

# Improving the radical cure of vivax malaria (IMPROV)

<b>Submission date</b>	<b>Recruitment status</b>	<input type="checkbox"/> Prospectively registered
30/06/2016	No longer recruiting	<input checked="" type="checkbox"/> Protocol
<b>Registration date</b>	<b>Overall study status</b>	<input type="checkbox"/> Statistical analysis plan
18/07/2016	Completed	<input checked="" type="checkbox"/> Results
<b>Last Edited</b>	<b>Condition category</b>	<input type="checkbox"/> Individual participant data
31/12/2021	Infections and Infestations	

## Plain English summary of protocol

### Background and study aims:

Malaria is an infectious disease which is common in tropical and subtropical countries, caused by a microscopic parasite which is spread from person to person by mosquitos. It can be serious disease if it is not treated quickly and effectively. One type, called vivax malaria, can hide in the liver and reenter the blood to cause repeated illness (relapse). Repeated relapse is particularly damaging to the health and development of children. The usual medicines given for vivax malaria can only kill the parasites in the blood. There is one medicine, called primaquine, which can be taken to kill the vivax malaria parasite in the liver and so will reduce the risk of relapses. Some individuals may have weak red cells. Red cells need enzymes to work properly and weak red cells have low amounts of an enzyme called glucose 6 phosphate dehydrogenase (G6PD). People with G6PD deficiency (G6PDd) can be at risk if they take primaquine because it can destroy their red cells. This study aims to find out how best to use primaquine in patients with normal or weak (G6PD deficient) red cells so that we can introduce better treatments for vivax malaria around the world.

### Who can participate?

Patients presenting to a participating treatment centre with uncomplicated vivax malaria are eligible to enrol provided they are over 6 months of age, not pregnant, and not suffering from any other medical condition.

### What does the study involve?

Participants are randomly allocated to one of three groups. Participants in all groups undertake standard antimalarial treatment (in pill form) as per standard practice in their country. In addition, those in the first group receive 14 days treatment of low dose primaquine ). Those in the second group receive seven days treatment of high dose primaquine followed by seven days of placebo (dummy pill). Those in the third group receive 14 days treatment with a placebo (dummy pill). Patients in all groups are followed up daily for two weeks, then weekly until week 8, and then monthly until 12 months to see if their malaria has come back.

### What are the possible benefits and risks of participating?

All patients benefit from receiving treatment against vivax malaria. Patients also receive the results of their G6PD test which can be useful to them if they need malaria treatment in the

future. The main potential risks are side-effects from primaquine but patients are tested for G6PDd, enrolled to a different treatment if found to have G6PDd and monitored closely.

Where is the study run from?

The study is run by Oxford University (UK) and takes place in health centres in Vietnam, Indonesia and Afghanistan

When is study starting and how long is it expected to run for?

January 2013 to February 2018

Who is funding the study?

1. Medical Research Council (UK)
2. Bill and Melinda Gates Foundation (USA)

Who is the main contact?

Professor Ric Price

[rprice@menzies.edu.au](mailto:rprice@menzies.edu.au)

## Contact information

**Type(s)**

Scientific

**Contact name**

Prof Ric Price

**ORCID ID**

<https://orcid.org/0000-0003-2000-2874>

**Contact details**

Centre for Tropical Medicine and Global Health  
Nuffield Department of Medicine  
University of Oxford  
Old Road Campus  
Roosevelt Drive  
Oxford  
United Kingdom  
OX3 7FZ

## Additional identifiers

**ClinicalTrials.gov (NCT)**

NCT01814683

**Protocol serial number**

MR/K007424/1

## Study information

**Scientific Title**

# Improving the Radical Cure of Vivax Malaria: A Multicentre Randomised Comparison of Short and Long Course Primaquine Regimen (IMPROV)

## Acronym

IMPROV

## Study objectives

Due to the long duration of standard primaquine treatment regimens, courses are difficult to supervise, are poorly adhered to and lack effectiveness. Our proposed multicentre randomised clinical trial will provide evidence across a variety of endemic settings on the safety and efficacy of high dose-short course primaquine in G6PD normal patients.

