

Malária transmissão: desafios atuais e novas ferramentas no contexto de eliminação – revisitando um workshop no IHMT

Transmissão de malária: desafios atuais e novas ferramentas no contexto de eliminação – revisitando um workshop no IHMT

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Resumo

Nos últimos anos, apesar de avanços consideráveis na eliminação da malária, esta doença continua a ser um dos maiores problemas de Saúde Pública em regiões tropicais, prevalecendo em países com sistemas de saúde frágeis. O aumento do investimento nas últimas décadas resultou no desenvolvimento de novas ferramentas e soluções no controlo da doença parasitária de maior impacto na humanidade.

O Centro de Saúde Global e Medicina Tropical organizou um encontro científico sobre os atuais desafios e as ferramentas inovadoras no contexto de eliminação de malária. Desde o início que a comissão organizadora, com uma composição multidisciplinar, teve como propósitos principais discutir as abordagens atuais para estudar a transmissão da malária e identificar novas ferramentas para medir a transmissão em diferentes contextos de malária, incluindo cenários de pré-eliminação. Neste artigo apresentamos uma síntese dos dois dias do workshop, dos seus intervenientes e principais conteúdos. Adicionalmente, procuramos refletir acerca da natureza multidisciplinar das apresentações e discussões, e a importância do trabalho conjunto para se alcançar o desiderato da eliminação da malária.

Palavras Chave:

Workshop, transmissão de malária, abordagens multidisciplinares.

Abstract

Lately, regardless of considerable progress in the elimination of malaria, this disease remains a major public health problem in tropical regions, prevailing in countries with weak health systems. Increased investment in recent decades resulted in the development of new tools and solutions for the control of the parasitic disease with the greatest impact on humanity.

The Centre for Global Health and Tropical Medicine hosted a scientific meeting on current challenges and innovative tools in the context of malaria elimination. From the beginning, the organizing committee, with a multidisciplinary composition, had as main purposes to discuss the current approaches to study the malaria transmission and to identify new tools to measure the transmission in different malaria contexts, including pre-elimination scenarios. In this paper we present a synthesis of the two days of the workshop, of its participants and main contents. In addition, we sought to reflect on the multidisciplinary nature of presentations and discussions, and the importance of working together to achieve the goal of eliminating malaria.

Key Words:

Workshop, malaria transmission, multidisciplinary approaches.

In recent years, despite considerable advances in eliminating malaria in countries in Asia, South America, and Africa, this disease remains one of the largest public health problems in tropical regions, prevailing in countries with weak health systems ¹. The significant increase in investment over the last two decades has given rise to the development of new tools and solutions to control the parasitic disease with the greatest impact in mankind.

The workshop on **Malaria Transmission: current challenges and new tools in the elimination context** was held at the Instituto de Higiene e Medicina Tropical (IHMT) (<http://www.ihmt.unl.pt/workshop-malaria-transmission/>) between the 30th and 31st of October 2017, under the scientific project of the Centre for Global Health and Tropical Medicine (GHTM).

IHMT/ GHTM aimed at creating an in depth debate over new challenges and innovative tools in the current elimination context of malaria transmission in the world, with the specific objectives:

- 1- Discuss current approaches to study malaria transmission
- 2- Identify new tools to measure transmission in different new settings of malaria, including pre-elimination scenarios.

The organizing committee composed by researchers from different backgrounds from biomedical sciences, statistics to social sciences searched for a multidisciplinary environment to discuss new challenges and innovative tools in the current elimination context of malaria transmission, combining different scientific backgrounds, tools, languages, and methodologies. Therefore, we decided to plan this workshop with the participation of top researchers from very diverse areas, working in several different settings. The diversity of the audience (health professionals, social, biomedical and geographical science researchers, students) also contributed to bring different points of view to bear these challenges.

Specifically, this event aimed to explore the environmental and social determinants in the new elimination contexts, as well as current approaches and new tools to measure malaria transmission and explore the efficacy of control methods.

This workshop included five plenary sessions with distinguished speakers from various international institutions. The topics were as follows:

- *Geospatial modelling of changing vector populations* by Catherine Moyes, Malaria Atlas Project, Big Data Institute, University of Oxford, UK.

