
KATE BRADY

Scale up the supply of experimental Ebola drugs

Estimates of the probable impact of the outbreak show that existing stocks of potentially useful medicines are insufficient, says **Oliver Brady**.

With the worst-ever outbreak of Ebola raging in West Africa, a World Health Organization (WHO) committee last week concluded that it is ethical to use unproven drugs and vaccines to try to combat the disease, as long as doctors obtain patients' informed consent. There are no medicines currently approved for routine use against Ebola, either to treat infected people or to protect those they come into contact with, so we are in uncharted territory. Two logical and immediate questions are: what investigational drugs and vaccines are available, and what volume of each would be required?

At the front line, options for therapy and post-exposure treatment include passive immunization with monoclonal or polyclonal antibodies, and antiviral agents. For broader protection, several vaccines have been tested on non-human primates.

With the backing of the WHO, policy-makers and funders are now trying to decide which of these options to accelerate into active service. They need good estimates of how many of these drugs and vaccines to manufacture and distribute to control an Ebola outbreak.

Together with colleagues, I have been trying to provide such estimates.

We have separated the people who require help into four categories. Most urgently, there are those who have already become infected with Ebola virus and people close to them, such as family members. Next are the medical and support staff who treat patients, and those who handle the corpses. At less immediate risk but still important to protect are essential non-medical staff in the region of the outbreak, such as humanitarian-aid workers and people who provide key local services. A case can be made that protection should also be offered to key domestic government workers and others providing essential logistical support. Finally, we have already seen isolated cases of Ebola spread far from its West African source by travellers, and policy-makers should consider protection for these imported cases.

The scientific literature holds some information about probable levels of exposure in these groups (see go.nature.com/1le6ua). This provides the best available evidence base for political and private funding decisions on the volume of drugs or vaccines that would be required.

To make this information available, my colleagues and I have constructed a spreadsheet that calculates the total number of people that might require treatment for a given outbreak (see go.nature.com/vv98gv). This value is customizable depending on factors such as which of the above categories are to be targeted.

The intention is not to provide exact numbers of doses required, but rather to scope potential demand for a number of realistic scenarios.

This demand is likely to be higher than many people realize. For example, our analysis suggests that, even under a conservative scenario, up to 30,000 people would have so far required treatment or prophylaxis in the current outbreak — substantially more than in any previous outbreak. The difference reflects the scale of the current emergency, which has made the jump from rural to urban areas. The WHO warned last week that reported numbers of cases and deaths "vastly underestimate" the size of the problem.

To estimate the demand for therapeutic or prophylactic agents more accurately, more-detailed data on patient contact rates and health-care-worker exposure must be collected or made available by the relevant organizations. These factors are likely to change as the Ebola epidemic spreads, treatment centres become available and people are quarantined.

UNDER A CONSERVATIVE SCENARIO, UP TO 30,000 PEOPLE WOULD HAVE SO FAR REQUIRED TREATMENT OR PROPHYLAXIS.

Our estimates may need to be increased if, with the transition from rural to urban environments, infected people are coming into contact with more people. Under such conditions, tracking a person's contacts for the full recommended 21 days after exposure to the disease becomes logistically challenging, and it may be necessary to refine which contacts are defined as epidemiologically significant. Policy-makers should consider the role of strategies such as mass vaccination and greater use of personal protective equipment.

Our analysis is crude and has very clear limitations. But it does demonstrate that for treatment and prevention interventions to be rolled out evenly and fairly, stocks must be scaled up substantially. It seems that supplies of the monoclonal-antibody therapy ZMapp are already exhausted, and available stocks of many other investigational drugs are limited to treatment courses for tens or hundreds of people, rather than the required thousands or tens of thousands.

It is clear that the scale of the current outbreak presents a change in the development landscape for those invested in Ebola therapeutics. As well as the direct disease burden, the unfolding epidemic in West Africa has revealed the huge potential for indirect costs brought about by political destabilization and crippled health-care services.

The use of ZMapp has already raised issues of equity of access to potentially life-saving therapies. But as WHO assistant director-general Marie-Paule Kieny has said: "I don't think that there could be any fair distribution of something that exists in such a small quantity."

The scale of the ongoing outbreak may tilt the politics and economics to speed the development of a drug or vaccine. But it also makes it difficult to scale up production and distribution. All involved must rise to meet the challenge. ■

➲ NATURE.COM
Discuss this article online at:
go.nature.com/uryy3v

Oliver Brady *is an epidemiologist at the University of Oxford, UK.*
e-mail: oliver.brady@zoo.ox.ac.uk