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## Oxford University Clinical Research Unit Submission to the Independent Panel on Pandemic Preparedness.

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### **1. What is your understanding about the emergence, spread across countries and scientific understanding of SARS-CoV-2 and COVID-19?**

Oxford University Clinical Research Unit (OUCRU, [www.oucru.org](http://www.oucru.org)) is a large-scale infectious diseases research center with site offices in Vietnam, Indonesia and Nepal. As a Wellcome-funded programme in Asia, our vision is to have local, regional and global impact on health, by leading a locally driven research programme on infectious diseases in Southeast Asia.

Our strategic focus on infectious disease, and nearly 30 years' experience working in Southeast Asia has meant that we are acutely aware of the potential for 'Disease-X' to arise from within this region. Following the SARS epidemic of 2003, and the H5N1 epidemic of 2008, much of our research has focused on emerging viral infections, (including influenza) and zoonoses.

From Jan 2012 – Dec 2017 we led the Wellcome Trust - Vietnam Initiative on Zoonotic Infections WT-VIZIONS. The focus of that project was on viral infections in Vietnam with special emphasis on zoonotic viruses: recognizing that these are relatively under-studied viruses of animal origin that are the dominant source of emerging infectious diseases in humans. WT-VIZIONS was run as a strategic consortium, with partners from rural hospitals, academic centers, national research institutes and public health authorities with years of working together. The project collected samples from diverse environments and species, including bats, and looked at coronaviruses in part of the collection.

(<https://www.mdpi.com/1999-4915/12/9/960>;

<https://academic.oup.com/ve/article/4/2/vey035/5250438?searchresult=1> )

Key findings from our work during the pandemic have included a publication in Clinical Infectious Diseases, (August 2020) where we described the control measures used by the government and their relationship with imported and domestically acquired case numbers, with the aim of identifying the measures associated with successful SARS-CoV-2 control:

(<https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciaa1130/5879764>).

Vietnam adopted an elimination approach to SARS-CoV-2 from before the first cases were identified in the country, and controlled SARS-CoV-2 spread through the early introduction of mass communication, meticulous contact tracing with strict quarantine, and international travel



restrictions. With large cohorts in government controlled quarantine facilities, we were able to test and clearly show the high proportion of asymptomatic and imported cases, and evidence for substantial presymptomatic transmission: <https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciaa711/5851471>.

## **2. When (date) and how (e.g. official correspondence, phone call, social media) did you learn about key information, alerts or recommendations from global or regional bodies?**

Like most of the rest of the world, our scientists first learned of the outbreak and key early information through global media reports, and the WHO situation reports which started in early January. However, a small subsection of our senior researchers report that they first heard about the existence of the new disease from colleagues in China in late December/early January. Twitter has also been an important vector of information, with almost all OUCRU scientists reporting that they have become aware of developments in the course of the pandemic via Twitter. Other important platforms for sharing information have included reliable media feeds such as ProMEDmail and Flutrackers – these platforms were useful for sharing information, opinions and data.

In Vietnam, the lunar new year holiday started on January 23<sup>rd</sup>, and government outbreak response teams were already mobilizing in advance of that holiday, with full awareness that movements of large swathes of the population during that period would have a significant impact on transmission of any infection in the community, despite the fact that there were not yet any reported cases (first case presented during the lunar new year holiday). During the first few weeks of January before the lunar new year holiday, we were contacted by the following:

- The vice-Director and Head of Virology of the National Institute of Hygiene and Epidemiology (NIHE), by text message, email and face to face meeting – requesting assistance with diagnostics.
- Hospital for Tropical Diseases (HTD) Director, by email, text message and face to face meetings – requesting assistance to set up a diagnostic assay prior to the release of the WHO recommended PCR protocol, and laboratory capacity.
- Wellcome Trust Director, by email and text message.
- WHO Vietnam, by email and text message.
- NHTD Heads of Laboratories, in person visit and emails – requesting assistance with diagnostics.
- NHTD, various senior doctors, text messages and email.
- NIHE colleagues in epidemiology, by email – requesting assistance in mathematical modelling
- NIHE together with Pasteur Institute in Nha Trang, by email and phone - requesting assistance with diagnosis of suspected cases
- Pasteur Institute in Ho Chi Minh City, by email and phone – requesting assistance with reagents for diagnostic testing



