

OXFORD UNIVERSITY CLINICAL RESEARCH UNIT COVID-19 RESPONSE

**Projects in progress, and outputs to date
August, 2020**





Our Vision

Our ten-year vision is to have local, regional and global impact on health by leading a locally driven research programme on infectious diseases in Southeast Asia.

Abstract

Oxford University Clinical Research Unit (OUCRU) is conducting a wide range of projects in response to SARS-CoV-2 and the disease it causes – COVID-19.

In this document, we have loosely grouped our projects into 5 themes: Clinical Research, Diagnostics and Virology, Epidemiology, Mathematical Modeling; and Social Science, Public Engagement and Policy Engagement.

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Introduction

After working in infectious disease research in Viet Nam for almost 30 years, OUCRU's vision for the next 10 years is to have local, regional and global impact on health, by leading a locally driven research program on infectious diseases in Southeast Asia. We realize that in order to meet our aims of being locally driven, as well as having impact, we need to have a strong understanding of health policy priorities in Viet Nam, as well as to nurture and develop strong relationships with health policy stakeholders in Vietnam.

Since January 2020, OUCRU has been quickly building a portfolio of research in response to COVID-19. Details of the project in progress are included in this document. We have grouped it into broad research themes:



Our work is always collaborative. We work closely with our local partners, as well as with partners from across our wider programme. Our work also includes international collaborations from around the world. This portfolio also contains many cross-disciplinary projects, recognizing that this pandemic is broad-reaching and needs a flexible, multi-layered response.

OUR COVID-19 PROJECTS

Clinical Research



PREDICTION OF RESPIRATORY FAILURE IN COVID-19 INFECTION AND UNDERSTANDING PATHOPHYSIOLOGICAL MECHANISMS

Funder: University of Oxford

Principle Investigator: Sophie Yacoub

Location of activity: Ho Chi Minh City, Vietnam

In this observational study, our primary aim is to utilize the expertise we have developed in OUCRU Vietnam to develop dynamic models that predict disease progression using real-time, longitudinal clinico-physiological data and specific blood biomarkers. Achieving this requires research in early infection and across the disease severity spectrum. In many countries, this is difficult due to high burden of severe cases. In Vietnam, the early identification of SARS-CoV-2 infections is routine due to a highly efficient test, trace and quarantine system.

At OUCRU Vietnam, in collaboration with Oxford UK, we are using point-of-care ultrasound and physiological monitoring via simple low-cost wearable devices to develop artificial intelligence (AI) systems to better manage critically ill patients.

In this project, we intend to use conventional statistical techniques and AI to develop dynamic predictive models that will enable identification patients at risk of disease progression in COVID-19. We will build on our expertise using data from wearable devices, point-of-care heart and lung ultrasound, and specific blood biomarkers.

PROGNOSTICATION OF OXYGEN REQUIREMENT IN NON-SEVERE SARS-COV-2 RESPIRATORY INFECTION (PRIORITY)

Funder: OUCRU (Wellcome funding)

Principle Investigator: Sakib Burza (MSF Spain)

OUCRU Co-Investigator: Sophie Yacoub

Location of activity: Ho Chi Minh City, Vietnam

Research question

In adults presenting to care with non-severe COVID-19, can subsequent need for oxygen be predicted from parameters measured at the time of arrival at a healthcare facility?

Objectives

1. To identify clinical and biochemical prognostic markers in adults with non-severe COVID-19, with a focus on:
 - a. Aiding safe discharge from a healthcare facility (i.e. a high NPV);
 - b. Near-term impact on COVID-19 interventions in a resource-limited setting (i.e. simple demographic variables and biochemical markers for which near-patient / POCTs are commercially available or in late-stage development).
2. To determine the ability of an LMIC-friendly point-of-care or near-patient prognostic test to predict subsequent oxygen requirement in adults with non-severe COVID-19.
3. To demonstrate that operational research can be conducted ethically and effectively in the context of a pandemic in a resource-limited setting without detracting from the emergency response.

VICO TRIAL A MULTI-CENTER RANDOMIZED OPEN LABEL TRIAL ON THE SAFETY AND EFFICACY OF CHLOROQUINE FOR THE TREATMENT OF HOSPITALIZED ADULTS WITH LABORATORY CONFIRMED SARS-COV-2 INFECTION IN VIETNAM

Funder: Viet Nam Ministry of Health, OUCRU (Wellcome funding)

Principle Investigator: Jeremy Day

Location of activity: Hanoi and Ho Chi Minh City, Vietnam

COVID-19 is a respiratory disease caused by a novel coronavirus (SARS-CoV-2) and causes substantial morbidity and mortality. There is currently no vaccine to prevent COVID-19 or therapeutic agent to treat COVID-19. This clinical trial is designed to evaluate chloroquine as a potential therapeutic for the treatment of hospitalised people with COVID-19. We hypothesise that chloroquine slows viral replication in patients with COVID-19, attenuating the infection, and resulting in more rapid declines of viral load in throat/nose swabs. This viral attenuation should be associated with improved patient outcomes.

Study design

The study is an open label, randomised, controlled trial with 2 parallel arms of standard of care (control arm) versus standard of care with 10 days of chloroquine (intervention arm) with a loading dose over the first 24 hours, followed by 300mg base orally once daily for 9 days. The study will recruit patients in three sites in Ho Chi Minh City, Viet Nam: the Hospital for Tropical Diseases, the Cu Chi Field Hospital, and the Can Gio COVID-19 hospital. The primary endpoint is the time to viral clearance from throat/nose swab defined as the time following randomization until the midpoint between the last positive and the first of the negative throat/nose swabs. Viral presence will be determined using RT-PCR to detect SARS-CoV-2 RNA. Prior to the randomization stage, there will be a 10-patient prospective observational pilot study following the same entry and exclusion criteria as for the randomized trial, undergoing the same procedures, to deliver preliminary feasibility and safety data.

Discussion

The results of the study will add to the evidence-based guidelines for management of COVID-19. Given the enormous experience of its use in malaria chemoprophylaxis, excellent safety and tolerability profile, and its very low cost, if proved effective then chloroquine would be a readily deployable and affordable treatment for patients with COVID-19.

Outputs to date

The trial protocol has been published in Wellcome Open Research:

<https://wellcomeopenresearch.org/articles/5-141>.

CLINICAL CHARACTERISTICS, MANAGEMENT AND DISEASE OUTCOMES OF COVID-19 PATIENTS IN INDONESIA: CLINICAL CHARACTERIZATION PROTOCOL (INACO STUDY)

Funder: University of Oxford

Principle Investigator: Raph Hamers

Location of activity: Jakarta, Indonesia

The global COVID-19/SARS-CoV-2 pandemic disproportionately affects low- and middle-income countries (LMICs), but rigorous research of its clinical management and consequences in those settings is lacking. Indonesia, with the fourth largest population (270 million) globally, is facing tremendous challenges, particularly in Jakarta and other hot zones with the highest death toll in the region. The epidemic shows no sign of slowing. Systematic approaches are urgently needed to “learn-as-we-go” by characterising clinical patterns, management and outcomes of hospitalised COVID-19 patients, analysed in an international context, in order to improve the constantly evolving national response.

We propose establishing a prospective observational cohort of hospitalised COVID-19 patients in Jakarta, Indonesia to generate this critically needed evidence. This work also establishes a research platform for studies of disease mechanisms and therapeutic intervention studies in the near future.

Aims and objectives

1. To describe the clinical patterns, severity, and current management of COVID-19 patients, estimate the disease outcomes, and identify associated factors in Indonesia.
2. To inform local clinical practice and national policy on the basis of this evidence and identification of specific gaps in care.
3. To establish a COVID-19 clinical research platform for studies and trials.

THE COPCOV STUDY

Funders: Bill & Melinda Gates Foundation, Wellcome, Mastercard Therapeutics Accelerator

Principle Investigator: Nick White ; **OUCRU Nepal Principle Investigator:** Buddha Basnyat; **EOCRU Principle Investigator:** Raph Hamers

Location of activity: Nepal and Indonesia. Activity suspended in Vietnam due to low patient numbers.

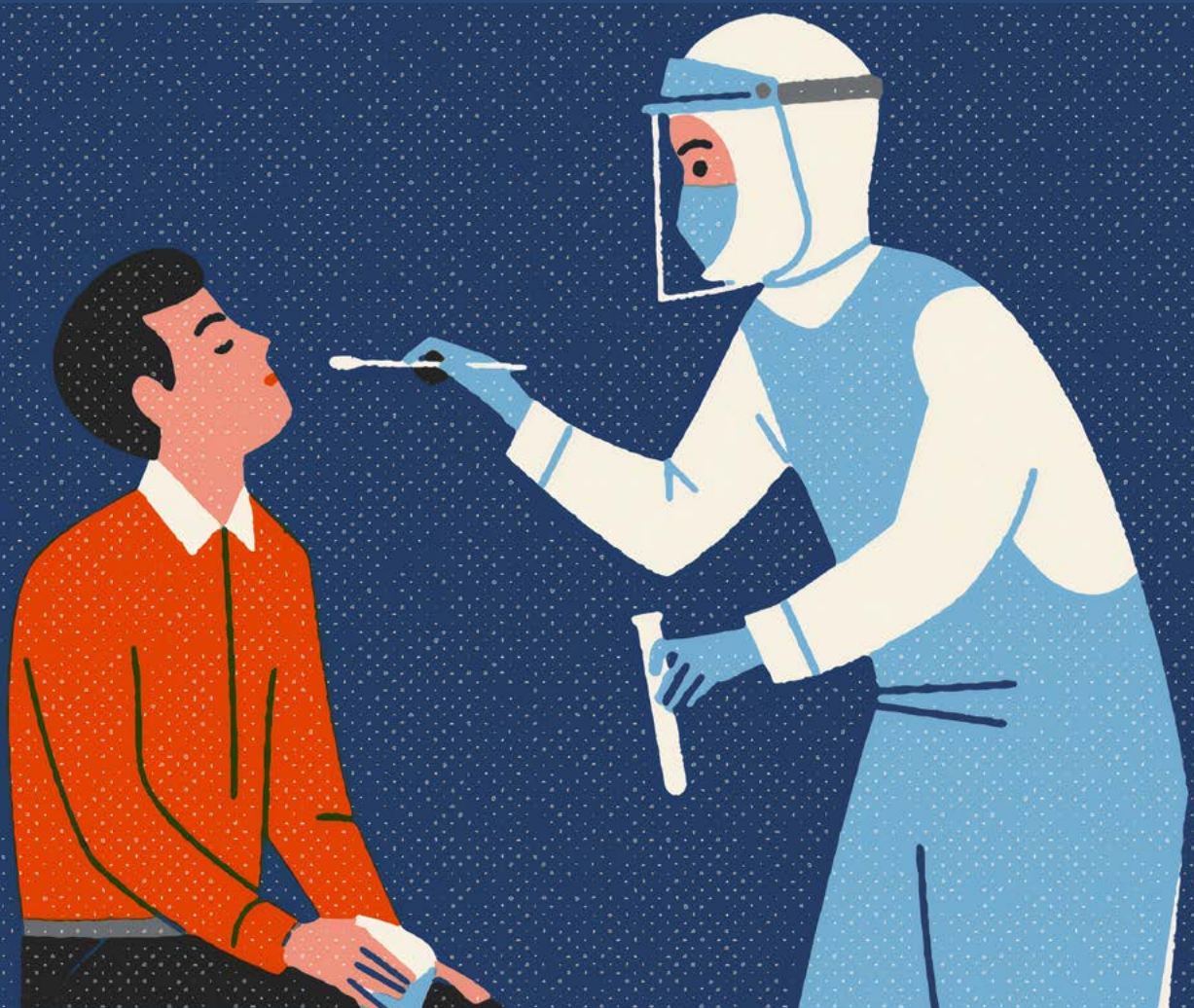
There are currently no proven vaccines or drugs for prevention of COVID-19. Chloroquine and hydroxychloroquine, drugs that have been used to treat malaria and a variety of rheumatological conditions have shown initial promise. Funded by the COVID-19 Bill & Melinda Gates Foundation, Wellcome and Mastercard Therapeutics Accelerator grant, the COPCOV study will enroll 40,000+ vital frontline health care workers and staff who have close contact with COVID-19 patients to determine whether chloroquine or hydroxychloroquine are effective in preventing or reducing the severity of COVID-19 infections.

