

Point-of-care diagnostic tests for low-resource settings

Point-of-care diagnostic tests (POCTs) can enable health-care workers to provide more rapid and effective care to people in low-resource settings.¹ POCTs should ideally meet the WHO's ASSURED criteria²—ie, being affordable, sensitive, specific, user-friendly, rapid and robust, equipment-free, and deliverable. However, this condition is not always possible. Our Brighter Futures project aims to understand the needs, costs, barriers and opportunities that affect the implementation of POCTs and develop a model to implement a POCT to improve maternal and child health-care in Peru. Through this project, we found that few appropriate tests were available. This scarcity in tests results from the fact that the scientists and engineers who design these tests, and the companies who develop and market them, are usually based in affluent countries and are often unaware of real settings and the real needs of the end-users.

To determine whether first-hand experience of health-care needs in low-income and middle-income country settings would lead to a better understanding of the specific needs of the intended target setting and end-users, we piloted a voyage of discovery by inviting developers of diagnostic tests from affluent countries to Peru. Our aims were (1) to expose test-developers to the challenges of providing health care in low-resource settings; (2) to assess the appropriateness of tests currently in development; and (3) to promote new collaborations between participants and local health-care professionals in low-resource settings.

An international mix of 22 participants, including diagnostic developers, global health researchers, and project funders (14 developers, six global health researchers, and

two funders), were taken on a 6 day experience through three distinct geographical regions of Peru: jungle, coastal desert, and Andean highlands. Participants visited several sites in each region, allowing them to tour health facilities spanning all levels of the health-care system. Participants observed the unique limitations and needs of each setting, and interacted directly with local end-users. A technology conference was held in Lima to provide a forum for in-depth conversations between international participants and national experts and policy makers.

We used pre-trip surveys to acquire information about participants' background knowledge, previous experience, and desired learning outcomes. Post-trip surveys allowed participants to assess how much they had learned, to rate their satisfaction with the desired learning outcomes, and to comment on the outcomes of their experiences. Diagnostic developers answered additional survey questions about how their experiences would influence changes to their current device design.

Throughout the site visits, participants had the opportunity to interact with, observe, and speak to local health-care professionals about the needs and limitations of their health facilities. Many of these individuals dedicate a vast amount of time into providing health care for their population and therefore are experts on what works and what does not work in their setting.

Participants left with a greater understanding of the current needs and challenges in maternal and child health. Respondents reported they were exposed to barriers and limitations that they were not previously aware of, and most of the test developers stated that there would be changes to current or future diagnostic device designs as a result of their experiences. Altogether, about half of the diagnostic device developers found areas in which

their device could be improved or simplified, and indicated that changes would be made to their current design on the basis of what they observed—as one participant stated: “I need to go back and rethink my design.”

Dozens of conferences that focus on global health needs, diagnostics, and other related topics are held across the world. However few, if any, allow participants to explore the real issues first-hand at the point-of-care. Exploring several regions in a middle-income country and visiting different types of health-care facilities, provided participants with a more enriching experience overall, and allowed them to voice their own observations and ask setting-specific questions directly to local people. There is no “one test fits all” solution to the challenges faced by local health-care providers, but low-tech health facilities require low-tech solutions. Through these real-world, hands-on examples and experiences, developers were able to assess their own products to determine whether their designs are appropriate for their target end-users.

These interactions are an opportunity for real problem-solving discussions about necessary trade-offs in device design, instead of impossible hypothetical scenarios, which so often occur when polling users for their ideal test qualities.^{3,4} Obviously, every end-user wants every test to be highly sensitive, specific, easy, cheap, and rapid, but in many cases technological or capacity limitations make it impossible. With an open dialogue between POCT developers and end-users, a clear list of must-have test qualities for each setting can be drawn up, while attributes of less importance can be given lower priority. Additionally, faced with few resources, local health-care professionals have the ability to come up with simple yet innovative solutions to challenges they encounter,⁵ and might be able to provide fresh insights into ways to solve challenges faced by developers.



For the Brighter Futures programme see <http://www.futurobrillantes.org>

Although this is a pilot voyage of discovery, this type of experience is clearly valuable for all players who advocated, fund, and develop diagnostics that can improve health care in low-resource settings. Let us allow local people to be part of the solution.

We declare no competing interests.

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- 1 Mabey DC, Sollis KA, Kelly HA, et al. Point-of-care tests to strengthen health systems and save newborn lives: the case of syphilis. *PLoS Med* 2012; **9**: e1001233.
- 2 Peeling RW, Holmes KK, Mabey D, Ronald A. Rapid tests for sexually transmitted infections: the way forward. *Sex Transm Infect* 2006; **82** (Suppl V): v1–v6.
- 3 Syed SB, Dadwal V, Rutter P, et al. Developed-developing country partnerships: benefits to developed countries? *Global Health* 2012; **8**: 17.
- 4 Hsieh Y-H, Gaydos CA, Hogan MT, et al. What qualities are most important to making a point of care test desirable for clinicians and others offering sexually transmitted infection testing? *PLoS One* 2011; **6**: e19263.
- 5 Nkengasong JN, Nsubuga P, Nwanyanwu O, et al. Laboratory systems and services are critical in global health: time to end the neglect? *Am J Clin Pathol* 2010; **134**: 368–73.