After the lunar new year holiday, once the first wave of infections was established in Vietnam, we were additionally contacted by:

- WHO, by email, invitation to participate in the 2019 novel Coronavirus Global Research and Innovation Forum in Geneva, Switzerland, 11-12 Feb 2020.
- Administration of Science Technology and Training- from the Ministry of Health (MoH), in order to conduct a clinical trial on the use of chloroquine as treatment, in response to which a Trial Steering Committee was established, assisted by members from both OUCRU and MoH. OUCRU then developed the protocol together with MoH.

In Indonesia, we were contacted through the request of an intermediary professional acquaintance of our Director, who had had a meeting with the COVID-19 National Taskforce Director to discuss high throughput diagnostic technologies in China. This ultimately led to the establishment Genomik Solidaritas Indonesia (GSI) laboratory in Jakarta (<https://www.gsilab.id>) – the largest PCR swab test lab in Indonesia. This first contact was first by phone and then in face-to-face meeting at the COVID-19 Taskforce headquarters in Jakarta.

By March 2020 we had a significant amount of contact with Indonesian hospitals and research institutes by WhatsApp, emails and face to face meetings – with all of these engagements informing our research strategy in Indonesia.

### **3. What actions were taken by your country, and when, to mitigate the impact of COVID-19?**

Our response to this question reflects our response as an academic institution, and what actions we have taken to mitigate the impact of COVID-19 in the countries where we operate.

In 2020, we rapidly developed a portfolio of research (more than 25 projects to date) in response to Covid-19, which can be grouped into five broad research themes:

- Clinical Research
- Epidemiology
- Diagnostics and Virology
- Mathematical Modeling
- Social Science, Public Engagement and Policy

Our work is always collaborative, and frequently cross-disciplinary, recognizing that this pandemic is broad-reaching and needs a flexible, multi-layered response. In all countries we work, we were approached by various sectors of the government, from government hospitals, CDCs, regional Departments of Health, and Ministries of Health to assist with their pandemic response. Key projects have included:

- Early preparedness, including setting up of a diagnostic assay to facilitate the first diagnosis in Vietnam in collaboration with the HTD;



- Sourcing reagents, developing testing protocols and preparing government laboratories to be able to conduct PCR testing in the very early response in Vietnam;
- Repurposing our research labs to become SARS-CoV-2 testing labs supporting the hospitals in our networks in all of our sites, and contribution to the 50,000 PCR tests conducted by the HTD to date;
- Secondment of clinical and lab staff to support hospitals and testing facilities;
- Financial, human and material resources to establishing capacity for whole genome sequencing directly from clinical specimens of SARS-CoV-2 at
- Implementing ISARIC protocol observational studies in Vietnam (this was set up in advance of the arrival of SARS-CoV-2 in Vietnam), Indonesia and Nepal for retrospective and prospective collection of clinical data and prospective sample collection to contribute to global ISARIC database;
- Tracking all-cause mortality at the epicenter of Indonesia's COVID-19 epidemic;
- Using mathematical modelling to predict the ICU burden in space and time with and without relocation of critical equipment from hospital to hospital in Vietnam; and
- Implementing 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 in collaboration with the MoH.
- Implementing the COPCOV study in Vietnam, Indonesia and Nepal – investigating the efficacy of chloroquine and hydrochloroquine as a prophylactic treatment:  
<https://www.tropmedres.ac/covid-19/copcov>.
- Implementing the RECOVERY trial in Vietnam, Indonesia and Nepal. RECOVERY is an Oxford-led multi-national clinical trial which aims to identify treatments that may be beneficial for people hospitalised with suspected or confirmed COVID-19:  
<https://www.recoverytrial.net/>

We also established an OUCRU Outbreak Advisory Board, which includes representatives from the MoH and NGOs related to the outbreak response in Vietnam, in order to help ensure that OUCRU's outbreak response projects are designed and communicated in a way that they quickly generate outcomes that are useful for key stakeholders' policy needs.



