel Don Go

Research Assistant

Department of Parasitology

College of Public Health

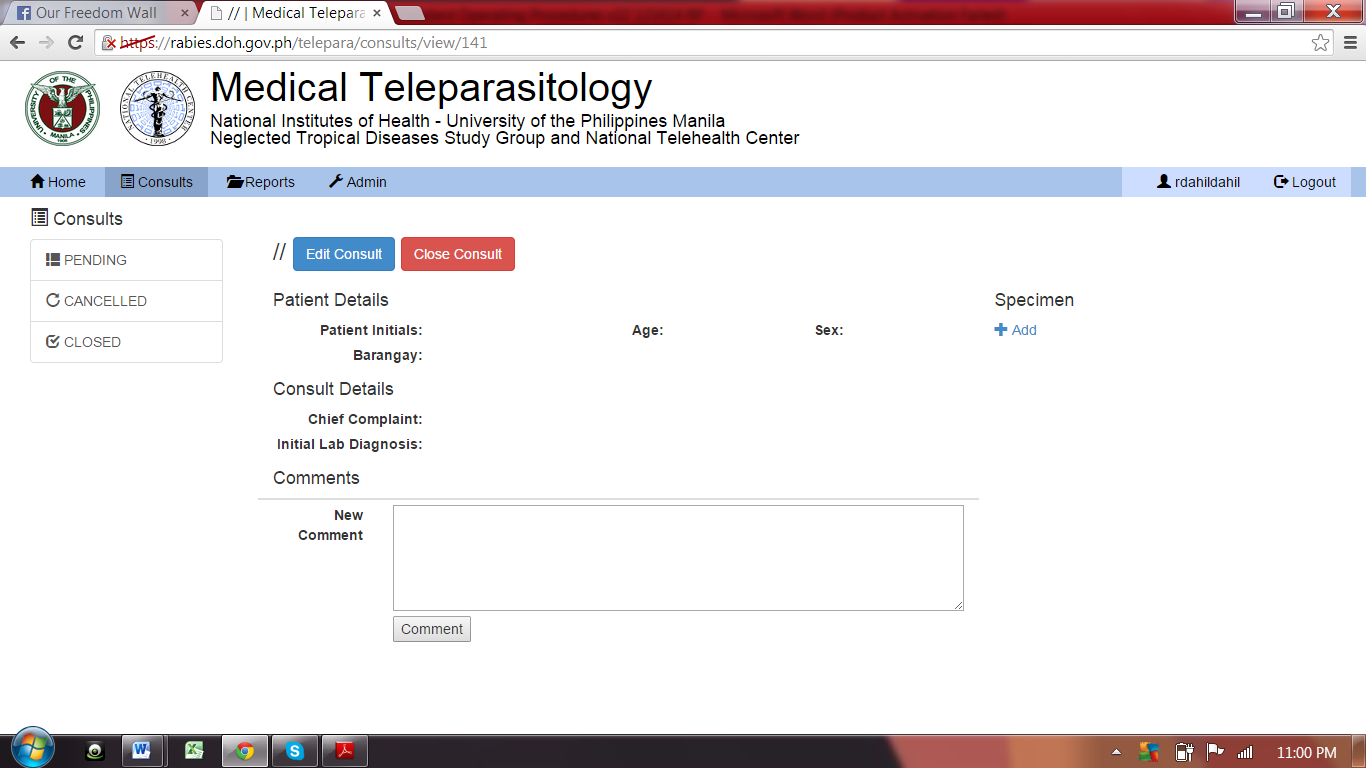
University of the Philippines Manila 1000

625 Pedro Gil Street, Ermita, Manila

Telephone number: (02) 523-5929 local 142

Email address: herscheldongo@yahoo.com.ph

**Annex C. Screen Shot of Referral Form**



**Annex D. Screen Shot of Consult Form**

