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Point-of-care testing: filling the diagnostic gaps in tropical medicine?

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Many infectious diseases require timely diagnosis and early appropriate treatment to prevent death and sequelae. The clinical management of patients suspected of having serious infections often consists of providing empirical treatment that targets the most relevant conditions while waiting for aetiological results obtained within hours, days or weeks by conventional microbiology. This strategy requires comprehensive epidemiological information, good clinical skills, and adequate laboratory facilities, and leads unavoidably to missed diagnoses on the one hand and unnecessary prescriptions on the other. In the past decade, major efforts have been made by the scientific community and industry to bring diagnostics closer to the care provider and to the patient. The concept of point-of-care (POC) testing has emerged for infectious diseases, as reviewed in a previous themed section of *Clinical Microbiology and Infection* [1–3]. Although no universal definition exists, POC testing refers to any diagnostic technique used at or near the patient and providing results within a very short time frame in order to allow decision-making (triage, referral, and treatment prescription or withholding) 'during the same clinical encounter' [4]. POC testing in developed countries may therefore comprise very diverse technologies (from simple immunoassays to more sophisticated nucleic acid amplification tests), users (lay persons to highly trained staff), and settings (homes to 'near-care' reference laboratories).

In the deprived settings of developing countries, this need for rapid diagnostic testing is even more pressing, because patients often seek care late and cannot easily come back to obtain results and specific treatments [3]. Major patient and health system delays are observed before diagnosis [5]. To be effective in poorly staffed, ill-equipped tropical settings, POC tests should ideally meet the 'ASSURED' characteristics —affordable, sensitive, specific, user-friendly, rapid and robust, equipment-free, and delivered—according to international recommendations issued about ten years ago [6]. For the time being, almost only lateral-flow immunochromatographic assays fulfil these stringent technical requirements, and other formats, requiring multiple steps or cold chains (flocculation, agglutination, and vertical flow-through immunochromatography), are progressively being abandoned. In tropical settings, the so-called rapid diagnostic tests (RDTs) are now almost exclusively such immunoassays, which are usually performed near the patient in primary-care laboratories, although some of them, e.g. for malaria, are increasingly being used in the community as well. Field diagnosis of malaria or human immunodeficiency virus has been greatly simplified over the past decade by the development of these RDTs, and countless commercial kits are now available at reasonable cost. More recently, major progress has been made for other infections, such as dengue and syphilis, and new tests are regularly being evaluated or entering clinical care.

This themed section is aimed at reviewing current RDT development and perspectives for several major clinical scenarios in tropical and travel medicine. Maltha *et al.* present, in two companion articles, the current performances and persisting pitfalls of RDTs for malaria diagnosis in endemic settings and in non-immune travellers. In their second review, the authors also discuss the potential use of new malaria RDTs for self-diagnosis or peer diagnosis during travel to tropical areas. In a third article, Mbanya describes the challenges in donating safe blood in low-resource tropical hospitals, and reviews the role of RDTs in detecting the major transfusion-transmissible infections in blood banks where western models of infectious screening are not affordable. Finally, in an attempt to address the growing challenge of non-malarial febrile illness in the tropics [7], Chappuis *et al.* review the currently available or near-term RDTs that could be used within integrated syndromic algorithms. Beyond the undeniable progress, readers will also realize that many gaps and challenges persist in terms of pathogen detection, clinical use, and operational implementation. It is also important not only to focus on a fragmented single-disease approach, but also to coordinate research efforts to enable patient-centred management. For a variety of similar challenging syndromes such as neurological disorders (Yansouni C *et al.*, *Lancet Infect Dis*, in press) or persistent diarrhoea [8], clinical and diagnostic studies should be conducted in various epidemiological contexts in order to elaborate and validate innovative and integrated RDT-based

diagnosis/treatment pathways. While we are waiting for more accurate technologies and adequately trained microbiologists in the low-resource settings, pertinent use of quality RDTs may substantially help to improve clinical care and epidemiological surveillance for the people in most need.

Transparency Declaration

The author has no conflict of interest related to the present article.

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