COPCOV is a randomized, placebo-controlled prophylaxis study. The study will enroll adults who work in a healthcare facilities and have not been diagnosed with COVID-19 or an Acute Respiratory Illness (ARI). There are COPCOV study sites in Europe, Asia and Africa.

Chloroquine and hydroxychloroquine, drugs that have been used to treat malaria and a variety of rheumatological conditions have shown initial promise with in-vitro activity against SARS-CoV-2. The COPCOV study plans to enroll 40,000+ vital frontline health care workers in Asia and Europe who have close contact with COVID-19 patients to determine whether pre-exposure prophylaxis with chloroquine or hydroxychloroquine are effective in preventing or reducing the severity of COVID-19 infections. COPCOV is a double-blind, randomised, placebo-controlled trial that will be conducted in healthcare settings. The participants will be randomised in Asia to receive either chloroquine or placebo (1:1 randomisation). A loading dose of 10mg base/kg (four 155mg tablets for a 60kg subject), followed by 155 mg daily (250mg chloroquine phosphate salt) will be taken for 3 months. The primary objective is to determine if chloroquine or hydroxychloroquine prophylaxis prevents symptomatic COVID-19 infection in healthcare workers. Secondary objectives are to determine if chloroquine or hydroxychloroquine prophylaxis attenuates COVID-19 infections or prevents asymptomatic COVID-19 infection. In Vietnam, we will aim to recruit 400 at-risk healthcare workers in hospitals, healthcare facilities and quarantine centres delivering direct care to patients with either proven or suspected COVID-19.

<https://www.tropmedres.ac/covid-19/copcov>

Diagnostics and Virology

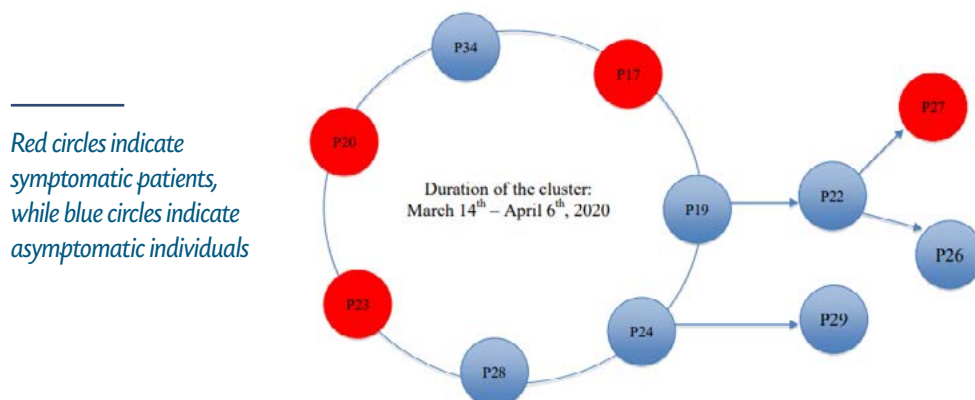


ISARIC STUDY: THE NATURAL HISTORY OF SARS-COV-2 INFECTION IN VIETNAM

Funder: OUCRU (Wellcome funding)

Principle Investigators: Le Van Tan, Rogier van Doorn

Location of activity: Ho Chi Minh City and Hanoi, Vietnam



Asymptomatic individuals shown to transmit SARS-CoV-2 infection in Vietnam

Background

Most clinical research to date has only been focusing on COVID-19 patients with moderately severe to severe disease, because these are groups of patients that are admitted to hospital for management worldwide. As a consequence, little is known about the natural history and transmission potential of completely asymptomatic infection with SARS-CoV-2.

We are in a unique position to study the natural history of SARS-CoV-2 infection, due to the strict quarantine and contact tracing protocols enacted in Vietnam. We are able therefore to recruit patients into our studies at all stages on infection, especially asymptomatic carriers.

Importance Our aim is to better understand the natural history of the infection, and this is important to inform the development of intervention strategies and is highly relevant for the current global response to on the ongoing COVID-19 pandemic.

Objectives

1. To describe the clinical, laboratory and virological characteristics of SARS-CoV-2 infection.
2. To study the immune responses in SARS-CoV-2 infected patients.
3. To identify potential protein markers that can predict severe disease.
4. To unravel the evolutionary history of SARS-CoV-2 at both within the human host and population level.
5. To develop and sustain a research platform at key institutes and hospitals in Vietnam to enable the country to rapidly respond to emerging infection outbreaks in the future.

NATURAL HISTORY OF SARS-COV-2 IN COMPARISON TO INFLUENZA A VIRUS: A MULTI-SITE STUDY FOCUSED IN THE SOUTHERN HEMISPHERE AND EQUATORIAL REGIONS

Funder: NIH CEIRS

Principal Investigator: Scientific Leadership Group with representatives from 7 consortia including the 5 CEIRS centres

OUCRU PI: Rogier van Doorn

Location of activity: Ha Nam and Hanoi, Vietnam

Purpose We propose to conduct human surveillance for SARS-CoV-2 and influenza virus at eight sites across the Southern Hemisphere and equatorial regions. Each of these sites has an established research relationship with one of the five Centers of the CEIRS Network. Each site has the clinical and laboratory infrastructure needed to support enrollment, data and sample collection, and analysis of virological and serological parameters using qPCR and ELISA assays, respectively. Each site is furthermore able to ship biospecimens to US-based CEIRS laboratories for more in-depth analyses. One of the sites is the Ha Nam community household cohort that is led by OUCRU Hanoi and the National Institute of Hygiene and Epidemiology

Importance Major knowledge gaps remain around the natural history of infection, spectrum of disease, risk factors for severe outcomes and the magnitude, quality and longevity of immune responses. To address these gaps, systematic and in-depth analyses of viral load, clinical outcomes and immune responses of infected individuals are rapidly needed. We propose to undertake such an effort. To give context to the results obtained, and better understand their implications for human health, we will examine SARS-CoV-2 and influenza virus infection in parallel

Objectives

1. Document clinical outcomes and risk factors for severe disease in individuals with SARS-CoV-2 infection.
2. Define virologic features of SARS-CoV-2 infection.
3. Define the magnitude, quality and longevity of immune responses to SARS-CoV-2.
4. Importantly, as a reference for comparison, parallel examination of influenza will be undertaken in each of these aims.

As was done in 2009 with the introduction of influenza virus A/H1N1pdm09 in this community, household sampling (using the [WHO household investigation protocol](#)) will be implemented in the Ha Nam cohort. We expect to be able to enroll 25 index cases with influenza and 25 index cases with COVID-19. With a median household size of 4 and an secondary infection rate of around 20% an additional 15 secondary cases of both influenza and COVID-19 may be enrolled. We will follow-up patients during 12 months. Acutely infected participants (n = 40) will be more intensively sampled according to the recommended schedule (10 sampling timepoints) to determine virus infection dynamics and kinetics, humoral and cellular immune responses, co-infections, and host gene expression.

CHARACTERISATION OF SARS-COV-2 IN SALIVA OF HEALTHCARE WORKERS IN HIGH-RISK SETTINGS AND ASSESSMENT OF THE USE OF THE CEPHEID XPERT®XPRESS SARS COV-2 CARTRIDGE

Funder: OUCRU (Wellcome Funding)

Principle Investigator: Abhilasha Karkey

Location of activity: Nepal

Diagnostic testing to identify persons infected with severe acute respiratory syndrome related coronavirus-2 (SARS-CoV-2) infection is central to control of the global pandemic of COVID-19. In a few countries, the use of diagnostic testing on a massive scale has been a cornerstone of successful containment strategies. In contrast, Nepal has been hampered by limited testing capacity within the country. However, various point of care technologies are emerging and of particular interest for our setting is the GenXpertXpert®Xpress SARS-CoV-2 cartridge. Cepheid has developed an automated molecular test for the qualitative detection of SARS-CoV-2. The test leverages the design principle in which multiple regions of the viral genome are targeted. The test can provide rapid detection of the current pandemic coronavirus in as soon as 30 minutes for positive results. The GenXpert machines have already been rolled out massively nationwide in Nepal since 2018. Therefore, providing evidence that the cartridges are efficient would be a tipping point towards successful containment. As rapid diagnostic tests to date remain to be highly unreliable and PCR capacity in the country is severely lacking, the use of the already existing GenXpert would be a cost effective and efficient way to screen and diagnose. The Xpert®Xpress SARS-CoV-2 cartridges have also already received FDA emergency approval.

Purpose

1. To provide evidence for national recommendation on the use of Cepheid Xpert®Xpress SARS CoV-2 cartridge on the GenXpert.
2. To define the frequency and characteristics of asymptomatic carriage of SARS-CoV-2 in HCWs caring for COVID-19 patients.
3. To define the frequency of SARS-CoV-2 infection in HCWs caring for COVID-19 patients.
4. To define the duration of detectable SARS-CoV-2 in HCWs prior to developing symptoms.
5. To determine whether transmission of SARS-CoV-2 occurs from HCW (asymptomatic and prodromal) to community contacts.
6. To demonstrate the utility of filter paper collection of saliva as a surveillance tool for SARS-CoV-2 infection.
7. To investigate the molecular epidemiology, intrahost diversity and evolution of SARS-CoV-2 in asymptomatic and symptomatic SARS-CoV-2 infections in HCWs.



Cepheid Expert® Xpress SARS CoV-2 cartridge

Importance

Providing evidence for the use of the Cepheid SARS CoV-2 cartridge would be a cost effective method of rolling out the test for the current pandemic coronavirus in Nepal. Understanding the risk of carriage and transmission to and by HCWs will enable the design of interventions to reduce this risk.

Primary Objectives

- Early identification and understanding of the incidence of symptomatic and asymptomatic infection in HCWs.
- Sequence & epidemiological analysis of transmission from infected patients (coupling with data collected in Vietnam).
- Assessment of filter paper-based saliva sample collection for the diagnosis and sequence characterisation of SARS-CoV-2.
- Assessment of turnover time and efficiency of Xpert®Xpress SARS CoV-2 cartridge for nationwide rollout.

