

Furthermore, symptoms do not seem to curtail sexual activity in a substantial proportion of men (an assumption that symptomatic infection quickly leads to treatment seeking is relied on by proponents of the oropharyngeal hypothesis). Also, the reliance on nucleic acid amplification tests to identify gonococci could be leading to the overinterpretation of positive results when these tests are unable to differentiate between concentrations likely to lead to transmission or not.

Ultimately, as argued in both Personal Views, this issue will only be laid to rest with more research. Until recently, data on kissing was not robustly collected in national surveys and other studies. If the involvement of the oropharynx proves to be important, there will need

to be a substantial shift in how gonorrhoea transmission prevention is tackled. Although, this change in route would be worrying if confirmed, a new understanding of gonorrhoea transmission dynamics would inevitably open up new avenues in reducing transmission.

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## Ebola in eastern DRC

When the current Ebola outbreak was declared on Aug 1, 2018, in North Kivu, Democratic Republic of the Congo (DRC), confidence was high that the hundreds of experienced responders and the new therapeutics and vaccines would be able to quickly stop this tenth outbreak in DRC. As of July 28, 2019, 2671 probable and confirmed cases and 1790 probable and confirmed deaths have been reported.<sup>1</sup> Leadership and coordination shortfalls, increased insecurity, mistrust, and denial from both the community and the responders are now hallmarks of the response.<sup>2</sup>

The ineffectiveness of the collection, analysis, and diffusion of epidemiological data, the centrepiece of any response, is predictive of the situation worsening. The different and mainly incomplete databases combined with the absence of accurate and up-to-date chains of transmission makes case counts, monitoring, and intervention difficult or even impossible. Many cases of Ebola virus disease are identified late, with many previous transits through unprepared health-care facilities, or are detected as community deaths. Most of the probable cases (death without laboratory confirmation) are not recorded. Research activities are following a parallel agenda, which often differs from timely intervention goals, with numerous data collections kept for exclusive scientific publications and to advance personal careers.

Laboratory diagnosis is done at multiple sites by the Institut National de Recherches Biologiques. This achievement is tempered by an overconfidence in the

capabilities of the laboratories, incomplete sharing of results with patient providers, low quality-control procedures, and unjustified fear of losing control. Rapid field molecular typing of the virus and bedside rapid diagnostic assays, both seen as a crucial support for the control of the 2014–16 west Africa outbreak, are not done to inform the response.

Early in the outbreak, new therapeutics were made available first under a monitored emergency use of unregistered and investigational interventions (MEURI) protocol, then through a randomised controlled trial supported by the US National Institutes of Health, the Institut National de Recherches Biologiques, and the DRC Ministry of Health.<sup>3,4</sup> As of July 30, 2019, 682 patients were recruited under the MEURI and 621 patients under the randomised controlled trial protocol. Late admission of cases due to fear from the community or ineffective follow-up of contacts has complicated the use of therapeutics and vaccines and analyses.

Ring vaccination of contacts and contacts of contacts of confirmed Ebola cases using rVSV-ZEBOV was rapidly implemented. As of July 27, 2019, 178 121 people have been vaccinated, 31 016 of whom were frontline workers, the rest being contacts and contacts of contacts of Ebola cases.<sup>1</sup> The epidemiological data generated by the vaccination and the contact tracing teams are mostly not shared. As a result, daily field reports have noted at least 651 identified contacts of confirmed cases who



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were not vaccinated and became cases (among them 205 deaths) between Dec 31, 2018, and July 30, 2019. Vaccination coverage among health-care workers is high but incomplete.

The initial response should be to generate, maintain, and constantly update the primary databases, then sharing them among all players. Parallel databases should not exist. Because of the field difficulties and the inadequate personnel resources, a single team staffed by the most experienced partners should oversee this task. During the autumn of 2014, a Conakry informal taskforce, consisting of one member from each main partner (Guinea Ministry of Health, WHO, Médecins Sans Frontières, Centers for Disease Control and Prevention) met at least once a week, allowing real fact-based understanding and management of the Ebola situation. This approach needs to be replicated for this outbreak at each level.

Laboratory support from national and external partners is needed and should provide timely support for clinical management of patients receiving experimental therapeutics or difficult epidemiological investigations, such as cases with multiple or unknown origins. As in the west African outbreak, point-of-care rapid diagnostic tests should be fielded, at least as an evaluation of community deaths.

The existing vaccination strategy and implementation on the ground, should be drastically changed. A single combined team should follow and vaccinate contacts and contacts of contacts. This policy, combined with a rapid and complete inclusion of all high-risk contacts, should reduce, or at least improve the outcome of, secondary Ebola cases and affect the transmission curve.

Even if the infection prevention and control efforts have yielded some progress, the relatively large proportion of cases due to reuse of material (eg, syringes, needles, and perfusion tubes) is unacceptable. More emphasis on the multiple risks of this practice should be advertised among the care providers and the population.

Helping the existing local health-care providers to regain the population's confidence is crucial. This should be done by introducing a comprehensive health system with actions that encompass the health-related problems encountered daily by the population—eg, malaria, vaccine-preventable diseases, childbirth, and quality of care.

Together with the presence of violence and insecurity, Ebola virus disease has a real chance of becoming endemic in this part of DRC. Only multiple and immediate changes, starting within the leadership and coordination of all the partners involved through inclusive, flexible, and unified response efforts, will be able to reverse the trend.

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## Precision public health and HIV in Africa

Laura Dwyer-Lindgren and colleagues<sup>1</sup> have published an important mapping study that shows changes in the prevalence of HIV across Africa between 2000 and 2017. They used multiple data sets and statistical modelling to estimate both the prevalence of HIV among adults aged 15–49 years (figure) and the number of HIV-infected adults in this age group (figure 3 in Dwyer-Lindgren and colleagues<sup>1</sup>), at a spatial resolution of 5 × 5 km. They are the first to map HIV epidemics across

the entire continent of Africa; previous mapping studies have focused on specific countries such as Lesotho<sup>2</sup> and Zimbabwe.<sup>3</sup>

The continental map shows that HIV epidemics in sub-Saharan Africa are not distinct entities contained within a country, but cross-national borders (figure). Neighbouring countries that have a similar prevalence of HIV at their national borders have a strong epidemiological linkage—for example Botswana and