| **Author, Year** | **Sub- category** | **Study Location** | **Study Type** | **Study Design** | **Relevant type of mass casualty event** | **Strategy** | **Findings** | **Outcome Modulators** | **Quality score** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Einav, 200972 | Case managers | Israel | Analysis of multiple real events | Pre-post | Explosive | Use of case managers in supervising patient care and transfer of care throughout an MCE. | Using case managers improved patient management and flow with similar staff and no additional resources. Reductions were observed in: the number of x-rays/patient/1st 24-hour (P < 0.001), time to performance of first chest x-ray (P = 0.015), time from first chest x-ray to arrival at the next diagnostic/treatment location (P = 0.016), time from ED arrival to surgery (P = 0.022) and hospital lengths of stay for critically injured casualties (37.1 +/- 24.7 versus 12 +/- 4.4 days, P = 0.016 for ISS > or = 25).  Using case managers had no adverse impact on the health outcomes of critically injured patients. Mortality rates were similar for critically injured patients. | N/A | 3/8 |
| Amlot, 201063 | Decontamina- tion | Western Europe | Exercise, drill, or training program | Randomized controlled trial | Chemical, Biological, Radiological, Nuclear | Use of instructions, washcloth and/or shower duration to increase decontamination effectiveness | Any form of showering is more effective than not showering; however, the use of a washcloth significantly improved results over showering alone, showering with instructions or showering for longer. Washcloth use led to 20% less contamination, compared to other interventions. | Showering instructions were provided before the shower, and were not available during the shower, which may have reduced effectiveness. | 3/6 |
| Loeb, 200991 | Health care worker prophylaxis | Canada | Analysis of single real event | Randomized controlled trial | Infectious disease: Influenza | The use of surgical masks in place of N95 respirators to protect healthcare workers against influenza. | Surgical masks were deemed noninferior to N95 respirators. The lower end of the 95% confidence interval for the reduction in incidence of influenza (N95-surgical) was greater than the established noninferiority limit of -9%. | N/A | 5/6 |
| Gao, 200787 | Health info technology | US | Exercise, drill, or training program | Post only with comparison group: Paper triage tags | Unspecified | Use electronic triage tags (Advanced Health and Disaster Aid Network, AID-N) to monitor vital signs and transmit information to first responders. | Time required for triage was similar in both electronic and paper triage groups.  Electronic triage tags allowed first responders to re-triage patients three times more often as first responders who used paper triage tags. | Triage status indicator used LEDs that were difficult to see from a distance under bright sunlight and when the triage tag was flipped over on the patient.  Patients might wander out of range or vehicles (e.g., fire trucks) might block data transmissions.  Pulse oximeter readings have limited accuracy in the presence of methemoglobin, carboxyhemoglobin, nail polish, nail fungus, fluorescent light, and motion.  Tags used at least eight times less energy than existing, similar devices | 5/8 |
| Xiong, 201061 | Health info technology | Not relevant | Computer simulation | N/A | Natural Disaster: Earthquake | Implement regional telemedicine hub to support delivery of specialty care during MCE | Use of the telemedicine hub reduced the number of deaths by 5.4%, 36.5% and 27.3% for the major, medium and minor scale earthquake scenarios respectively.  Use of the telemedicine hub reduced local ED bed usage and local trauma specialist usage for medium and minor earthquakes.  Use of the telemedicine hub lowered average wait times for ED beds and specialists. | Rapid availability of specialists external to the event are required  Local ED resources may serve as a bottleneck and require higher rates of transfer even when the telemedicine hub is operational | 2/7 |
| Beck-Razi, 200793 | Imaging | Israel | Analysis of single real event  Validation study | Medical record review | Explosive, Trauma: War | Use of focused assessment of sonography for trauma (FAST) in for MCE triage. | FAST results were generally consistent with the results of CT scans, laparotomy and clinical observation. Overall accuracy of FAST (compared to other methods) was 93.1% (sensitivity: 75.0%, specificity: 97.6%). | Sonography in this study was performed and interpreted by radiologists, not emergency medicine physicians/providers  Type of injury varied between soldiers (open wounds and fractures) versus civilians (blast/shrapnel injuries)  FAST only can detect fluid/air so can diagnose bleeding, but cannot exclude all clinically important types of abdominal injury | 6/8 |