Description of the team

The laboratory teams of Patan hospital (PH), the Institute of Medicine: Teaching hospital (IOM) and the CMDN/Intrepid laboratory are involved in this study. All three centers are based in Kathmandu. PH and IOM are public hub hospitals for COVID-19 while CMDN/INPL is a molecular diagnostics center.

VALIDATING GENEXPERT PLATFORM FOR SARS-COV-2 DIAGNOSIS FOR REMOTE SITES IN EASTERN INDONESIA

Funder: University of Oxford

Principal Investigator: Kevin Baird

Location of activity: Sumba, Indonesia

Control of the expanding COVID-19 epidemic in Indonesia requires access to SARS-CoV-2 diagnostics – currently just 526 tests/1,000,000 vs. 2,681, 3,264, and more than 30,000 for Vietnam, Thailand, and Singapore. Indonesia’s islands have limited access to rtPCR laboratories. The extent of SARS-CoV-2 spread, particularly in impoverished eastern Indonesia, thus remains unknown. The limited availability of supplies, combined with extraordinary cost, difficulty of transport, and enormous backlogs at referral laboratories preclude timely diagnostics for COVID-19 across most of eastern Indonesia.

We aim to leverage existing networks of GeneXpert (Cepheid, USA) platforms (MDR TB) diagnosis in eastern Indonesia to remedy nearly non-existent COVID-19 diagnostic services. FDA-approved COVID-19 cartridges are available from Cepheid at LMIC-discount of \$19.80/test. We further aim to validate saliva in that platform, thereby simplifying sample collection and logistics. We envision enabling access to SARS-CoV-2 diagnosis at a fraction of the cost and rendered within one hour, employing available GeneXpert instruments and logistics. We will demonstrate the accuracy and practicality of GeneXpert COVID-19 diagnoses by leveraging our expertise, experience and networks on the remote island of Sumba in eastern Indonesia. We will employ two existing GeneXpert instruments and laboratory facilities at the new government referral hospital for western Sumba.

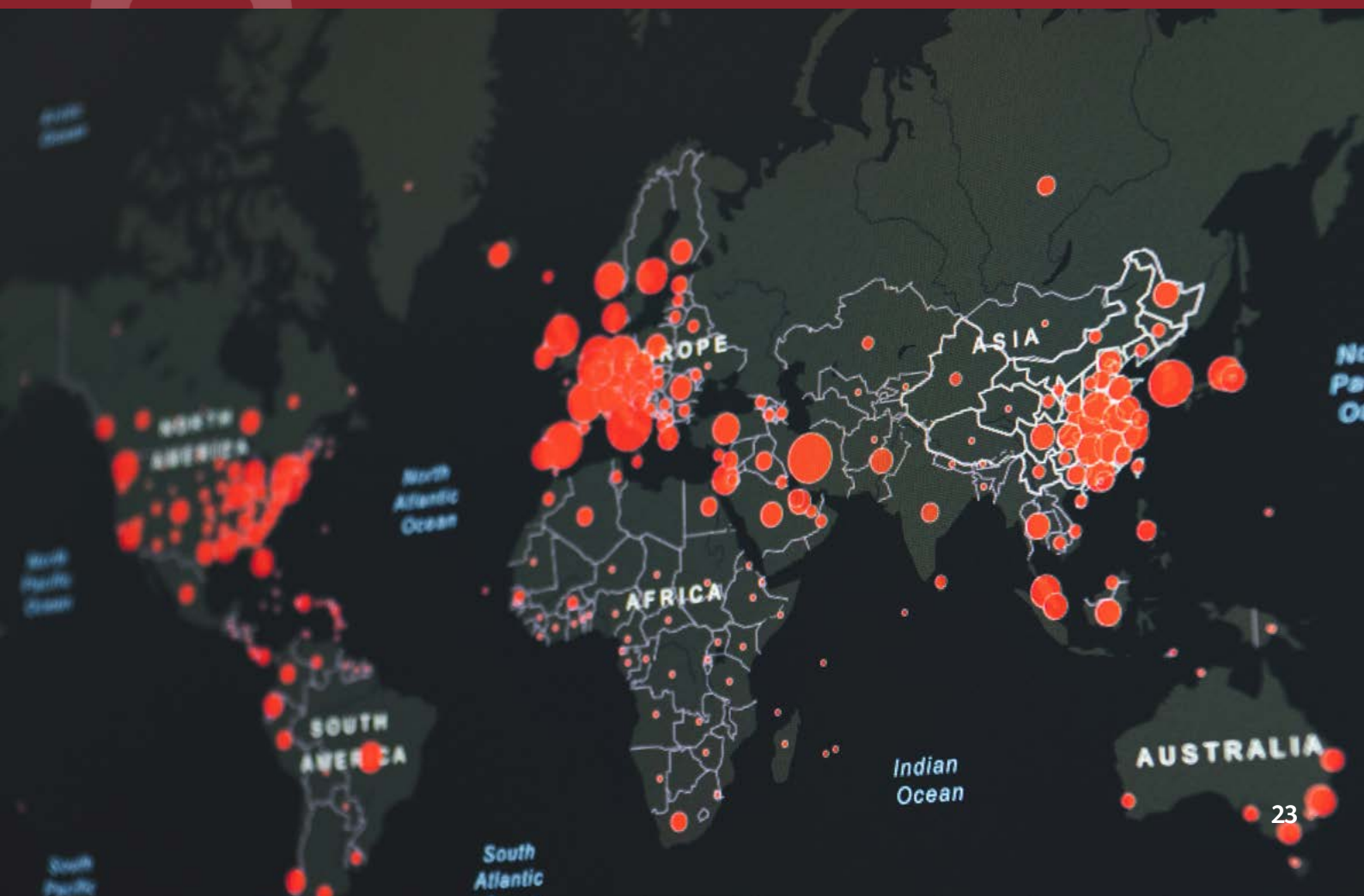
Aims and objectives

1. Validate diagnosis of SARS-CoV-2 by analysis of fresh and dried saliva in GeneXpert among 300 patients seeking treatment for febrile illness at Karitas Hospital.
2. Describe prevalence of SARS-CoV-2 among patients seeking treatment for febrile illness at Karitas Hospital.
3. Validate the practical diagnosis of SARS-CoV-2 by analysis of 300 saliva specimens on filter paper collected at remote clinics and sent to Karitas Hospital.
4. Describe prevalence of SARS-CoV-2 among patients seeking treatment for febrile illness at health posts in remote Kodi subdistrict on Sumba.

DIAGNOSTICS AND VIROLOGY OUTPUTS TO DATE

- January 2020: led the national development of SARS-CoV-2 diagnostic assays in Vietnam.
- February 2020: attendance at WHO R&D Blueprint meeting to establish the global research agenda for COVID-19 in Geneva.
- July 2020: Attendance at WHO Virtual Global Research and Innovation Forum on COVID-19.
- Group leader Le Van Tan is a member of the WHO COVID-19 Clinical Management and Characterization Working Group.
- CID Paper: *The natural history and transmission potential of asymptomatic SARS-CoV-2 infection*: <https://academic.oup.com/cid/article/doi/10.1093/cid/ciaa711/5851471>.
- *Duration of viral detection in throat and rectum of a patient with COVID-19*, MedRxiv: <https://www.medrxiv.org/content/10.1101/2020.03.07.20032052v1>.
- *SARS-CoV-2 and co-infections detection in nasopharyngeal throat swabs of COVID-19 patients by metagenomics*, Journal of Infection, in press.
- *Community transmission of SARS-CoV-2 at a bar gathering – Ho Chi Minh City, Vietnam* (Emerging Infectious Diseases, submitted).
- Successfully produced full genome sequences directly from clinical specimens at both the National Hospital for Tropical Diseases in Hanoi and National Institute for Hygiene and Epidemiology, Vietnam using Illumina platform.
- Sequences have been uploaded to GISAID.
- ISARIC protocols for observational work on COVID-19 approved by the National Hospital for Tropical Diseases in Hanoi for retrospective and prospective collection of clinical data and prospective sample collection to contribute to global ISARIC database.
- Analysis of epidemiological data from Vietnam National Steering Committee (100 days paper).
- Analysis of viral load data from National Institute for Hygiene and Epidemiology, Vietnam (in preparation).
- Demonstrating the absence of subgenomic RNA in throat swabs of repositive cases, suggesting that no evidence of ongoing viral replication at the time the patients became repositive.
- Quantification of neutralizing antibodies during the course of illness in relation to the duration of subgenomic RNA loads measured in throat swabs.

Epidemiology



CHARACTERISATION OF SARS-COV-2 IN SALIVA OF HEALTHCARE WORKERS IN HIGH-RISK SETTINGS

Funder: OUCRU (Wellcome Funding)

Principle Investigator: Maia Rabaa

Location of activity: Ho Chi Minh City, Vietnam

Purpose

1. To define the frequency and characteristics of asymptomatic carriage of SARS-CoV-2 in health care workers caring for COVID-19 patients.
2. To define the frequency of COVID-19 occurring in health care workers caring for COVID-19 patients.
3. To define the duration of detectable SARS-CoV-2 in health care workers prior to developing symptoms.
4. To determine whether transmission of SARS-CoV-2 occurs from health care workers (asymptomatic and prodromal) to community contacts.
5. To demonstrate the utility of filter paper collection of saliva as a surveillance tool for SARS-CoV-2 infection.
6. To investigate the molecular epidemiology, intrahost diversity and evolution of SARS-CoV-2 in asymptomatic and symptomatic SARS-CoV-2 infections in health care workers.

Importance

Understanding the risk of carriage and transmission to and by health care workers will enable the design of interventions to reduce this risk. Development of a robust cold chain-independent sampling modality will enable enhanced population surveillance, diagnosis and follow-up.

Primary Objectives

- Early identification and understanding of the incidence of symptomatic and asymptomatic infection in health care workers.
- Assessment of the risk of transmission to the community by asymptomatic health care workers.
- Assessment of filter paper-based saliva sample collection for the diagnosis and sequence characterisation of SARS-CoV-2
- Sequence & epidemiological analysis of transmission from infected patients to healthcare workers (coupling with data collected under other studies)

Outputs to date

- The first 100 days of SARS-Cov-2 control in Vietnam (co-authors Maia Rabaa, Chau Vinh, and Tran My Phuc:
<https://www.medrxiv.org/content/10.1101/2020.05.12.20099242v2>)
- RT-PCR detection of SARS-CoV-2 from dried saliva samples collected on FTA filter paper (in progress)

MOLECULAR EPIDEMIOLOGY AND WITHIN HOST EVOLUTION OF COVID-19 / SARS-COV-2 IN VIETNAM

Funder: OUCRU (Wellcome funding)

Principle Investigators: Rogier van Doorn and Le Van Tan

Location of activity: Hanoi and Ho Chi Minh City, Vietnam

Purpose / Hypothesis We will study the epidemiology of the early epidemic of COVID-19 in Vietnam by establishing a sequencing pipeline at the National Hospital for Tropical Diseases and the National Institute of Hygiene and Epidemiology and investigating viral diversity at both population and within host level, and among clusters from January onward. We also propose to add SARS-CoV-2 diagnostics to two ongoing projects:

1. A National sentinel influenza-like illness (ILI) surveillance system to detect early community transmission and describe the contribution of COVID-19 to ILI and
2. A household community cohort in Ha Nam to study within-household transmission, including the role of children, respectively.