- *Current approaches and new tools to measure malaria transmission* by Nuno Sepúlveda, Centro de Estatística e Aplicações da Universidade de Lisboa and London School of Hygiene and Tropical Medicine, UK.

- *The economic challenges and benefits of eliminating malaria* by Elisa Sicuri, ISGlobal, University of Barcelona, Spain.

- *Impact of genetic and bio-ecological heterogeneities of mosquito vectors on Malaria transmission and control in Africa: future perspectives in context of elimination and growing urbanization* by Alessandra dela Torre, Dipartimento di Sanità Pubblica & Malattie Infettive, University La SAPIENZA, Roma, Italy.

- *Beyond 2020: Pushing the envelope of malaria elimination tools* by Rhoel R. Dinglasan, CDC South-eastern Regional Center of Excellence for Vector Borne Diseases, University of Florida, Emerging Pathogens Institute, USA.

First day

The opening session was chaired by the IHMT deputy director M. R. Oliveira Martins. Afterwards, the workshop started with a general perspective on Geospatial and Modelling tools. Firstly, with Catherine Moyes in a talk entitled: “*Geospatial modelling of changing vector populations*” [2] and divided into two parts. The first part focused on modelling spatial distribution and abundance of mosquito vectors to incorporate them into spatial-temporal analyses of malaria prevalence. The second part highlighted studies on modelling spatial-temporal patterns of insecticide resistance in malaria vectors to investigate the relationship between this insecticide resistance and residual variation in malaria transmission. Most of these results were obtained within the frame of the Malaria Atlas Project [3] and also IR Mapper [4]. Later, Nuno Sepúlveda presented an overview on “*Current approaches and new tools to measure malaria transmission*” [2] where epidemiology, statistics, and genetics were integrated. He pointed out the need of measuring the residual malaria transmission intensity, giving attention to the fact that the total number of official cases excludes asymptomatic individuals. The role of case exportation and the danger of malaria importation were also described. Thus, the frequent underestimation of malaria data is a concern to face. This talk explored the antibody-based estimates of malaria transmission, such as seroprevalence and seroconversion rate, that are gaining wide interest in order to quantify the exposure of the population to malaria parasites instead of presence of infection. This talk presented the current concepts of a single-antigen serological analysis to discuss how they can be used to inform malaria

elimination using antibody data generated from the new multiplex platforms. Statistical modeling is also an important piece of this complex puzzle. Thus, this session was accompanied by other oral presentations on studies where geospatial and modelling tools have been used in different contexts: in Brazil “*Local epidemiology and spatial analysis of malaria transmission in the Brazilian Amazon*” [2] by Canelas T. et al. (Univ. S. Paulo, et al.); Equatorial Guinea: “*Malaria determining risk factors at the household level in two rural villages of mainland Equatorial Guinea*” [2] by Guerra M. et al. (IHMT)); and in Angola where a project on artificial intelligence underway was presented by Maia M. et al. (IHMT) “*Leveraging artificial intelligence to improve malaria epidemics’ response*” [2]. (article published in page 35 of this special issue).

There was also a poster relating urbanization and malaria in the capital cities of Angola and Guinea-Bissau entitled “*Mapping urban land use changes in the cities of Luanda and Bissau using time stacks of Landsat satellite imagery*” [2] by C. Capinha and S. Soares from GHTM/IHMT.

In the afternoon, the focus was on “hard” social sciences perspective. Elisa Sicuri brought forward a general view on “*The economic challenges and benefits of eliminating malaria*” [2]. She presented a cost effectiveness analysis of malaria control and elimination out of the Mozambique context. She argued that malaria elimination is not cost effective in the short term because it implies strong financial efforts, which are difficult to harmonize with political cycles and with competing problems and interests. Additionally, it is necessary to consider the risks associated with malaria elimination activities as policy makers need to balance it with other priorities, and poverty related diseases, considering an equity approach. This talk noted however, that the benefits associated with malaria elimination go beyond health, and include tourism, economic growth and school outcomes. The example of a current malaria elimination initiative in a district of Southern Mozambique was reported. An example from the private sector “*Effectiveness of private sector malaria control: the case of sugarcane workers in southern Mozambique*” [2] was also presented by Brew J. (ISGlobal, et al.).