| Korner, 2011104 | Imaging | Western Europe | Exercise, drill, or training program | Post only with comparison group: 4-slice MDCT | MCEs involving major trauma | Use 64-slice multi-detector computerized tomography scan (vs. 4-slice MDCT) with high volume image reading capabilities to facilitate triage during MCEs | The 64-MDCT protocol reduced image processing time from an average of 9.0 minutes to 4.1 minutes. | Large volume of data led to an overload of the 3D workstation; backups workstations would be required  Image quality might be a modulator but it was not assessed as part of the study | 7/8 |
| Korner, 200680 | Imaging | Western Europe | Exercise, drill, or training program | Pre-post with comparison group: Individually admitted patients after multiple trauma (historical) | Unspecified | Implement accelerated whole body multislice computed tomography protocol (Triage MSCT) | Use of the triage MSCT protocol allowed a throughput of 6.7 patients per hour compared to 2.4 patients per hour for the standard protocol.  Triage MSCT protocol produced an average of 201 images per patient compared with 1031 images per patient for the standard protocol. | Triage MSCT patients were assumed to undergo preparation at the site of the MCE or during transport, did not undergo focused abdominal ultrasound, and were transferred directly to the CT exam room. This accounted for most of the throughput gain.  To decrease image number and image calculation time, no high-resolution reformations and multiplanar reformations were calculated in the Triage MSCT group.  Tube cooling problem were encountered when using the Triage MSCT protocol that required a reduction in dose for each scan and consequently the potential for lower image quality. This issue may be avoided by using newer scanners.  Staff participating in the study were instructed before the simulation on how to operate the CT console with the new MSCT protocol. | 5/7 |
| Sarkisian, 199186 | Imaging | Eastern Europe | Analysis of single real event | Retrospective case review | Natural Disaster: Earthquake | Sonographic screening for abdominal/pelvic injury or bleeding to triage earthquake MCE casualties and screen for occult injuries | False positive rate of 0/345 (0%) among patients without true abdominal trauma. (Reviewers' calculation)  False negative rate of 4/55 (7.2%) among patients with true abdominal trauma. (Reviewers' calculation)  Mean exam time of 4 minutes (Range: 1-10 minutes) | N/A | 4/8 |
| Kanter, 200777 | Load sharing  \*Also in Altered standards | Not relevant | Computer simulation | N/A | Unspecified | 1) Control distribution of pediatric disaster victims to avoid overcrowding near scene  2) Expand hospital capacity by altering standards of care to provide only "essential interventions" | Simulated mortality was reduced both by controlling the distribution of disaster victims and by relaxing standards of care. The greatest reduction was achieved by employing both strategies together. | Findings are based upon a variety of untested and extrapolated assumptions. Thus, "the reported results are not intended to recommend particular response strategies."  A large urban center is modeled; the applicability to rural or suburban environments is unclear. | 3/9 |
| Leiba, 200697 | Load sharing | Israel | Analysis of single real event | Post only with comparison group: Benchmark (implied) | Explosive | 1) Central allocation of patients to hospitals based on available resources  2) Central information system and local hospital information offices remote from care areas  3) Simplified field triage system - urgent (P1 & P2), non-urgent (P3), and expectant (P4) to speed scene clearance | Avoidance of individual hospital overload - 5/13, 5/13 and 3/13 urgent patients triaged to three nearest Level I trauma centers  Limited diversion of medical care personnel to family/media information needs  Speed of scene clearance - all 21 urgent (and 2 DOA) casualties evacuated in 25 minutes. All ambulance patients cleared within 35 minutes | N/A | 2/8 |
| Raiter, 200875 | Load sharing | Israel | Analysis of single real event | Post only with comparison group: Benchmark (implied) | Explosive | 1) Central Incident Command System (ICS) which gathers data and assigns patients to receiving hospitals  2) Robust redundant communications channels between Command Center, Responders, and Receiving Hospitals | Optimal allocation of resources (patients to hospitals) - no overload of capacity - nearest Level I got 5/9 severe patients, Level II got 4/9, 59 mildly injured patients distributed amongst 5 hospitals  Effective communication between responding entities - cell phone service overloaded/failed, radio, beeper & internet channels functioned smoothly | N/A | 3/8 |
