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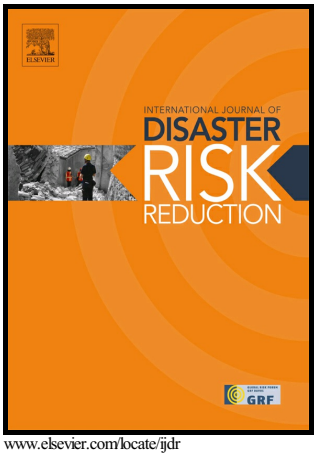

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A System Dynamics Approach to the Seismic Resilience Enhancement of Hospitals

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Abstract

In the aftermath of earthquakes, hospitals serve the critical role of treating casualties. In many cases, the key components of a hospital (i.e., the building, staff, medicine inventory, technical systems, and medical equipment) are affected by an earthquake. To handle the demand surge, affected hospitals should recover in an effective manner. Hospital recovery is a complex and dynamic process because each component requires specific types and amount of resources to recover. Furthermore, the recovery of each component not only affects its performance but also plays a role in the overall hospital recovery. Hospital administrators need to model the complex recovery process after a future earthquake in order to make critical decisions regarding the amount of resources invested in the recovery of each component. This paper proposes a system dynamics simulation model that characterizes the dynamics of the post-earthquake recovery process of a hospital. The model determines the impacts of component damage and resource shortage on the quality of services that are provided by the hospital. It also considers the flow of patients, the dynamics of treatment operations, and the recovery efforts that are implemented to mitigate the impacts of an earthquake on each hospital component. It then quantifies the functionality and

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