This research proposes a methodology that combines optimization, frontier analysis, and regression analysis approaches to obtain an efficiency index to determine the efficiency of cooperative-networks among hospitals before an occurrence of mass casualty disasters. In order to apply the methodology, hospitals and potential disaster's locations in the Orlando area were identified and characterized.

The network optimization generated 75 hospital networks, and considered three disaster sizes and the networks were built based on two cases. In the first case, each hospital is a hub and the other hospitals in the network are spokes to respond to a disaster located at the average distance from the hub-hospital selected to all the 12 potential disaster locations. In the second case, a disaster's location is a hub and all of the hospitals are spokes. Then, the hospitals are added to the network until they reach their capacities and all of the victims are allocated. We used Data Envelopment Analysis to analyze the 75 networks to estimate their comparative efficiency and build the index to measure network efficiency.

Findings showed that the relevant variables to design a hospital network are the average distance from the hub to the hospitals, services offered in the network, the average waiting time in the emergency departments, and the number of victims involved.