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**PRE-HOSPITAL TRIAGE SYSTEMS: CLASSIFICATION, COMMON FEATURES,
AND EVALUATION OF THEIR APPLICATION IN REAL-WORLD DISASTERS
AND EMERGENCY SCENARIOS**

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Time-efficient pre-hospital triage can save lives and maximize resources during a mass casualty incident (MCI). Two of the most common methods used for measuring accuracy of triage system performance include under-triage and over-triage rates; they are important because they directly impact the patient outcome. Many triage systems have been implemented in real-world disasters and disaster simulators such as Simple Triage and Rapid Treatment (START), SIEVE, etc.

The purpose is to assess the elements found throughout pre-hospital triage systems, along with an assessment of the performance of START and SIEVE within both real life and simulated disasters based on the rates of under-triage and over-triage.

The literature review conducted was systematic and used clinical case reports, simulation studies and peer-reviewed journals such as PubMed, American Journal of Disaster Medicine (AJDM), Cambridge Core, PubMed Central (PMC), Research Gate. The key parameters extracted were triage criteria, patient distribution, under-triage & over-triage rates, and overall system accuracy. Some of the case studies included were train crash, Emergency Medical Services (EMS) disaster responses, and large-scale fire simulation exercises. In triaging, the rapid assessment of all systems, color-coded ranks, and physiological assessment of breathing, perfusion and mental status were performed. A real train crash case study revealed a total of 148 patients, where field triage identified 22 patients as code red, 68 patients as code yellow, and 58 patients as code green; however, the total number of patients who arrived at the hospital included only 2 patients being code red, 26 being code yellow, and 120 being code green. This caused an over-triage of 53% and an under-triage of 2%, thus demonstrating that the triage system was more focused on patient safety than on the strain that this would place on the resources. By analyzing the overall results of an EMS disaster in which the START triage system had an overall accuracy of 71%, with 5.8% of patients being under-triaged, and over-triaged cases totaling 23.3%, this confirms that the START triage system has a tendency to over-triage, while maintaining a low number of missed critically injured patients. A fire drill simulation of a disaster triage scenario using SIEVE with 3800 patients demonstrated a 37% under-triage and a 13% over-triage; this indicates that the SIEVE triage system expedited the process of triage but had a greater chance of missing critically ill patients. Other simulations and disaster analysis depicted similar trends, demonstrating that START prioritizes low under-triage at the expense of high over-triage. Other systems such as SIEVE demonstrated high under-triage in mass casualty incidents (MCI). Accepted standards suggest that under-triage should be limited to <5%, even if over-triage increases to 25-50%, to minimize the number of critically ill patients who are missed. Pre-hospital triage varies in their balance of speed, simplicity, and accuracy. While some, like START, are designed to minimize missed patients to improve the safety of the patient(s) being discharged from the emergency room(s), others like SIEVE and various methods allow for quick sorting of patients, but there is a greater chance of missing patients. Identifying these differences helps first-responders to better respond to disasters via informed selection of pre-hospital triaging methods and ongoing training and evaluation. Overall, there is significant need to evaluate all current pre-hospital triaging methods so that the number of people served during disasters (MCIs) can be optimized and the care provided after a disaster can be maximized.