Importance By implementing and applying molecular diagnostics we will contribute to understanding local epidemiology and generate higher resolution baseline and follow-up data to inform the national response against COVID-19 in Vietnam. Study of within host evolution would shed light on the pathogenesis of the infection, important to inform clinical management and development and intervention strategies.

Objectives Our objectives are to gain insight from diagnostics at three different levels and stages of the epidemic. We aim to:

1. Implement direct sequencing of SARS-CoV-2 from clinical specimens using Nanopore technology ([ARTIC network protocols](#)) and to study the molecular epidemiology of the first cases and clusters of COVID-19 in Vietnam;
2. Investigate intra host evolution of SARS-CoV-2 using samples collected as part of our observational study in the Cu Chi site;
3. Add SARS-CoV-2 diagnostics to samples collected through the sentinel ILI surveillance system to detect cryptic circulation of SARS-CoV-2 during the first wave (JAN-MAY) and detect potential community transmission going forward; and
4. Conduct a household transmission study in an existing household cohort in northern Vietnam should household transmission occur.

ASSESSMENT OF THE IMPACT OF COVID-19 ON PREGNANCY CARE AND OUTCOMES

Funder: OUCRU (Wellcome Funding)

Principal Investigator: Anuraj Shankar

Location of activity: Jakarta, Indonesia

The scope of COVID-19-associated morbidity and mortality among pregnant women and newborns is unclear. There are substantial changes in antenatal care, delivery, and prenatal care, and limited to nil routine syndromic COVID-19 surveillance or diagnosis. It is unclear what changes there may be in clinical care, community support, home support, and delivery care. These gaps or lapses may comprise the largest adverse effects of the COVID-19 pandemic in Indonesia. There is thus an urgent need to quantify the estimated.

COVID-19-associated impact on morbidity and mortality among pregnant women and newborns, and explore data-driven digital interventions and surveillance methods to develop targeted risk mitigation strategies.

Hypothesis There is quantifiable excess COVID-19-associated morbidity and mortality among pregnant women and newborns in Indonesia due to inadequate antenatal care, delivery, and prenatal care, poor self-care during social distancing, and from viral exposure during pregnancy.

Objectives

1. To document gaps in antenatal care, delivery, and prenatal care and delivery care practices in community care and birthing clinics due to health system changes.
2. To estimate the excess COVID-19-associated morbidity and mortality among pregnant women and newborns due to the above issues and exposure or infection with the virus.

TRACKING ALL-CAUSE MORTALITY AT THE EPICENTER OF INDONESIA'S COVID-19 EPIDEMIC

Funder: OUCRU (Wellcome Funding)

Principal Investigator: Iqbal Elyazar

Location of activity: Jakarta, Indonesia

Hypothesis There is quantifiable excess mortality associated with onset of COVID-19 epidemics among six urban centers in Indonesia.

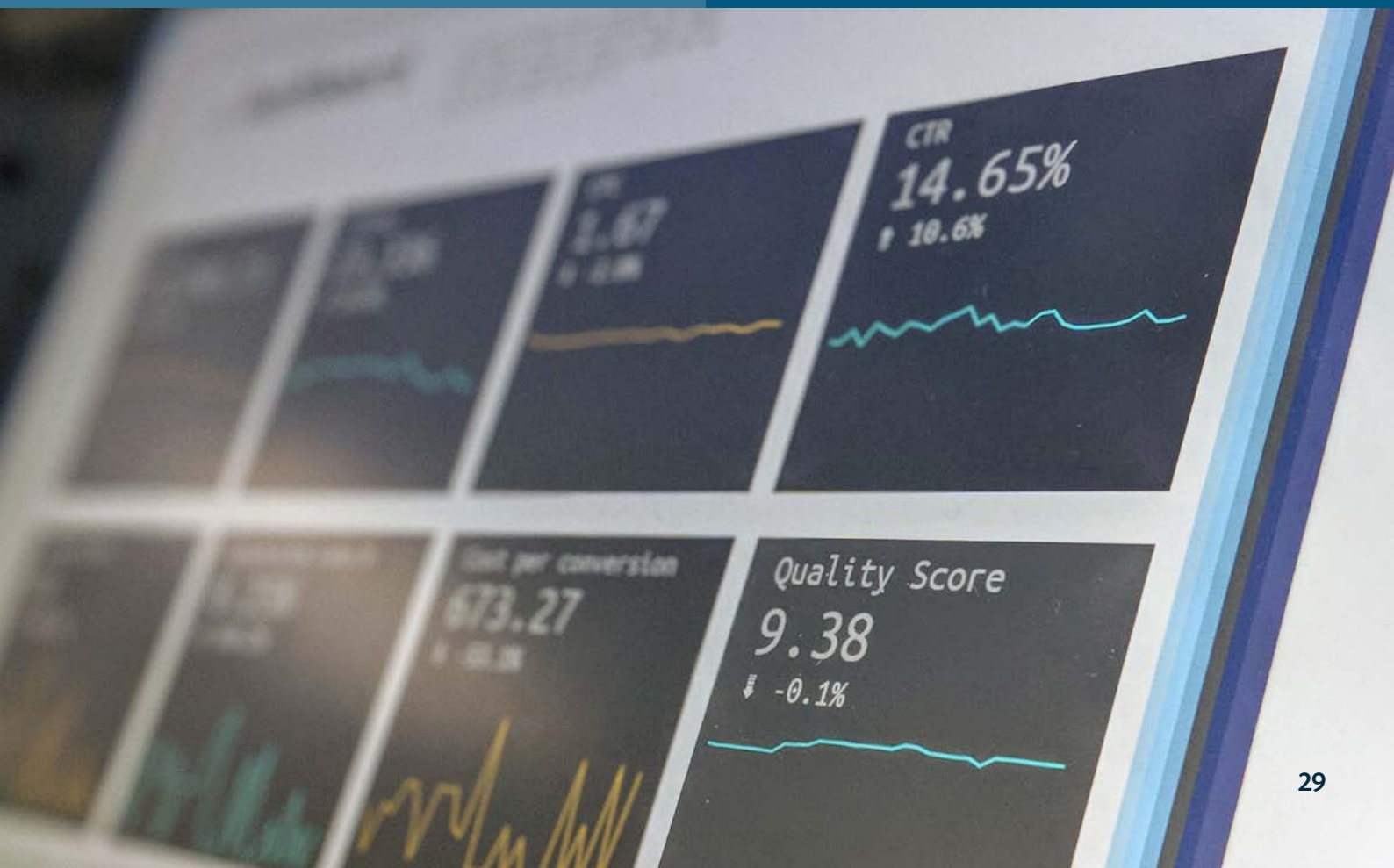
Objectives

We aim to estimate excess mortality attributable to the COVID-19 epidemic occurring in six major urban centers on Java. We propose doing so by the following objectives:

1. Identify specific government officers who collect data regarding burials or cremations or other estimators of all-cause mortality and contract them for weekly reporting of those statistics to us.
2. Assemble weekly data on all-cause mortality by age and gender from all six cities from January 2017 up to the present day, with weekly reporting until March 2021.
3. Assemble weekly data reporting regarding COVID-19 suspect deaths, along with confirmed COVID-19 cases and confirmed deaths, all by age and gender.
4. For each city, generate a monthly calculation of excess mortality attributable to COVID-19 compared to both suspected and confirmed deaths.
5. Report these findings to the government agencies managing the COVID-19 crisis.
6. Publish these findings monthly in Indonesian language in the Indonesian webpage for The Conversation.
7. Publish the findings for the first 3 months of Indonesia's epidemic (March, April, May 2020) in a peer-reviewed biomedical journal.



Mathematical modeling



MODELING COVID-19 IN VIETNAM

Funder: OUCRU (Wellcome funding)

Principal Investigator: Marc Choisy

Location of activity: Hanoi and Ho Chi Minh City, Vietnam

Collaborator(s): Dr. Pham Quang Thai, Infectious Disease Control Department, National Institute of Hygiene and Epidemiology (NIHE), Hanoi.

Purpose The purpose of this study is to develop a mathematical model of intensive care unit (ICU) burden in time and space. The model will be calibrated with data collected in Vietnam when available (most of the time), or with data published from other countries (in particular what concerns risk factors of severe cases). The present project will also produce data on the preexisting level of population protection against coronavirus before the COVID-19 and against SARS-Cov 2 as the epidemic progress (if it does).

Importance Such a model of ICU burden is required by the National Steering Committee for COVID-19 response. Such a model will be used to assist fast decision making if a crisis occurs. As such, the model is an original enough piece of research to be published in itself. The framework of the model is generic enough to be applied to other contexts than Vietnam.

Primary objectives

- Predict the ICU burden in space and time with and without relocation of critical equipment from hospital to hospital.
- Look for policies (including quarantine, lock-down and stay-at-home, potentially with different implementations by locality and age class) that minimize the ICU burden.
- Estimate the baseline force of infection against coronaviruses, as well as the rate of waning immunity (if there is).
- Generate a map of pre-existing population levels of protection against SARS-CoV-2 and other coronaviruses. Test the level of cross-protection between SARS-CoV-2 and other coronaviruses in Vietnam.

Outputs to date

- Publication: The first 100 days of SARS-CoV-2 control in Vietnam. medRxiv 2020.05.12.20099242; doi: <https://doi.org/10.1101/2020.05.12.20099242>

A large, stylized, light blue graphic of a person with a sun-like head, positioned in the upper left background.

Social Science, Public Engagement and Policy Engagement





COVID-19 SOCIAL SCIENCE AND PUBLIC ENGAGEMENT ACTION RESEARCH IN VIETNAM, INDONESIA AND NEPAL (SPEAR): EXPLORING THE EXPERIENCES AND IMPACTS OF COVID-19 FOR HEALTHCARE WORKERS AND VULNERABLE COMMUNITIES

Funded by: OUCRU (Wellcome funding)

Principal Investigators: Jennifer Van Nuil, Sonia Lewycka, Mary Chambers, Abhilasha Karkey, Raph Hamers

SPEAR in Vietnam

OUCRU Vietnam PIs: Jennifer Ilo Van Nuil, Sonia Lewycka, Mary Chambers

Location of activity: Ho Chi Minh City, Vietnam

Description of team

The SPEAR project in Vietnam is being led by Jennifer Ilo Van Nuil and Sonia Lewycka for the social science components and Mary Chambers for the public engagement component, with project management support from Jaom Fisher. There will be four main sites in Vietnam including Hospital for Tropical Diseases (HTD) in Ho Chi Minh City, National Hospital for Tropical Diseases in Hanoi, and areas with ongoing research collaborations in Nam Dinh and Dak Lak. OUCRU's team working with HTD include Ngoc Nguyen Thi Kim, Hien Tran Minh, along with collaborators from the hospital including Dr. Nguyen Thanh Phong, Dr. Nguyen Thanh Truong, and Head Nurse Bui Thi Hong Ngoc. Ha Nguyen Thanh will coordinate the work in Nam Dinh and Hanoi with the following team members working on the social science component: Yen Nguyen Thi Hong, Nam Vinh Nguyen, and Hang Tran Thi, along with collaborators from National Hospital for Tropical Diseases. Ha Nguyen Thanh, PhD student, and Yen Nguyen Hoang will coordinate the work in Dak Lak on the social science and engagement data collection.