| Wolf, 200970 | Load sharing | Western Europe | Exercise, drill, or training program | Post only with comparison group: Benchmark | Unspecified | New model to accommodate MCEs with >200 casualties, including on-site triage and stabilization and immediate transport of severely injured patients to modular “Initial Care Hospitals” for further stabilization and emergency treatment including surgery | Mean time from registration to entry into operating room for 10 patients needing emergency surgery was 19.5 minutes  National standard was met at the designated “Initial Care Clinic”: 60-minute lead time (from alert to full preparedness and maximum influx of patients) | N/A | 8/8 |
| Gunal, 2004103 | Medical treatment | Asia | Analysis of single real event | Post only with comparison group: Benchmark (historical comparison) | Natural Disaster: Earthquake | An organized, on-site medical intervention for the prevention of acute renal failure in crush victims after a catastrophic earthquake. | Only 4 of 16 patients with rhabdomyolysis required hemodialysis. All 16 survived. This is compared to dialysis rates of 60.8% and 77% for comparable patients in two recent earthquakes, and to other reported mortality rates of 15%-40% for patients who require hemodialysis. | N/A | 6/8 |
| Vardi, 200482 | Medical treatment | Israel | Exercise, drill, or training program | Randomized controlled trial | Chemical | Spring-driven intraosseous infusion device to replace IV insertion in a chemical MCE where providers are in full protective gear. | Simulated survival with/without IO device use - 73.4% survival versus 3.3% survival (under the simulation rules)  Total average casualty treatment time with/without device - 207 seconds versus 590 seconds | Anesthesiologists performed faster in both treatment and control groups | 6/8 |
| Satterthwaite, 201064 | Space optimization | Australia | Analysis of single real event | Retrospective case review | Explosive, Transportation accident | Use reverse triage to create surge capacity, including: suspension of normal elective activity, discharging patients earlier in the day, and increasing use of community care options such as respite nursing home beds and community nursing services) | Nineteen patients were discharged early (and would not have been discharged early under normal conditions).  Seven patients were ultimately readmitted, however, early discharge did not increase clinical risk. | N/A | 2/7 |
| Scarfone, 2011105 | Space optimization | Philadel- phia, PA | Analysis of single real event | Pre-post | Infectious disease: Influenza | 1) Appropriate space for other uses, including: 1) converting the hospital lobby to an ED waiting room 2) using a subspecialty clinic to care for non-urgent patients, and 3) using a 24-hour short stay unit to care for ED patients.  2) Use physicians not board certified in pediatric emergency medicine and inpatient-unit medical nurses to care for ED patients.  3) Other strategies included stockpiling PPE, antiviral medication, and bed surfaces, and the use of a tiered distribution of H1N1 vaccine. | Both patients' average wait time in the ED and the rate of leaving the ED without being seen during the pandemic were less than rates measured during the peak of seasonal influenza in the prior year.  The ED continued to accept all children brought by local ambulance crews, and never went on divert status. | Decision to abandon initial plan to treat all children with ILI in one or more unit | 2/8 |
| Van Cleve, 2011107 | Space optimization | Seattle, Washington | Analysis of single real event | Pre-post | Infectious disease | Reverse triage to identify patients for release and increase inpatient surge capacity | The hospital discharged essentially the same number of patients on November 4 as on previous high-census days when the surge plan was not activated, suggesting that the surge plan did not succeed in creating excess discharges. | The hospital never declared a disaster abd never sytematically implmented reverse triage | 5/8 |
| Andreatta, 201090 | Training | Ann Arbor, MI | Exercise, drill, or training program | Randomized controlled trial | Explosive | Use virtual reality to teach START triage | Virtual reality-based triage performance did not lead to improved performance compared to (traditional) standardized patient triage training. | Higher up-front costs for VR development | 6/6 |