## Appendix: Publications relating to COVID-19 from OUCRU authors (as of 8 Dec 2020)

D K Ming, S Sorawat, H Q Chanh, P T H Nhat, S Yacoub, P Georgiou, A H Holmes. Continuous Physiological Monitoring Using Wearable Technology to Inform Individual Management of Infectious Diseases, Public Health and Outbreak Responses. *Int J Infect Dis.* 2020 Jun 1;S1201-9712(20)30393-3. doi: 10.1016/j.ijid.2020.05.086

Nguyen Van Vinh Chau, Vo Thanh Lam, Nguyen Thanh Dung, Lam Minh Yen, Ngo Ngoc Quang Minh, Le Manh Hung, Nghiem My Ngoc, Nguyen Tri Dung, Dinh Nguyen Huy Man, Lam Anh Nguyet, Le Thanh Hoang Nhat, Le Nguyen Truc Nhu, Nguyen Thi Han Ny, Nguyen Thi Thu Hong, Evelyne Kestelyn, Nguyen Thi Phuong Dung, Tran Chanh Xuan, Tran Tinh Hien, Nguyen Thanh Phong, Tran Nguyen Hoang Tu, Ronald B Geskus, Tran Tan Thanh, Nguyen Thanh Truong, Nguyen Tan Binh, Tang Chi Thuong, Guy Thwaites, Le Van Tan, OUCRU COVID-19 research group. The Natural History and Transmission Potential of Asymptomatic SARS-CoV-2 Infection. *Clin Infect Dis.* 2020 Jun 4;ciaa711. doi: 10.1093/cid/ciaa711

Le Van Tan, Nguyen Thi Thu Hong, Nghiem My Ngoc, Tran Tan Thanh, Vo Thanh Lam, Lam Anh Nguyet, Le Nguyen Truc Nhu, Nguyen Thi Han Ny, Ngo Ngoc Quang Minh, Dinh Nguyen Huy Man, Vu Thi Ty Hang, Phan Nguyen Quoc Khanh, Tran Chanh Xuan, Nguyen Thanh Phong, Tran Nguyen Hoang Tu, Tran Tinh Hien, Le Manh Hung, Nguyen Thanh Truong, Lam Minh Yen, Nguyen Thanh Dung, Guy Thwaites, Nguyen Van Vinh Chau, for OUCRU COVID-19 research group. SARS-CoV-2 and co-infections detection in nasopharyngeal throat swabs of COVID-19 patients by metagenomics. *J Infect.* 2020 Aug;81(2):e175-e177.

Evelyne Kestelyn, Nguyen Thi Phuong Dung, Yen Lam Minh, Le Manh Hung, Nguyen Minh Quan, Nguyen Thanh Dung, Ngo Ngoc Quang Minh, Tran Chanh Xuan, Nguyen Thanh Phong, Van Ninh Thi Thanh, Joseph Donovan, Tran Nguyen Hoang Tu, Le Thanh Hoang Nhat, Nguyen Thanh Truong, Dinh Nguyen Huy Man, Huynh Phuong Thao, Nghiem My Ngoc, Vo Thanh Lam, Huynh Hong Phat, Phan Minh Phuong, Ronald B. Geskus, Vo Thi Nhi Ha, Nguyen Ngo Quang, Hien Tran Tinh, Le Van Tan, Guy Thwaites, Jeremy Day, Nguyen Van Vinh Chau, OUCRU COVID-19 Research Group. A multi centre randomized open label trial of chloroquine for the treatment of adults with SARS-CoV-2 infection in Vietnam. *Wellcome Open Res.* 2020 Jun 12;5:141. doi: 10.12688/wellcomeopenres.15936.1