Purpose / Hypothesis The purpose of the project is to draw on anthropological and participatory engagement methods to explore the wider socio-cultural context of COVID-19 and its impact on health-related workers and vulnerable communities in Vietnam, Nepal,

and Indonesia in order to inform guidance on strengthening support for health workers and improving access to public health measures for the most vulnerable populations.

Importance The findings of these studies will be valuable for partner and government organizations in the countries that OUCRU works in to inform:

- Guidelines on strengthening support for health workers;
- Guidelines to improve access of the most vulnerable populations to public health measures; and
- The development of targeted and pertinent public health messaging.

These studies will also feed into global discussions and guidelines and in particular WHO think tanks on 'Ethics and Public Engagement and COVID-19' that the Global Bioethics Network is contributing. The PIs are members of this group.

Primary Objectives The primary objectives include:

- Identify and describe the experiences and perceptions of healthcare workers and other healthcare staff during/after the COVID-19 pandemic in Nepal, Indonesia, and Vietnam.
- Explore the impact of the COVID-19 outbreak on vulnerable communities in Nepal, Indonesia, and Vietnam.
- Identify misinformation circulating within these populations and co-design targeted evidenced-based public engagement.

SPEAR in Nepal

OUCRU Nepal PI: Abhilasha Karkey

Location of activity: Kathmandu, Nepal

Description of team

The SPEAR project in Nepal is being managed by Samita Rijal on the social science side and Summita Udas on the public engagement side. Summita Udas Shakyas is a public and community engagement Officer at OUCRU-NP. She has a master's in anthropology and is also a counseling psychology student. She works to raise the profile of health research and science in Nepal through participatory and fun activities. Her PE team consists of Sarita (social sciences), Babin (graphic design) and Sushmita (communication). Samita Rijal is a clinical trial officer at Oxford university clinical research unit based in Patan hospital. She has a Master's in pharmacology and is currently pursuing a Master's in psychology. The psychology team for the study includes Dr. Rabi Shakyas, Dr. Pawan Sharma, and Anup Rajbhandari, all senior practicing psychiatrists at the Patan Hospital.



SPEAR in Indonesia

EOCRU Indonesia Principal Investigator: Raph Hamers

Location of activity: Jakarta, Indonesia

Description of team

The SPEAR project in Indonesia is being coordinated by Ragil Dien and Mutia Rahardjani, with consultation from Ralalicia Limato, and under the supervision of Raph Hamers and a representative from Universitas Indonesia. The study will be conducted in three provinces in Indonesia, including DKI Jakarta, West Java, and Nusa Tenggara Timur (NTT). The study team also includes Livia Nathania Kurniawan, a public engagement assistant, and a junior social science researcher based within EOCRU, as well as a project officer who will be based in NTT in collaboration with Sumba Foundation.



PUBLIC AND COMMUNITY ENGAGEMENT RESPONSE TO COVID-19

Funded by: OUCRU (Wellcome funding)

Principal Investigator: Mary Chambers

Location of activity: Vietnam, Indonesia and Nepal

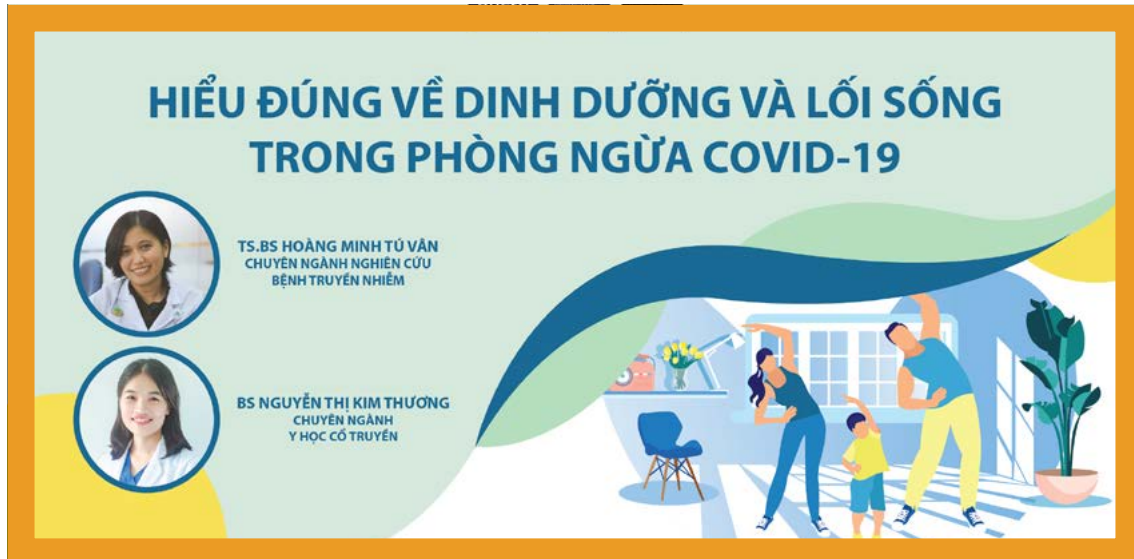
Objectives Building trust in a time of public health crisis through public and community engagement, including:

- Building dialogue between public and experts.
- Listening to communities.
- Empowering communities through knowledge transfer.

Outputs to date

1. Dialogue

- 'Hear the Expert' – EOCRU and The Conversation Indonesia. Live stream discussion between scientists and public. 21st April 2020
- 'How to overcome stress during pandemic season for Healthcare Workers – Online Workshop' – OUCRU and Healthcare Improvement Research (CHIR) and Wake up Schools. Live stream workshop discussion stress factors of Healthcare Workers and introducing the practice of mindfulness to reduce their stress. 5th April 2020.
- 'Ask the Scientists' – OUCRU Schools Engagement team. Online 'chats' between schoolchildren and scientists.
- 'COVID-19: Truths and Myths' – OUCRU and British Embassy Vietnam, live stream Q&A between experts and public. 9th June 2020: Prof Jeremy Day and Nguyen Thanh Ha.
- 'Working together to beat COVID-19: engaging and involving patients and public' – Cochrane Training Webinar Series. 11 June 2020: Dr Mary Chambers.



2. Listening to communities

- Digital Diaries (see SPEAR project below)
- Schools Photo Competition – Photo and caption about learning experience in COVID-19 lockdown.
- Advisory group meeting: HTD healthcare workers. 10 June 2020

3. Knowledge transfer

- Articles for The Conversation newspaper - EO CRU
- Poster How to protect yourself from COVID-19 - OUCRU NP
- WHO 'Myth Busters' for social media – in Vietnamese and Nepali OUCRU & OUCRU NP
- Animations for social media: Coping with stress during COVID-19 In Bahasa Indonesia, Vietnamese and English



COMBATING COVID-19 RELATED FAKE NEWS

Funded by: University of Oxford

Principal Investigator: Mary Chambers

Collaborators: Nguyen Thanh Ha, Minh Hien, Sumita Udas, Ragil Dien, Katrina Lawson

Location of activity: Ho Chi Minh City, Vietnam

Importance Public health and wellbeing is put at risk by fake news, and never more seriously than in times of public health emergencies such as the current COVID-19 pandemic. While traditional news remains the dominant source of science information, social media platforms have become important sources of health information and sites for public discourse. However, the health and science presented on these platforms is often problematic. We propose that the antidote to this risk is a targeted and positive public engagement response delivering evidence-based news, in partnership with policy makers and key public health stakeholders.

Methods By tracking current fake news stories about COVID-19 on social media in Vietnam, Nepal and Indonesia – the host countries for Oxford University Clinical Research Units, we will identify misinformation that is circulating in these communities. Our findings will be fed back to national policy makers and public health stakeholders to enable them to tailor their COVID-19 related public health messaging. We will bring working groups together to develop evidence based, locally appropriate public engagement media and open discussion forums to positively counter the trending misinformation, thereby increasing understanding, safe behaviour and public/expert trust.

Outputs to date

Links to animation films

1. [*Coping with stress during the COVID-19 pandemic*](#)
2. [*Posters – Nepal and OUCRU*](#)
3. [*Leaflets*](#)
4. [*Photo completion SEP*](#)
5. [*Live stream discussion*](#)



ENGAGING WITH POLICY MAKERS IN THE COVID-19 PANDEMIC, THROUGH THE CREATION OF AN OUTBREAK ADVISORY BOARD

Funder: Wellcome

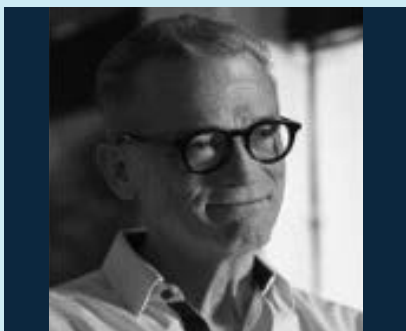
Project lead: Katrina Lawson

Location of activity: Hanoi and Ho Chi Minh City, Vietnam

Team members Nghiem Nguyen Minh Trang, Nguyen Kim Ngan

In order to ensure that OUCRU's COVID-19 research is locally-driven, and is best able to achieve local, regional and global impact, we will establish an OUCRU Outbreak Advisory Board (OAB). The membership of the OAB will comprise of key stakeholders who are working to support policy-makers in Vietnam's outbreak response, as well as select members of the OUCRU COVID-19 Research Group. The purpose of the OAB is to provide all members a forum to discuss, share and understand each other's activities and priorities, in the context of OUCRU's outbreak research programme. The OAB will be established in response to COVID-19, but will exist in perpetuity, and in future will be able to advise on work relating to general epidemic preparedness, and acute outbreaks as they arise.

OUR TEAM



Professor Kevin BAIRD

Kevin Baird is the Head of Eijkman-Oxford Clinical Research Unit in Jakarta, Indonesia, and Professor of Malariology, Nuffield Department of Medicine, University of Oxford. He earned a B.Sc. in Microbiology, M.Sc. in Biochemistry from University of Maryland, and a Ph.D. in Medical Zoology from Tulane University. He has long focused on *Plasmodium vivax* malaria, in particular on the problems of G6PD deficiency and cytochrome P-450 2D6 pharmacogenetics regarding the toxicity and efficacy of primaquine therapy against relapse of that species. His laboratory undertakes clinical trials of therapies against relapse of *P. vivax*, principally in Indonesian soldiers but also in village settings, in addition to laboratory and field studies of G6PD deficiency biochemistry, diagnostics, and epidemiology. His research in 2020 includes pragmatic diagnostics for SARS-CoV-2 infection, COVID-19 seroepidemiology, and epidemiology of the COVID-19 epidemic in Indonesia.



Assoc.Prof. Buddha BASNYAT

Buddha Basnyat is the director of the Oxford University Clinical Research Unit in Nepal which is associated with the Patan Academy of Health Sciences within Patan Hospital. He is a medical doctor practicing medicine and doing both infectious disease and high altitude medicine research in Kathmandu, Nepal. He has published widely in both these fields in well-known medical journals and written chapters with co-authors in the latest standard medical textbooks. With regard to COVID-19 he has written a number of opinion pieces providing information and advice on management of the pandemic in Nepal. He is actively advocating COVID-19 research across the country and has forged unique collaborations as a result.