| Hsu, 200481 | Training | US, Western Europe, Eastern Europe, Asia | Systematic Review/Meta-analysis | N/A | All-hazards, Chemical, Biological, Radiological, Nuclear, Explosive, Transportation accident | 1) Conduct hospital disaster drills to train hospital staff to respond to a mass casualty event  2) Use computer simulations to train hospital staff to respond to a mass casualty event  3) Conduct tabletop or other exercises to train hospital staff to respond to a mass casualty event | Disaster drills have the potential to identify problems with incident command, communications, triage, patient flow, materials and resources, security, and decontamination. Disaster drills usually were not designed to evaluate the effectiveness of patient care.  Computer simulation was able to identify bottlenecks in patient care, electromechanical failures, crowd control issues and other security problems, and resource deficiencies.  Evidence is insufficient to reach definitive conclusions regarding the effectiveness of computer simulations or tabletop exercises. | N/A | 7/10 |
| Jarvis, 200988 | Training | Western Europe | Exercise, drill, or training program | Randomized controlled trial | Unspecified | Use computer game method of triage training | Computer game participants achieved higher triage tagging accuracy (compared to participants in a tabletop exercise) | Providing interim feedback improves step accuracy but not accuracy of triage classification. | 4/8 |
| Sanddal, 200499 | Training | US | Exercise, drill, or training program | Pre-post | Explosive, Transportation accident | A 1 hour training program to improve pediatric triage performance ("JumpSTART") | The training session improved triage performance and that improvement was sustained at 3 months. | Motivation and abilities of trainees  The generalizability of performance improvement to other scenarios (or to any non-drill situation) is unknown.  The sustainability of performance improvement beyond 3 months is unknown.  Using triage tags rather than simulating them was found to be helpful | 6/8 |
| Vincent, 200971 | Training | US | Exercise, drill, or training program | Pre-post | Explosive | Teach triage skills using podcasts and iterative multi-manikin simulations | Accuracy of triage, choice of intervention, and rapidity of triage all improved with training. | Performance may vary with mechanism of injury  Improvement might have resulted from technical familiarity with manikins rather than improvement in triage skills. | 3/5 |
| Vincent, 200873 | Training | US | Exercise, drill, or training program | Pre-post | Unspecified | Teach mass casualty triage skills using an immersive 3D Virtual Reality environment. | Triage accuracy and intervention scores improved significantly after one iteration of training. Time to complete the scenario improved with each iteration. | There may have been a selection bias, with more technologically savvy learners signing up to participate in this trial  Apparent performance gains could reflect familiarity with VR equipment rather than improved triage knowledge | 4/7 |
| Adeniji, 201192 | Triage | Western Europe | Validation study | Retrospective case review | Infectious disease: Influenza | STSS (Simple Triage Scoring System) to help triage critical care admissions during influenza pandemic | STSS had superior accuracy in predicting ICU need relative to SOFA score - the Area Under the Curve (AUC) of the Receiver Operator Characteristic (ROC) was 0.88 versus 0.77  STSS had superior accuracy in predicting need for mechanical ventilation relative to SOFA score - the Area Under the Curve (AUC) of the Receiver Operator Characteristic (ROC) was 0.91 versus 0.87 | Low mortality of H1N1 patients prevented evaluation of predictive accuracy for mortality | 3/6 |
| Aylwin, 200679 | Triage  \*Also in Altered standards | Western Europe | Analysis of single real event | Retrospective case review | Explosive | 1) Trained/experienced triage at scene  2) Simplified on-scene triage (urgent (P1 & P2), not urgent (P3), expectant  3) Re-triage at every stage, directed by trained/experienced providers with explicitly designated authority  4) Damage Control approach (minimize use of all critical hospital resources) | Accuracy of on-scene triage was much higher for locations where fully trained responders (versus by medically trained bystanders) performed triage (33% overtriage versus 82% overtriage of critical patients)  Speed of scene clearance - Average of 27 P1 & P2 (most seriously wounded) patients per hour (= 2.2 minutes per patient)  Second stage screening (at the ED Door) reduced the surge demand (by screening out over-triage and identifying under-triaged/deteriorating patients) reducing initial overtriage to 0% and undertriage to 20% of critical patients.  Increase available surge capacity - created 10 ICU bed spaces and made all ORs available within 2 hours | N/A | 5/8 |