Hannah Clapham, James Hay, Isobel Routledge, Saki Takahashi, Marc Choisy, Derek Cummings, Bryan Grenfell, C. Jessica E. Metcalf, Michael Mina, Isabel Rodriguez Barraquer, Henrik Salje, Clarence C. Tam. Seroepidemiologic Study Designs for Determining SARS-COV-2 Transmission and Immunity. *Emerg Infect Dis.* 2020 Jun 16;26(9). doi: 10.3201/eid2609.201840

Thai Quang Pham, Maia Rabaa, Luong Huy Duong, Tan Quang Dang, Quang Dai Tran, Ha Linh Quach, Ngoc Anh Hoang, Dinh Cong Phung, Nghia Duy Ngu, Anh Tu Tran, Ngoc Quang La, My Phuc Tran, Chau Vinh, Khanh Cong Nguyen, Duc Anh Dang, Duong Nhu Tran, Guy E Thwaites, H Rogier van Doorn, Marc Choisy, OUCRU COVID-19 Research Group. The first 100 days of SARS-CoV-2 control in Vietnam. *Clin Infect Dis.* 2020 Aug 1;ciaa1130. doi: 10.1093/cid/ciaa1130

Nguyen Van Vinh Chau, Nguyen Thi Thu Hong, Nghiem My Ngoc, Tran Tan Thanh, Phan Nguyen Quoc Khanh, Lam Anh Nguyet, Le Nguyen Truc Nhu, Nguyen Thi Han Ny, Dinh Nguyen Huy Man, Vu Thi Ty Hang, Nguyen Thanh Phong, Nguyen Thi Hong Que, Pham Thi Tuyen, Tran Nguyen Hoang Tu, Tran Tinh Hien, Ngo Ngoc Quang Minh, Le Manh Hung, Nguyen Thanh Truong, Lam Minh Yen, H Rogier van Doorn, Nguyen Thanh Dung, Guy Thwaites, Nguyen Tri Dung, Le Van Tan, OUCRU COVID-19



research group. Superspreading Event of SARS-CoV-2 Infection at a Bar, Ho Chi Minh City, Vietnam. *Emerg Infect Dis.* 2020 Oct 16;27(1). doi: 10.3201/eid2701.203480

Nguyen Van Vinh Chau, Le Mau Toan, Dinh Nguyen Huy Man, Huynh Phuong Thao, Nguyen Phu Huong Lan, Dinh Thi Bich Ty, Dinh Khac Hieu, Nguyen Thi My Tien, Nghiem My Ngoc, Le Manh Hung, Nguyen Thanh Dung, Tran Tan Thanh, Nguyen Thanh Truong, Guy Thwaites, Le Van Tan. Absence of SARS-CoV-2 antibodies in health care workers of a tertiary referral hospital for COVID-19 in southern Vietnam. Absence of SARS-CoV-2 antibodies in health care workers of a tertiary referral hospital for COVID-19 in southern Vietnam. *J Infect.* 2020 Nov 19;S0163-4453(20)30713-1. doi: 10.1016/j.jinf.2020.11.018

Henry Surendra, Iqbal RF Elyazar, Bimandra A Djaafara, Lenny L Ekawati, Kartika Saraswati, Verry Adrian, Widyastuti, Dwi Oktavia, Ngabila Salama, Rosa N Lina, Adhi Andrianto, Karina D Lestari, Erlina Burhan, Anuraj H Shankar, Guy Thwaites, J. Kevin Baird, Raph L. Hamers. Clinical characteristics and mortality associated with COVID-19 in Jakarta, Indonesia: a hospital-based retrospective cohort study. *Medrxiv.* <https://doi.org/10.1101/2020.11.25.20235366>