## Ethics approval required

Old ethics approval format

## Ethics approval(s)

1. Human Research Ethics Committee of the Northern Territory Department of Health and Menzies School of Health Research (HREC), 16/06/2013, ref: 2013-1991
2. Oxford Tropical Research Ethics Committee (OxTREC), 04/06/2013, ref: 1014-13

## Study design

Double-blind three-arm randomised controlled trial

## Primary study design

Interventional

## Study type(s)

Treatment

## Health condition(s) or problem(s) studied

P. vivax malaria

## Interventions

Patients will be randomly assigned to one of the three treatment arms below:

Intervention group 1: Standard blood schizonticidal therapy plus 14 days of supervised

primaquine (7mg/kg total dose) administered once per day (0.5 mg/kg) orally

Intervention group 2: Standard blood schizonticidal therapy plus 7 days of supervised  
primaquine (7mg/kg total dose) administered once per day (1.0 mg/kg OD) followed by 7 days of  
placebo orally

Control group: Standard blood schizonticidal therapy plus 14 days placebo orally

The schizonticidal consists of Chloroquine in Vietnam and Afghanistan, and Dihydroartemisinin-piperaquine in Indonesia.

For all study arms, follow up is daily for 2 weeks, then weekly till week 8 and then monthly until 12 months.

## Intervention Type

Drug

**Phase**

Not Applicable

**Drug/device/biological/vaccine name(s)**

1. Chloroquine 2. DHA-piperaquine plus primaquine

**Primary outcome(s)**

1. Incidence rate (per person-year) of symptomatic recurrent *P. vivax* is measured within 12 months
2. Incidence rate (per person-year) of symptomatic recurrent *P. vivax* parasitaemia (detected by microscopy) over 12 months of follow-up in the 7 versus 14-day primaquine groups for all sites combined and stratified by site

**Key secondary outcome(s)**

1. The incidence rate (per person-year) of any recurrent *P. vivax* malaria is measured at 12 months
2. The incidence rate (per person-year) of any recurrent (i.e. symptomatic and asymptomatic) *P. vivax* parasitaemia over 12 months of follow-up in the 7 and 14-day primaquine regimens for all sites combined and stratified by site
3. Incidence risk of any recurrent symptomatic of *P. vivax* malaria compared to control arm is measured at 12 months
4. The incidence rate (per person-year) of any recurrent symptomatic *P. vivax* parasitaemia over 12 months of follow-up in either the 7 or the 14-day primaquine regimens compared with the control arm, for all sites combined and stratified by site
5. The Haematological recovery in patients with vivax malaria will be assessed as the incidence risk of severe anaemia (Hb<7g/dl) and/or blood transfusion within the 12 month follow up period, and the mean fall in baseline Hb at day 7 and day 14
6. Proportion of patients with Serious Adverse Drug reactions is measured within 42 days of primary treatment, 6 and 12 months
7. Tolerability of primaquine will be assessed by comparing the proportion of patients with nausea, vomiting, abdominal pain and vomiting of a dose within 1 hour of administration within 12 months
8. Drug tolerability will be assessed by comparing the proportion of patients completing a full course of observed primaquine therapy within 12 months
9. Incidence risk of severe anaemia in G6PD deficient arm and/or requirement for blood transfusion within the 12 month follow up period and the mean fall in baseline Hb at day 7 and day 14
10. Cost effective analysis in the management of *P. vivax* with respect to the use of G6PD tests, the dosing schedule and the epidemiological context will be conducted at 12 months

**Completion date**

28/02/2018

## Eligibility

**Key inclusion criteria**

Participant (or parent/guardian of children below age of consent) is willing and able to give written informed consent to participate in the trial; verbal consent in the presence of a literate witness is required for illiterate patients. In addition, written assent (or verbal assent in the presence of a literate witness for illiterates) from children 12 to 17 years as per local practice.