| Beyersdorf, 199685 | Triage | Spokane, WA | Analysis of single real event | Post only with comparison group: Benchmark (implied) | Mass shooting | Preexisting/pre-tested MCE response plan incorporating interagency cooperation, unified communications and incident command, on-scene provider triage, and allocation of casualties based on hospital resources. | A total of 2/19 patients (11%) were over-triaged and 2/19 (11%) were under-triaged.  100% survival. | Pre-hospital vehicles contained job descriptions and duties printed on small cards, and were utilized to establish a command center and chain of command at the scene  Designation of a regional disaster control hospital allowed for minute-by-minute knowledge of the capabilities of area hospitals and efficient dispersion of the victims to appropriate facilities.  Surgical specialists were preassigned to specific facilities thereby avoiding confusion. | 2/6 |
| Cancio, 200894 | Triage | Iraq | Analysis of multiple real events  Validation study | Medical record review | Military/Combat | The use of the Field Triage Score (FTS07) compared to the Revised Trauma Score (RTS) in predicting mortality and massive transfusion. | FTS predicted mortality and massive transfusion nearly as well as the Revised Trauma Score (RTS), but can be calculated without computing assistance in the field. | Often, study patients already had field interventions (such as intubation) performed prior to RTS/FTS assessment | 4/6 |
| Casagrande, 2011106 | Triage | Not relevant | Computer simulation | N/A | Nuclear | Use Model of Resource and Time-based Triage to prioritize victims with moderate life-threatening injuries over victims with severe life-threatening injuries, and to prioritize victims with different levels of radiation exposure. | First, when the victim loading is low (i.e., less than or equal to the baseline number of surgical teams and patients),a triage system that prioritizes moderately injured victims followed by severely injured victims followed by mildly injured victims (mod-sev-mild) saves 10% more lives than alternative approaches. Second, as the victim loading increases relative to the resources available (up to 10-fold more patients or 10-fold fewer surgical teams as the baseline), mod-sev-mild saves more than 3-fold more victims than a sev-mod-mild system.  Delaying the care of victims with trauma and >0.7 Gy of irradiation increases the number of lives saved by 1.4-fold compared to a system in which irradiated victims are treated exactly like non-exposed victims.  The mod-sev-mild triage scheme results in less demand for ICU beds than a sev-mod-mild scheme (15,000 vs. 17,000 on the first day). | N/A | 6/9 |
| Cohen, 199884 | Triage | Israel | Analysis of multiple real events  Validation study | Retrospective case review | Explosive | Use American College of Surgeons Committee on Trauma criteria during field triage for blast MCE injuries. | Field undertriage rate - 0/26 (0%) critical patients, 4/28 (14%) severely injured, and 19/143 (13%) moderately injured patients initially classified as less severe  Field overtriage rate - 12/36 (33%) minor injury patients initially classified as more severe | Experience of field triage providers | 4/8 |
| Cone, 200969 | Triage | US | Exercise, drill, or training program | Post only with comparison group: Benchmark | All-hazards | Use of the Sort- Assess- Lifesaving Interventions- Treatment/transport (SALT) triage protocol. | Study participants (paramedics) using SALT had a 78.8% accuracy rate. The overtriage rate was 13.5% and the undertriage rate was 3.8%. The undertriage rate is lower than the 5% the authors assert is standard in the literature.  Average triage time was 15 seconds (median: 11.5 seconds; range 5-57 seconds). | Time elapsed between training on triage method and application of methodology.  Training level and experience of triage provider (EMT, Paramedic, MD, etc.) may also influence accuracy | 5/8 |
| Cone, 200874 | Triage | New Haven, CT | Exercise, drill, or training program | Post only with comparison group: Gold standard triage category | Chemical | Use combined trauma/CBRN-specific triage method during an MCE. | Overtriage rate (1.8%, 1/56 patients)  Undertriage rate (10.8%, 6/56 patients)  Triage speed - 19 seconds per patient | Inaccuracy in triage mostly due to missing signs of chemical toxidrome | 6/8 |
| Cryer, 201095 | Triage | Los Angeles County, CA | Analysis of multiple real events | Pre-post | Transportation accident | 1) Use a trauma system performance improvement program to evaluate MCE response, identify shortcomings, and change policy based upon the findings.  2) Use air transport to facilitate distribution of "immediate" patients evenly to area trauma centers.  3) Encourage EMS to distribute all victims meeting "trauma center criteria" to trauma centers rather than to non-trauma community hospitals. | Regional EMS quality improvement plan can improve the distribution of patients to appropriately resourced hospitals in mass casualty events. In the 2005 train crash only 44% (11/25) of "immediate" patients were taken to trauma centers, as compared to 89% (55/62) in 2008.  In the 2005 crash, only 2 patients were transported by air; in 2008, 34 were transported by air. | N/A | 5/8 |