It was also presented an historical summary of the pre-elimination scenario of malaria in Portugal of the beginning of the 20th century from the interviews made to real time witnesses by Saavedra M. (Univ. York, UK) “*Stories from the past and everyday experiences of malaria: Portugal, 1930-1960*” [2] (article published in page 51 of this special issue).

A longitudinal view on the case of Angola was made available via the poster titled “*Malaria control strategies in Angola- 1980-2015- a history unfolding*” [2] by J. Birck and J. Varanda (Univ. Coimbra).

Later, the focus of the conference shifted back to the mosquito vector. A. dela Torre gave a detailed historical perspective on the genetic and ecological diversity of the *Anopheles* sp. in Africa. She identified recent human and environmental changes like urbanization and deforestation and their effects in malaria transmission and control: “*Impact of genetic and bio-ecological heterogeneities of mosquito vectors on malaria transmission and control in Africa: future perspectives in context of elimination and growing urbanization*” [2]. The session was closed by a presentation tackling the Angolan case presented by F. Fortes (Programa Nacional de Controlo da Malária), titled “*Human antibody responses to the Anopheles salivary gSG6-P1 peptide: a novel immuno-epidemiological biomarker tool for evaluating the efficacy of malaria vector control method*” [2].

This thematic session included the participation of four posters: Faleiro B. et al. (ISA, GHTM) “*Molecular evidence of positive selection in transglutaminases of Anopheles gambiae*” [2].; Gulia-Nuss M. (Univ. Nevada, USA) “*A palatable insecticide*” [2].; Rocha H and Silveira H. (GHTM) “*Plasmodium bergheisporozoites detection, differentiation and quantification during sporogonic cycle in Anopheles tissues using flow cytometer approach*” [2].; Barata J. and Torrejon E. et al. (GHTMet al.) “*Molecular detection of plasmodium in field collected Anopheles samples from Guinea Bissau (1993- 2010)*” [2].

Second day

The focus of attention turned to the Malaria parasite *Plasmodium* sp. with a future perspective on new diagnostic and elimination tools.

Rhoel R. Dinglasan gave the talk entitled “*Beyond 2020: Pushing the envelope of malaria elimination tools*”. He discussed the progress and pitfalls of two pioneering interventions: 1) a prototype saliva-based rapid test for detecting subclinical malaria parasite carriers through a novel parasite biomarker, 2) a universal malaria transmission-blocking vaccine that targets a midgut-surface antigen of the parasite’s mosquito vector.

This session was complemented by three oral communications:

Azevedo R. and Markovic M. et al (IMM, Leiden Univ.) “*A bioluminescence method for in vitro screening of Plasmodium transmission-blocking compounds*” [2]; Fonseca A. et al. (ISGlobal, et al.) “*Pregnancy-specific serology to monitor malaria transmission in elimination*” [2]; Fortes et al. (IPST, Coimbra) “*Malaria serology in blood donors – persistence of antibodies in ex-residents from endemic countries*” [2].

This thematic session focused on the malaria parasite included the participation of two posters:

Pena A. et al. (IMM, et al.) “*Plasmodium short N-Glycans*

are critical for parasite survival” [2]; Lemos C. et al. (Hospital de Santa Maria, CHLN, Lisboa) “Case report: 28 year-old female with fever and thrombocytopenia .” [2] (article published in page 45 of this special issue).

The closing session was led by Professor J. Pinto (GHTM/IHMT).

The workshop gathered people of ten different nationalities, representing 50 different institutions. The audience was comprised of a total of 76 people, including 29 students or interns from IHMT and 11 medical doctors. Most of the participants were involved in malaria research activities in biomedical and pharmaceutical sciences (Msc&PhD students, Post-Doc Researchers).

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The Non-Governmental Organization AMI-Fundação de Assistência Médica Internacional was also represented in the workshop.

Briefly, the main objectives of the workshop, to integrate views from different scientific areas and to foster exchange of knowledge, were achieved. At the end there was a general consensus that multidisciplinary events like this one need to be repeated in order to better contribute to the aim of eliminating malaria. A hard task that can only be achieved via further sponsoring scientific networks that add value and new perspectives making the difference in this complex problematic.

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