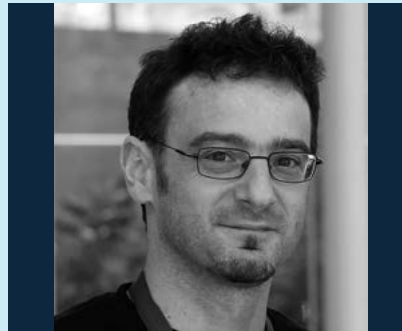
Dr. Mary CHAMBERS

Dr. Mary Chambers is the Head of Public and Community Engagement at the Oxford University Clinical Research Unit Vietnam. Mary has been in Vietnam for almost 20 years – initially as a medical entomologist, working on malaria and dengue transmission. Over the past decade, she has developed the engagement programme for OUCRU across Ho Chi Minh City, Hanoi, Nepal and Indonesia. Mary's personal interests lie in using participatory art and film to amplify community voices and bring them into conversations about biomedical research.



CHAU Vinh

Mr. Chau Vinh is a data coordinator with strong computational and organizational skills, and a keen interest in infectious disease epidemiology. Vinh has been integral to rapid organization, mapping, and translation of data to assist the OUCRU COVID-19 response.



Dr. Marc CHOISY

Marc Choisy is a bio mathematician interested in the epidemiological dynamics of infectious diseases (i.e. the spread of diseases in populations). He is particularly interested in the seasonality and spatial diffusion of infectious diseases and how this can be used to optimize prevention and control of diseases. His methodology consists in developing mathematical models that are calibrated to surveillance data. This allows to estimate key epidemiological parameters, test hypotheses and conduct in silico experiments.



Professor Jeremy DAY

Prof Day is a doctor, specialized in infectious diseases, and has lived in Ho Chi Minh City since 2007. He leads the Central Nervous System and HIV Infections Research Group at the Oxford University Clinical Research Unit, based within the Hospital for Tropical Diseases. The group's aim is to improve the outcomes from infectious diseases important in our local population by rigorously testing and developing new treatments. This includes optimizing the use of current treatments, 'repurposing' old drugs (testing whether off-patent drugs have activity against the diseases we work on), and developing novel compounds. We test treatments using randomized controlled trials that are carefully designed to help doctors make the best treatment decisions at the point that patients come to hospital. Because our mission is to improve and protect the health of our local population, we have become involved in research aiming to understand and improve outcomes from COVID-19. Before coming to Vietnam Prof Day studied medicine at Cambridge University in the UK, and worked as a doctor completing his specialist training in Edinburgh, London and Manchester.



Dr. DONG Huu Khanh Trinh

Dr. Trinh is a medical doctor who is interested in Statistics and Modeling, currently a PhD student at OUCRU, studying on brain imaging patterns of Tuberculosis meningitis. He is working with the Biostatistics and Mathematical modeling group in predicting COVID-19 burdens.



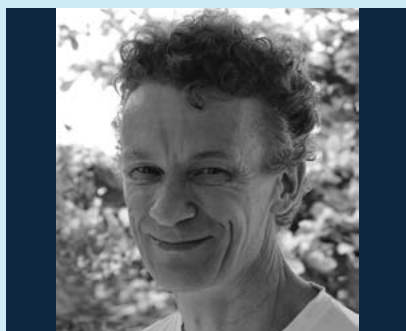
Dr. DU Hong Duc

Du Hong Duc, PhD, is a biostatistician and epidemiologist based at the Oxford University Clinical Research Unit (OUCRU) in Ho Chi Minh City (HCMC), Vietnam. He has a PhD from University of Tasmania and a Master of Public Health specialized in Epidemiology and Biostatistics at The University of Melbourne, Australia. He joined the Biostatistics group at OUCRU-Vietnam in 2020. Before joining OUCRU, he has 12 years working and conducting research in various fields, applying biostatistics, epidemiology, study design and quantitative methods in observational and interventional studies. His research interests have built from his diverse experience working with disadvantaged populations in Vietnam and Australia. Dr. Duc is interested in understanding determinants of COVID-19 transmission and severity, intensive care unit burden, response measures and public health impacts of COVID-19 in Vietnam and other countries.



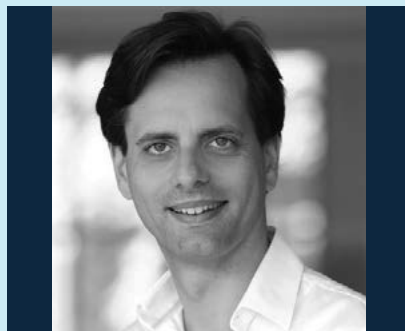
Dr. Iqbal ELYAZAR

Dr Iqbal leads the Biostatistics and Geospatial Group at the Eijkman-Oxford Clinical Research Unit in Indonesia. He earned his BSc in Statistics from Bogor Agricultural Institute, his MPH in Health Informatics from the University of Indonesia, and his DPhil in Malaria Disease Mapping from the University of Oxford. He has focused on biostatistics, disease surveillance, spatial epidemiology and malaria elimination strategies for 17 years. He completed a Wellcome Trust Training Fellowship in Public Health and Tropical Medicine in 2017. His primary research interests includes big data exploration in population health, geospatial analysis of infectious and non-infectious diseases, burden of diseases estimates and population mobility impact to infectious disease transmission.



Associate Professor Ronald G. GESKUS

Ronald is associate professor in biostatistics at Oxford University. Since January 2017 he has been the head of the biostatistics group at the Oxford University Clinical Research Unit in Ho Chi Minh City. Before, he worked as senior statistician in the department of infectious diseases of the Public Health Service of Amsterdam for over 20 years. Besides, he was associate professor in biostatistics at the Academic Medical Center of the University of Amsterdam. His research interests include: i) models for complex time-to-event data (competing risks, multi-state models); ii) models for complex longitudinal data; iii) prediction based on time-updated marker values; iv) causal inference. Most of his work has been inspired by problems related to infectious diseases (HIV, STI, TBC). He and his group are actively involved in several studies on COVID-19.



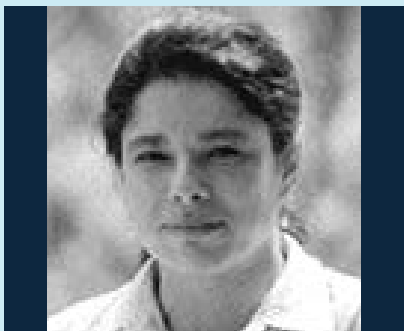
Associate Professor Raph HAMERS

Dr Raph Hamers is an internist and infectious disease physician, trained in The Netherlands, and an Associate Professor at University of Oxford, based at the Eijkman-Oxford Clinical Research Unit in Jakarta, Indonesia. He holds a PhD from the University of Amsterdam, and an honorary consultant position at Amsterdam University Medical Centres (AMC). His research to date has been centered on the clinical management, molecular epidemiology and public health aspects of HIV in sub-Saharan Africa, particularly drug-resistant HIV. After joining OUCRU in 2017, he initiated the Clinical Infectious Disease Research Programme, with a focus on tuberculosis, antimicrobial drug resistance, emerging infectious diseases, diagnostics and multidisciplinary approaches to improve health outcomes in low-resource settings. His research in 2020 includes clinical characterisation of hospitalised COVID-19 patients, assessment of COVID-19 chemoprophylaxis in hospital workers, and social science on the impact of COVID-19 on experiences and perceptions of health workers and vulnerable communities, all in Indonesia.



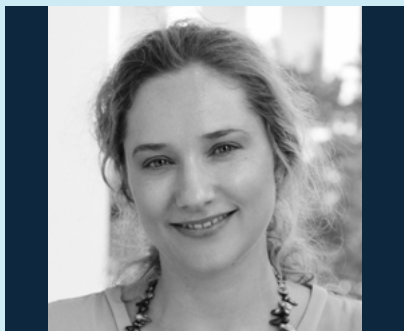
HO Van Hien, MCDBA, MCSE, EMBA

Mr Hien is a computer and data management expert based at OUCRU in Ho Chi Minh City. He has worked at a leading pharmaceutical company for over three years and has been working in OUCRU for over eighteen years and playing as a leading role in delivering IT and data management services. He was a key collaborator in creating data management infrastructure in Viet Nam for the South East Asia Infectious Disease Clinical Research Network (SEAICRN) by holding the position of Regional Data Manager and a member of network Data Management committee. Over the past eighteen years, he has been the architect for all IT systems and applications in OUCRU Ho Chi Minh City and Ha Noi. In addition, he designed and created a sophisticated data management system for clinical trials called CLIRES that has been used for all OUCRU research projects. The system has been also widely used by the International Severe Acute Respiratory & Emerging Infections Consortium for a number of studies including SPRINT SARI and the WHO Clinical Characterisation Protocol, and by Comprehensive Resistance Prediction for Tuberculosis: an International Consortium (CRyPTIC) as a core electronic data collection platform. During the COVID-19 outbreak, he has been leading a group of Data Managers who have designed and delivered rapid database and electronic data capture (EDC) for COVID clinical trials not only for OUCRU in Vietnam but also for trials in Indonesia and Nepal.



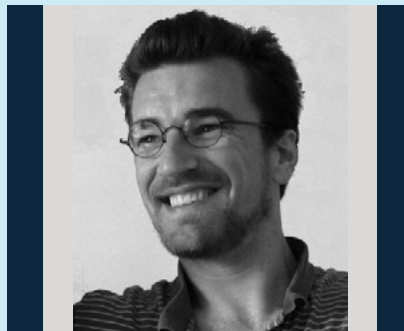
**Associate Professor
Abhilasha KARKEY**

Abhilasha Karkey is a medical microbiologist at the Oxford University Clinical Research Unit in Nepal. Patan Hospital is recognized by the Government of Nepal as one of the hub hospitals in Kathmandu that is actively fighting the COVID 19 pandemic. Though her main focus is looking at transmission dynamics of antibiotic resistance genes within the local population, the ongoing pandemic has shifted her focus towards asymptomatic SARS-CoV-2 infections and the effects that the pandemic has had on the psyche of frontline health care workers. She is an active spokesperson for the use of the GeneXpert System for the detection of SARS-CoV2 and has been advising the national technical body for the use of the system that is widely available in the country via the National Center for COVID-19 Management (CCMC).



Evelyne KESTELYN, MPH

Evelyne is a clinical trialist who has been managing clinical research since 2006 through institutions in Rwanda, the Netherlands and now Viet Nam. She joined OUCRU in January 2016 as Head of the Clinical Trials Unit. The CTU manages research operations and governance for OUCRU, which includes Units in Viet Nam, Indonesia and Nepal. The CTU manages more than 70 active research projects at 65 collaborating institutions, run by hundreds of research staff. It leads and shares trial management systems, explores and addresses ethical issues in clinical research and contributes to clinical trials legislation. Currently the CTU has been involved in the start up and conduct of COVID-19 clinical research by supporting ethics and regulatory requirements as well as offering study coordination through experienced study staff including pharmacists, data entry staff and monitors.