| Guest, 2009102 | Triage | Western Europe | Prospective cohort study  prospective data collection during conventional care conditions | N/A | Infectious disease: Influenza | Implement Christian et al.'s triage protocol during an influenza pandemic | For prioritizing ICU admission, sensitivity/specificity for "no significant organ failure" were 0.66/0.83, respectively. For the "palliative treatment only" category, sensitivity and specificity were 0.29 and 0.84, respectively.  For prioritizing ongoing ICU care, sensitivity/specificity for "no significant organ failure" were 0.76/0.86, respectively. For the "palliative treatment only" category, sensitivity and specificity were 0.61 and 0.87, respectively. | N/A | 5/7 |
| Gutsch, 200696 | Triage | Western Europe | Exercise, drill, or training program | Post only with comparison group: Benchmark | Unspecified | Use mSTART triage algorithm | Triage time by EMTs was a median of 35 seconds each (average 41 seconds), which compares favorably with emergency physician average of ~3 minutes. EMT critical red over-triage was 5.3% and critical red under-triage was 3% (both are considered excellent). Sensitivity was 88%, and specificity was 94%. | N/A | 4/4 |
| Hirshberg, 201066 | Triage | Not relevant | Computer simulation | N/A | Explosive | 1) Use a 2-stage triage system for large-scale MCEs  2) Use most experienced physician for the first step of triage | Single-step triage works well for small-scale incidents. When resources are overwhelmed, 2-stage triage substantially increases the "time to saturation" (point at which ED is at full capacity).  If two triage providers have 70% and 90% accuracy, assigning the better provider to the first step of a sequential triage increases time to saturation by approximately 50%. | Value of 2-step procedure varies with the ratio of casualties to provider teams  Model does not deal well with the possibility of under-triage in two-step process | 6/9 |
| Janousek, 199983 | Triage | US | Exercise, drill, or training program | Post only with comparison group: Provider groups compared against each other. | Chemical, Biological, Nuclear, Trauma: War | The use of various providers types in doing MCE triage. | Physicians had higher triage accuracy scores than other military healthcare providers (nurses, dentists and medics, using the NATO triage classification system (mean score of 54, compared to 50-- denominator could not be determined). There were no statistically significant differences between emergency physicians, surgeons and general medical officers. Likewise, there were no differences between medics, nurses and dentists. | N/A | 3/7 |
| Kilner, 201062 | Triage | Not relevant | Systematic Review/Meta-analysis | N/A | Explosive, Natural Disaster | Field triage tools for victims of "big bang" incidents (sudden onset MCEs rather than slowly emerging MCEs). | There is limited evidence for the validity of existing triage tools. The authors identify the Sacco triage system as "the most promising" but state that further evaluation of this tool is required. | N/A | 8/8 |
| Kuniak, 200876 | Triage | US | Exercise, drill, or training program | Post only with comparison group: Gold standard disposition categories | Radiological | Use Radiation Injury Severity Classification (RISC) for early triage of radiation MCE casualties when dosimetry data are unavailable | Accuracy of raters’ classification was approximately 95%. | Trend towards training level affecting triage accuracy (MD>RN>EMT)  Hematologic component proved most difficult to score  System allows for the rapid assessment of ARS severity without the availability of dose information  Less complex than other systems (e.g., METROPOL) and is amenable to self-education. | 6/8 |
| Lerner, 201068 | Triage | Augusta, GA & Milwaukee, WI | Exercise, drill, or training program | Post only with comparison group: Benchmark (START protocol) | Explosive | Use of the Sort- Assess- Lifesaving Interventions- Treatment/transport (SALT) triage protocol | Performance using the SALT protocol was comparable to other studies using the START triage protocol. Final triage was correct 83% of the time (CI: 78-88%), compared to START studies (48-75%). 6% were overtriaged and 10% were undertriaged.  Timing using the SALT protocol was comparable to other studies using the START triage protocol. Mean triage time was 28 seconds (Std dev: 22 sec), compared to 30 seconds for START. Further, this study used simulated 'patient' interference, which may have increased triage times. | N/A | 5/8 |
| Navin, 200998 | Triage | Not relevant | Computer simulation | N/A | Unspecified | Use Sacco triage method (vs. START triage) for patients of military age with blunt, penetrating, and blast injuries. | Simulated survivorship improves by 20-300% depending upon the distribution of injuries and resource constraints. | N/A | 3/7 |
