The Ebola outbreak in West Africa has been a newsworthy problem for much of the last year. Now the world medical association has announced that there is a cure available. In this paper, we present a model to optimize the eradication of Ebola using the cure. The focus will be on:

* Halting the spread of Ebola.
* Determining a minimum number of the doses of the cure required to eradicate Ebola.
* Choose reasonable locations to deliver the cure.
* Develop a feasible and efficient system for delivering the cure.

Our model of choice for predicting the spread of Ebola is the SEIR model. It models a population by splitting it into Susceptible, Exposed, Infectious, and Recovered stages, and calculating how the individuals in the population move through these stages as time passes. The flux of the population through the stages depend strongly on how easily Ebola is transmitted, the rate people recover from being ill represented by , and how many people are infectious.

How the cure interacts with the SEIR model is an important assumption. We are assuming that the cure is a medicine that is used on a sick person to cure them of Ebola. It is not a vaccine, but a method of treatment that requires one dose per day that greatly improves recovery speed and strongly reduces the mortality rate. This means the cure will aid in the extermination of Ebola by rapidly reducing the proportion of the population that is infected so that fewer people will be exposed to Ebola.

Spatial spread of the disease is not something the SEIR model calculates. That would make it very hard to predict where Ebola will spread to. However, because Ebola is so widely spread in Guinea, Sierra Leone, and Liberia while the surrounding countries have managed to suppress and eradicate Ebola within their own borders, we will assume that most of the spread of Ebola will be within already infected areas. Thus, while being able to account for spatial aspects of spread such as population mixing would improve the model, it is good enough to make useful predictions as it is.

In our cases study of Sierra Leone our model we predict 3,549 future cases of Ebola when = 0.178, which is its baseline value without the cure. If we assume the cure increases the value of to 0.378 then our model predicts there will be 2,836 future cases, and if becomes 0.678 with the cure there will be only 1,775 future cases.

As for determining how to distribute the cure, we recommend using trucks to distribute the cure within afflicted countries. The truck routes can be made fast by creating a minimum spanning tree of the roads between distribution points. We recommend using currently existing Ebola treatment centers as the distribution points as they are typically near existing Ebola outbreaks.