Dr. Thomas KESTEMAN

Thomas is a clinical microbiologist working at the Oxford University Clinical Research Unit in Hanoi, after having worked in several other countries (Afghanistan, Belgium, France, Lebanon, Madagascar). He is a medical doctor with various degrees in Microbiology, in Epidemiology of Infectious Diseases, and in Tropical Medicine. His research interests focus on antimicrobial resistance and medical microbiology in resource-limited settings, but also encompass respiratory infections, social inequities in health, and malaria control. Recently, Thomas shifted his research efforts to the understanding and modelling of COVID-19 transmission in Vietnam and other low- and middle-income countries.



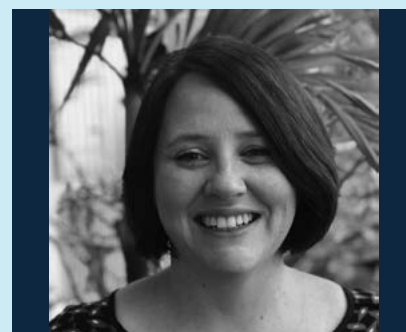
LAM Anh Nguyet, MSc

Ms Nguyet has been working for OUCRU since 2003. Her experience with emerging infection responses include isolation of pandemic viruses such as H5N1 and H1N1 and the use of serological assay to assess the cross neutralization between Hand, foot and mouth disease pathogens. Currently, she is responsible for COVID-19 diagnosis, PBMC isolation and serological work of COVID-19.



Dr. LAM Minh Yen

With expertise in clinical research and infectious diseases, Dr. Yen has helped OUCRU to establish and run several COVID-19 studies, including one randomized clinical trial. Her experience help studies to run smoothly with the highest quality possible during the pandemic.



Katrina LAWSON

Katrina is the Grants and Communications Manager at OUCRU. She is based in HCMC, Vietnam, and supports internal and external communications and policy engagement for the unit. In order to strengthen OUCRU's capacity to communicate and engage with the policy community, Katrina has led an initiative to build a team of skilled policy engagement and communications staff at OUCRU. This work is partially funded by her Wellcome grant: Establishing systemic policy engagement at OUCRU: a pilot project. Under Katrina's leadership, the communications and policy team also contribute to a number of strategic projects at OUCRU including establishing an Outbreak Advisory Board in response to COVID-19.



LE Kim Thanh

Ms Thanh is in charge of the logistic of COVID-19 studies. She has been coordinating the 3SEI and 05EI since the beginning of the pandemic, and is responsible for the repository of COVID-19 samples.



LE Nguyen Truc Nhu, MSc

Ms Nhu's research was on cellular aspects of H5N1 virus. Currently, she is responsible for COVID-19 diagnosis. She is also interested in using real time PCR to detect sub genomic RNA of SARS-CoV-2 in patient samples to assess the infectiousness of COVID-19 patients during the course of the illness.



Dr. LE Thanh Hoang Nhat

Nhat is a bio-statistician working at the OUCRU HCMC with over 5 years of experience. His research focuses on using statistical and mathematical modeling to understand infectious disease. He has a lot of attention on Measles, Tuberculous meningitis, Cryptococcus meningitis, Antimicrobial Resistance in TB. During the pandemic of COVID-19, he is an active member of three different groups within OUCRU. He has joined in designing the Chloroquine trial running at OUCRU. This trial tests the effectiveness of Chloroquine to shorten the viral clearance of SARS-CoV-2. He works as main statistician to analyze the result of this clinical trial. He joined with Dr. Tan's team help to analyzing his work on virology dynamics of SARS-CoV-2 to understand the natural history of SARS-CoV-2 infections of quarantined patients in Vietnam. In parallel, he also join the modeling COVID-19 team led by Dr. Marc Choisy to estimate the epidemiological parameters (latent duration and infectious duration) of the transmission of SARS-CoV-2. These estimates will help to model precisely the dynamics transmission of SARS-CoV-2 in the population.

**Dr. LE Van Tan**

Dr. Tan is a virologist with over 15 years' experience of doing clinical research in Vietnam. He has been in charge of the Emerging Infections Group of OUCRU since 2015, and a frontline health care worker during the COVID-19 pandemic. The Emerging Infections COVID-19 group led the national development of diagnostic assays in Vietnam in January 2020. The reagents were shared with major institutes in Vietnam, including the Hospital for Tropical Diseases, Institute Pasteur, and the National Institute of Hygiene and Epidemiology. In collaborations with our key partners (NTD, DOH and CDC in HCMC), Dr. Tan is running the ISARIC study, which aims to unravel the natural history of SARS-CoV-2 infections in Vietnam. The group's most recent research output showed that 43% of quarantined people who were RT-PCR positive for SARS-CoV-2 were asymptomatic, but potentially contagious. The results emphasize the importance of contact tracing, airport quarantine and RT-PCR screening for SARS-CoV-2 among isolated people in controlling the ongoing pandemic. In the second week of February 2020, Dr. Tan attended the WHO R&D Blueprint meeting to establish the global research agenda for COVID-19 in Geneva, and he is a member of the WHO COVID-19 Clinical Management and Characterization Working Group.

**Dr. Sonia LEWYCKA**

Sonia is an epidemiologist working at the Oxford University Clinical Research Unit in Hanoi. Her research focuses on the use of population-based studies to evaluate the coverage, equity and impact of public health interventions and programmes. She has previously evaluated the impact of community-based interventions and vaccines to improve maternal and child survival in Malawi, and she is currently leading the development and implementation of complex health behaviour change interventions to tackle inappropriate antibiotic use and antibiotic resistance in two cluster-randomised trials in Vietnam. Target groups include parents, farmers, pharmacists, drug sellers, primary healthcare workers, hospital doctors and the general public. Alongside this, she is using population datasets to analyse global distributions and determinants of antibiotic use, and building mathematical models to identify intervention points with the largest potential for impact on antibiotic use and resistance. Sonia is interested in understanding and mitigating risk for vulnerable communities affected by COVID-19 and response measures, as well as exploring the wider positive and negative public health impacts in Vietnam and other low- and middle-income countries.

**NGHIEM Nguyen Minh Trang, MSc**

Trang is a Policy Engagement Researcher at OUCRU. She is a Master in Health Economics and Health Care Management, graduated from Chulalongkorn University, Thailand. She used to be a Clinical Research Coordinator at OUCRU. She has been involved in research studies in different areas of the health sector, and antimicrobial resistance was her focus in the last 5 years. With more than 15 years working in the health research area in Viet Nam, seeing different sources of evidence presented by the research community, as well as a lack of evidence-based action plans or policies, and lack of engagement between researchers and policymakers, her passion for policy engagement has developed.



MSc. Pharm. NGUYEN Bao Tran

Nguyen Bao Tran, MSc. Pharm, is a Pharmacy Team Leader working in the OUCRU Clinical Trials Unit. Tran is responsible for the management of the OUCRU Research Pharmacy team, which involves oversight of the design and implementation of all logistics and procedures involving investigational products. As a member of the Clinical Trials Unit Training Team, Tran delivers courses on Good Clinical Practice and works with clinical research staff on professional development initiatives. She has significant experience in clinical pharmacy research, quality assurance procedures, supply chain management, research skills training and implementation of randomized controlled trials in a range of infectious diseases related to Meningitis Tuberculosis, Hepatitis, Dengue, Enteric, Cryptococcal meningitis, HIV, SARS-CoV-2. Tran's interests also include pharmacy quality standards, adaptive trial designs and trial pharmacy management training for hospitals in Vietnam, Nepal and Indonesia.



NGUYEN Kim Ngan, MPH

Ngan is a Policy Engagement Coordinator at OUCRU. She has a master's degree of Public Health from Flinders University, South Australia. Before joining OUCRU, Ngan worked as a public health researcher at Hanoi Medical University and Vietnam Public Health Association, and made many contributions to important outcomes such as the establishment of a Tobacco Control Law; boosting the development of regulations on dioxin-related food, and infectious diseases. After 10 years, Ngan's focus now is on the importance of engagement between researchers and policymakers for evidence-based policy making. Currently, she is conducting an internal review on policy engagement activities at OUCRU. Ngan supports researchers to produce and access effective science advice, and develop key practical ways which can help facilitate research evidence for policy makers, especially about COVID-19 research.



NGUYEN Thanh Ngoc

Ngoc joined the Innovation Project as a research nurse and had helped us with logistic and data collection on VICO Trial: A multi-center randomized open label trial on the safety and efficacy of chloroquine for the treatment of hospitalized adults with laboratory confirmed SARS-COV-2 infection in Vietnam and SARS-COV-2 in quarantined individuals at isolation centres for COVID-19.



Dr. NGUYEN Than Ha Quyen

Dr. Quyen is an Ethics team leader. She has been working in this position since 2017 after gaining significant experience in trials and observational studies conducted at OUCRU-Vietnam and other Southeast Asian countries. She is in charge of reviewing study documentation to ensure the OUCRU studies are compliant with appropriate standards, are ethically designed and approved by the appropriate authorities. COVID-19 related studies have brought some unique ethical considerations as well as challenges related to getting approvals in place in a very short time frame.



NGUYEN Thi Han Ny, MSc

Together with the Emerging Infectious team, Han Ny set up SARS-CoV-2 RT-PCR for patient diagnosis in early days of January 2020. She helped rule out SARS-CoV-2 in the first two suspected cases arriving in Vietnam who were admitted to Da Nang hospital in January 2020. She has been part of the diagnostic team which handled some 1,200 COVID-19 patients per day.



Dr. NGUYEN Thi Huyen Thuong MD

Thuong had worked for Pasteur Institute in Ho Chi Minh City as a clinical trial monitor before joining OUCRU in 2018. In her role of trial monitor, she ensured the quality of the ongoing trials complied with the international standards of ICH-GCP. She is currently a clinical research coordinator based at OUCRU in Ho Chi Minh City, Vietnam. Thuong has been involved in managing many major clinical trials related to malaria drugs, influenza vaccines, pneumonia vaccines over the last 4 years. Thuong's main efforts related to the COVID-19 pandemic are supporting coordination and management of a multi-site trial researching available, safe, and effective drugs on treatment of hospitalized patients with laboratory-confirmed SARS-CoV-2 infection in Vietnam. She has also been involved in many OUCRU Public Engagement activities, such as Science Visit, Chat with Scientists, Science Debate to engage the public with OUCRU's research as well as motivating the next generation to explore science as a potential career.



Dr. NGUYEN Thi Phuong Dung

Dr. Nguyen Thi Phuong Dung is Vice Head of the Clinical Trials Unit based at the Oxford University Unit, Ho Chi Minh City Viet Nam. She joined OUCRU from 2001. She is responsible to oversee initiation and execution of all OUCRU research including supervision, management and development of the OUCRU Ethics-Regulation Team, Contract Team, and Monitoring Team. She also plays a crucial role as the initial contact for key stakeholders and collaborators of OUCRU research to develop and strengthen relationships with collaborative partners. During the COVID-19 pandemic, she has been involved in defining the collaborators, setting up the studies, and conducting COVID-19 clinical studies by supporting site initiation, managing trial progress and ensuring the quality of the clinical trials.