| Nie, 201067 | Triage | Asia | Analysis of single real event | Post only with comparison group: Benchmark (START protocol) | Natural Disaster: Earthquake | Use field triage method that accounts for resources at the accepting institution. In this instance, a 'resuscitation' category was added. | The addition of a resuscitation group to standard (START) protocols led to lives saved within that group. 4 of 6 patients in the resuscitation group survived to discharge. These patients would have been classified as 'expectant' under START. | Strategy depends heavily on local decisions.  Accuracy of triage may depend on specialty of physician who conducts initial triage. | 2/8 |
| Rehn, 201065 | Triage | Western Europe | Exercise, drill, or training program | Pre-post | Transportation accident | TAS Triage Method for bus crash type MCE (combines triage Sieve for adults and trauma tape for pediatric patients) | Overtriage rate before implementation of TAS: 9/74 (12.2%), versus 0/74 (0%) after implementation of TAS  Undertriage rate before implementation of TAS: 9/24 (12.2%) , versus 0/24 (0%0 after implementation of TAS  Scene clearance rate - mean: 22 minutes (range 15-32) before implementation of TAS, versus mean: 10 minutes (range 5-21) after implementation of TAS | Need TAS Training  Need TAS Equipment  Probably easier to collect accurate input data under simulation conditions than in real MCE | 6/8 |
| Rodriguez- Noriega, 201089 | Triage | Mexico | Analysis of single real event | Prospective case series | Infectious disease: Influenza | Use Influenza-Like Illness Scoring System to triage adults seeking care at an ED during an influenza pandemic. Patients with high scores are admitted and treated with oseltamivir. Those with intermediate scores are sent home with oseltamivir and followed up by phone daily for 10 days. Those with low scores are discharged home without treatment. | Of 1324 ambulatory patients who were discharged without receiving oseltamivir, 14 (0.8%) returned after their initial visit. Three of these patients were hospitalized and treated with oseltamivir (two of them tested positive for H1N1). | N/A | 5/8 |
| Romm, 201160 | Triage | US, Canada/ Australia/ New Zealand, Western Europe, Asia | Laboratory test | N/A | Radiological, Nuclear | Use fewer metaphase spreads when using the dicentric chromosome assay method of biodosimetry for mass radiological incidents. | Analyzing 50 metaphases gives reliable and accurate individual dose estimations over the dose range of 0.75 to 4.5 Gy. Most of these dose estimations are within 20% of the actual doses. Dose estimations based on analysis of only 20–30 metaphases allowed an accurate evaluation in the higher dose ranges. (Routine standard is 500-1000 metaphases) | Range of exposure doses and uniformity of exposure will impact effectiveness of strategy. | 5/5 |
| Sacco, 2007101 | Triage | Not relevant | Computer simulation | N/A | Any MCE associated with penetrating trauma | Use Sacco Triage Method (as compared to START) for victims with penetrating trauma injuries during an MCE | Under severe resource restrictions, the Sacco Triage Method may save up to an additional 6 to 16 individuals (among 60 simulated victims); whereas the minimum survival benefit is between 0 and 7 victims. When resources are not constrained, the method saves at most 5 additional victims (out of 60). | Method requires inter-hospital coordination with respect to reporting resource availability and receiving patients  Method also requires robust communication systems | 5/7 |
| Schenker, 2006100 | Triage | New York, NY | Exercise, drill, or training program | Post only with comparison group: Benchmark | Chemical, Explosive, Transportation accident | Implement START triage algorithm during mass casualty event | A total of 88/121 patients (70%) were triaged accurately.  A total of 29 of 47 patients (62%) were managed appropriately when their clinical status was altered as part of the exercise. Six patients who underwent status changes indicating a possible myocardial infarction or asthma attack were classified as over-triaged according to START but were judged to be managed appropriately by exercise staff. | N/A | 6/8 |
| Zoraster, 200778 | Triage | Los Angeles, CA | Analysis of single real event | Retrospective case review | Transportation accident | Use of START triage by a regional trauma network to prioritize transport of MCE patients and to distribute them among area hospitals. | Trauma centers were underutilized and community hospitals received critical patients that they were poorly equipped to handle. | Hospital capacity self-report was inaccurate  START categorization scheme was imperfectly understood  START triage categories differ from trauma center criteria, causing confusion | 4/6 |