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Development of the science of mass casualty incident management: reflection on the medical response to the Wenchuan earthquake and Hangzhou bus fire

Key words: Mass casualty incident, Surge, Vulnerability, Earthquake, Fire incident

- In the science of surge, an important indicator of MCI response is medical surge response capability (MSRC). MSRC refers to the ability for surge capacity to meet surge (Hick, *et al.*, 2004). MSRC can be calculated in the following equation (Jenkins, *et al.*, 2006; Kelen, *et al.*, 2006):

- Medical surge response capability = planning * $\frac{\text{surge capacity}}{\text{surge}}$

- The introduction of this formula was a great progress, but there is an unsolved problem: classical surge theory cannot explain why two similar surge capacities dealing with similar disasters, show different endings. This paper is aimed to outline and develop an improved research paradigm for MCI management.

- The development of the research paradigm of MCI response from two-dimensional consideration of surge and surge capacity to three-dimensional analysis of surge, surge capacity and vulnerability is extrapolated theoretically based on the science of surge theory and the retrospective analysis of MCI response in the 2008 Wenchuan earthquake and 7.5 bus fire incident in Hangzhou.
- Therefore, vulnerability is introduced into the measurement of surge response capability, expressed as:
- $$\text{Surge response capability} = \text{planning} * \frac{\text{surge capacity}}{\text{surge}} * \text{vulnerability}$$
- This new paradigm breaks through the limitations of traditional research paradigms and will contribute to the development of a methodology for disaster research.