1. Monoinfection with *P. vivax* of any parasitaemia in countries which use Chloroquine (CQ) as blood schizontocidal therapy. Mixed infections with *P. vivax* and *P. falciparum* can be enrolled in countries which use an artemisinin combination therapy
2. Diagnosis based on rapid diagnostic tests
3. Over 6 months of age
4. Weight 5 kg or greater
5. Fever (axillary temperature 37.5 degrees C) or history of fever in the last 48 hours
6. Able, in the investigators opinion, and willing to comply with the study requirements and follow-up

**Participant type(s)**

Patient

**Healthy volunteers allowed**

No

**Age group**

Mixed

**Sex**

All

**Total final enrolment**

2336

**Key exclusion criteria**

1. Female participant who is pregnant, lactating or planning pregnancy during the course of the study
2. Inability to tolerate oral treatment
3. Previous episode of haemolysis or severe haemoglobinuria following primaquine
4. Signs/symptoms indicative of severe/complicated malaria or warning signs requiring parenteral treatment- Haemoglobin concentration less than 9 g/dL
5. Known hypersensitivity or allergy to the study drugs
6. Blood transfusion in last 90 days, since this can mask G6PD deficient status
7. A febrile condition due to diseases other than malaria (e.g. measles, acute lower respiratory tract infection, severe diarrhoea with dehydration)
8. Presence of any condition which in the judgment of the investigator would place the participant at undue risk or interfere with the results of the study (e.g. serious underlying cardiac, renal or hepatic disease; severe malnutrition; HIV/AIDS; or severe febrile condition other than malaria); coadministration of other medication known to cause haemolysis or that could interfere with the assessment of antimalarial regimens
9. Currently taking medication known to interfere significantly with the pharmacokinetics of primaquine and the schizontocidal study drugs
10. Prior antimalarial medications in the previous 7 days

**Date of first enrolment**

01/07/2014

**Date of final enrolment**

30/11/2017

# Locations

## Countries of recruitment

Afghanistan

Ethiopia

Indonesia

Viet Nam

## Study participating centre

**Health Protection and Research Organisation (HPRO)**

Laghman

Afghanistan

1001

## Study participating centre

**Health Care and Social Development Organization (HSDO)**

Jalalabad

Afghanistan

2601

## Study participating centre

**Hanura Health Center**

Lampung

Indonesia

35451

## Study participating centre

**Tanjong Leidong District Health Center**

Medan

Indonesia

20231

## Study participating centre

**Dak O Health Commune**

Viet Nam

830000

**Study participating centre**  
**Bu Gia Map Health Commune**  
Viet Nam  
830000

**Study participating centre**  
**Krong Pa Health Commune**  
Viet Nam  
600000

**Study participating centre**  
**Metehara Health Centre**  
Ethiopia

**Study participating centre**  
**Arba Minch Hospital**  
Ethiopia

## **Sponsor information**

**Organisation**  
University of Oxford

**ROR**  
<https://ror.org/052gg0110>

**Organisation**  
Menzies School of Health Research

## **Funder(s)**

**Funder type**  
Research council

**Funder Name**  
Medical Research Council

**Alternative Name(s)**  
Medical Research Council (United Kingdom), UK Medical Research Council, MRC

**Funding Body Type**  
Government organisation

**Funding Body Subtype**  
National government

**Location**  
United Kingdom

**Funder Name**  
Bill and Melinda Gates Foundation

**Alternative Name(s)**  
Bill & Melinda Gates Foundation, Gates Foundation, Gates Learning Foundation, William H. Gates Foundation, BMGF, B&MGF, GF

**Funding Body Type**  
Government organisation

**Funding Body Subtype**  
Trusts, charities, foundations (both public and private)

**Location**  
United States of America

## Results and Publications

**Individual participant data (IPD) sharing plan**  
Not provided at registration

**IPD sharing plan summary**  
Data sharing statement to be made available at a later date

### Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Results article</a>		14/09/2019	31/12/2021	Yes	No
<a href="#">Protocol article</a>	protocol	07/12/2015		Yes	No
<a href="#">Participant information sheet</a>	Participant information sheet	11/11/2025	11/11/2025	No	Yes