Dr. NGUYEN Thi Tam

Dr. Tam is a Molecular Scientist working for OUCRU in Hanoi, Vietnam. She got PhD in Molecular Biotechnology at School of Biological Science, University of Queensland, Australia in 2016. Her research focuses on identification of antibiotic resistance and relevant molecular mechanism of the bacterial pathogen. She applied whole genome sequencing technologies such as Illumina Miseq and Oxford Nanopore to detect resistant genes and mutations causing resistance. She also works for AMR reference laboratory based at National Hospital of Tropical Diseases to confirm pathogenic species, antibiotic susceptibility testing and molecular test. Currently, she has sequenced whole genome of SARS-CoV-2 isolated at National Hospital of Tropical Diseases from the directly clinical samples. She fined out the correlation between amino acid mutations of SARS-CoV-2 to clinical symptom in severe pneumoniae patients, and detect specific mutations in binding region of spike protein which contributes to understanding of entry process of virus.



NGUYEN Thi Thu Hong MSc

Ms. Hong has been working for OUCRU for more than 5 years. She is interested in using genomic based approach to understand the transmission dynamics of SARS-CoV-2. She has successfully set up the ARTIC whole genome sequencing assay at OUCRU. She also actively engages with laboratory staff of OUCRU in Ha Noi as they work to generate SARS-CoV-2 sequences from the North.

**PHAM Hong Anh**

Ms. Pham Hong Anh is a research assistant who focuses on characterizing the diversity and spread of zoonotic viruses in animal populations across Vietnam. Anh also has significant experience in sequencing and analyzing genome sequence data from endemic pathogen populations spreading in Southeast Asia, and is applying her expertise to the development of COVID-19 diagnostics for use in remote settings and other surveillance activities.

**Dr. PHAM Thanh Duy**

Dr. Duy is a molecular microbiologist and Joint Head of the Molecular Epidemiology group. While much of his work is focused on understanding the evolution and epidemiology of bacterial pathogens, Duy's molecular biology expertise lends to COVID-19 work including novel surveillance, diagnostic, and sequencing approaches.

**Dr. PHAN Nguyen Quoc Khanh**

Dr. Khanh is a member of the Innovation Project of OUCRU. He is has been in charge of the clinical aspect of COVID -19 studies (05EI/ An observational study of the clinical features, epidemiology, microbiology and immunological response of infection caused by emerging pathogens in Southern Viet Nam; 35EI/SARS-COV-2 IN QUARANTINED INDIVIDUALS AT ISOLATION CENTERS FOR COVID-19; VICO trial/A multi-center randomized open label trial on the safety and efficacy of chloroquine for the treatment of hospitalized adults with laboratory confirmed SARS-CoV-2 infection in Vietnam).



Dr. PHUNG Khanh Lam

Dr. Phung Khanh Lam is a postdoc researcher who has been working at the OUCRU's Biostatistics group for almost 10 years. His research focuses on developing, evaluating and applying clinical prediction models for infectious diseases, especially dengue fever. Dr Lam is also a lecturer at the Department of Epidemiology, Faculty of Public Health at the University of Medicine and Pharmacy at Ho Chi Minh City. Since March 2020, he has been working with colleagues in the OUCRU Covid-19 Modelling Team to develop different statistical and mathematical models to evaluate responsive lockdown and other strategies in controlling the COVID-19 pandemic in Vietnam.



Dr. Maia RABAA

Dr. Maia Rabaa is a molecular epidemiologist and phylogeneticist at OUCRU in Ho Chi Minh City, Vietnam, where she has been based since 2012. Since early 2020, she has led the Molecular Epidemiology Group at OUCRU with joint group head, Dr. Pham Thanh Duy. Maia specializes in the analysis of phylogenetics and phylodynamics of viral pathogens, including zoonotic and emergent viruses. She has particular expertise in monitoring viral zoonosis at the human-animal interface, and in tracing emergent pathogens and their changing epidemiologies as they spread within new populations. COVID-19 research that Maia is leading in the Molecular Epidemiology group focuses on defining the molecular epidemiology of SARS-CoV-2 in Southeast Asia, the development of cold chain-independent means and isothermal nucleic acid amplification technology for diagnosis of COVID-19, and the identification of potentially relevant coronaviruses in wild and farmed animal populations in Vietnam.



Dr. Anuraj SHANKAR

Anuraj Shankar leads research in community health at the Eijkman-Oxford Clinical Research Unit in Jakarta, Indonesia, and is a research fellow at the Nuffield Department of Medicine, University of Oxford. He earned a B.Sc. in Chemistry, and B.Sc. in Zoology from Ohio University, and a D.Sc. in Immunology from Harvard University. His work spans from biomedicine to global health policy, with a unifying theme of regulation and resilience of complex systems at the biological, behavioral and programmatic level. Dr. Shankar has extensive experience as a principal investigator of trials in low and middle income countries assessing effects of nutrition and other interventions on maternal, newborn and child mortality and morbidity, on child cognitive development, and on malaria, diarrhea and pneumonia, and immune function. His research in 2020 includes design of digital-assisted serological and molecular diagnostics for SARS-CoV-2 infection, and assessment of COVID-19 on pregnancy, and impact of COVID-19-related health system changes on maternal and newborn health in Indonesia.



**Prof. Guy THWAITES,
OUCRU Director**

Guy has been Director of the Oxford University Clinical Research Unit (OUCRU) and Vietnam Wellcome Africa Asia Programme (AAP) since 2013. He qualified from Cambridge University and the United Medical and Dental schools of Guy's and St Thomas' Hospitals and trained in Infectious Diseases and Microbiology in Brighton, the Oxford University Clinical Research Unit (OUCRU) in Vietnam, Imperial College London, and the Hospital for Tropical Diseases in London. His research interests focus on the management of severe bacterial infections, especially those involving the central nervous system. He sits on advisory boards for the WHO and the Australian and UK governments. He was elected a Fellow of the Academy of Medical Sciences in the UK in 2018.



**Associate Professor Louise
THWAITES**

Louise Thwaites is a clinical researcher based at the Oxford University Unit, Ho Chi Minh City Vietnam. She works with a team of scientists and clinicians whose work aims to improve the care of critically ill patients in resource limited settings. The teams' interests encompass a broad range of activities, from randomized controlled trials of drug treatments to the application of new devices and analytic systems in intensive care units. Most of this work is based at the Hospital for Tropical Diseases, Ho Chi Minh City, but the team also works in a wider network of intensive care units in Vietnam and Southeast Asia. Adapting to the COVID-19 pandemic, the team are now looking at the use of vital sign monitoring systems and new devices to identify and treat those most at risk of severe disease.



TRAN My Phuc

Ms. Phuc is a research manager who has managed large clinical trials and hospital- and community-based epidemiological surveillance of zoonotic diseases in Vietnam. Phuc has strong interest in field epidemiology, outbreak investigation, and disease surveillance, which have allowed her to contribute insight and assistance in data coordination in the OUCRU COVID-19 response.



Dr. TRAN Tan Thanh

Dr. Thanh is a postdoc scientist of the Emerging Infections group. He joined OUCRU in 2000. He has been involved in the diagnostics and research of many emerging infections in that time. These are SARS-CoV (2003), avian influenza H5N1 (2004), pH1N1 influenza (2009), and enteroviruses causing hand foot and mouth disease (2012 - present). Currently, Thanh contributes to many different areas of COVID-19 research including but not limited to improving our understanding of the duration of viral shedding, the levels of neutralizing antibodies against SARS-CoV-2, and the replicative potential of SARS-CoV-2 over the course of illness. He is a co-author on the two recent OUCRU COVID-19 publications.



TRAN Thi Bich Lieu, MPH

Ms. Lieu is currently a research assistant in Mathematical Modeling group at OUCRU. With her experience in data analysis and modeling, she would like to quantify the consequences of COVID-19 on the vaccination in Vietnam using the data from National Immunization Information System because if there is the delay in vaccination, this is possibly the causes of other outbreaks. She is also interested in looking at the effects of different interventions during COVID-19 on the transmission of other diseases such as influenza-like diseases.



TRAN Thi Ngoc Dung

Ngoc Dung is a research assistant with expertise in the development of diagnostic assays and genome sequencing approaches for application to the study of enteric viruses in low and middle income countries. Ngoc Dung's strengths in experimental design and laboratory techniques are being applied to the development of COVID-19 diagnostics for use in remote settings and other surveillance activities.



Professor Rogier VAN DOORN
Director, OUCRU Hanoi

Prof. Rogier van Doorn is a clinical microbiologist from The Netherlands and has worked in Vietnam since 2007. Rogier was head of the virology and emerging infections groups at OUCRU HCM and worked on infections like avian influenza virus A/H5N1 ("bird flu") and hand, foot and mouth disease. Rogier was head of the virology reference laboratory of the Southeast Asian Infectious Diseases Clinical Research Network and helped improve and establish molecular diagnostic capacity in hospitals in Vietnam and the region, including a biosafety level 3 laboratory at OUCRU/HTD. The emerging infections group contributes to pandemic preparedness by setting up and disseminating diagnostics for emerging infections. Rogier is now director of the OUCRU unit in Hanoi and leads a team of 35 people working on laboratory, community and health economics aspects of antimicrobial resistance and the natural history of seasonal influenza in a community cohort in Ha Nam.



Dr. Jennifer Ilo VAN NUIL

Jennifer Ilo Van Nuil, PhD, is a medical anthropologist based at OUCRU in Ho Chi Minh City (HCMC), Vietnam. Jennifer is broadly concerned with the relationships between global health interventions, politics, and practice. Her main research interests include the ethnography of biomedicine, infectious diseases, global health, and social theory. Jennifer has worked on research in Rwanda for over ten years and has been working in Vietnam for the past two years. Jennifer's main research endeavors at this time include exploring the socio-cultural context of access to medications for viral hepatitis through post-marketing clinical trials in southern Vietnam, community based participatory research with communities at risk for viral hepatitis in and around HCMC, and research surrounding the experiences of COVID-19 and the impacts of the local, national, global responses within vulnerable communities in Vietnam, Nepal and Indonesia.



VU Duy Thanh

Mr Thanh leads the Schools and Youth Engagement programme that aims to promote broader science literacy in society and is vice head of the PCE group. He has 13 years of experience working with children, youth and community-based volunteer groups in Vietnam. Thanh is interested in using non-formal and in-formal education approaches to facilitate and increase participation of stakeholders in decision-making process, also to enhance personal, social and academic development of young people.



Dr. VU Thi Ty Hang

Dr. Hang is responsible for supervising the technical and safety aspects of the diagnostic laboratory of OUCRU/HTD. During the community transmission period in HCMC, the lab processed some 12,000 COVID-19 sample per day.



Dr. Sophie YACOUB

Sophie is the Dengue Research Group lead at OUCRU-Vietnam. She's a Physician in Infectious Diseases and General Medicine and holds an honorary Consultant appointment at London North West University Healthcare NHS Trust in the UK. She has a PhD from Imperial College London and an MSc in the Control of Infectious Diseases from the London School of Hygiene and Tropical Medicine (LSHTM). Sophie is currently leading a translational programme of work on the pathophysiology and immune pathogenesis of dengue viral infections, as a well as assessing innovative technologies for clinical monitoring and intervention trials of novel host-directed therapeutics. Building on this expertise, Sophie and her team are leading some of the COVID-19 observational and interventional trials in Vietnam and regionally.

