

Triage is Broken



By Mick Navin, MS, & Bob Waddell II, EMT-P

Triage is broken,” former Air Force Surgeon General P.K. Carlton, MD, told attendees of the 2004 Medical Readiness Conference, who included U.S. Surgeon General Richard Carmona. “There is no scientific basis for the current system. It is not scalable, not reproducible, and does not lend itself to computer applications!”¹

Data from the Madrid train bombing of March 2004 support Carlton’s contention.² Of 312 patients “red-tagged” as needing immediate care (i.e., those expected to die without immediate medical intervention), only 89 required hospitalization for more than 24 hours. Did the other 223 patients truly require the extraordinary resources needed to provide immediate care? This may have wasted money, and it may have cost lives: Patients arrived at treatment facilities over a three-hour span. How many of the 14 in-hospital deaths received delayed care due to the mistriaging of others?

On January 26, 2005, two commuter trains with 241 passengers derailed in Glendale, CA.³ The 129 injured were transported by 24 ambulances and three helicopters to 13 area hospitals. How does an EMS responder to such a scene determine the order in which to send patients, make the best use of helicopters and ambulances and maximize the saving of lives? How does a harried triage officer ensure that he’s not just moving the disaster to the hospital, as has happened in 75% of U.S. mass-casualty incidents in which a majority of patients were sent to a single hospital?⁴

Was the triage strategy in Glendale effective? There is no way to know. Current triage strategies don’t measure patient outcomes. This helps explain why the American College of Surgeons suggests that an overtriage rate of at least 50% is desirable, so as to not miss critically injured patients.⁵

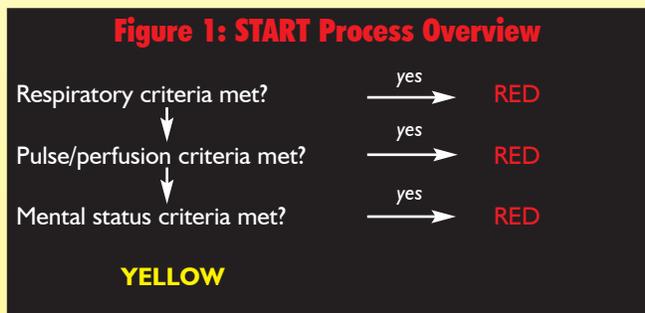
A recent study further indicates problems with current triage pro-

ocols. A mass-casualty tabletop exercise conducted across six EMS regions in Pennsylvania in 2003–04 demonstrated extraordinary inconsistency in triage within regions and across the state. The inconsistency was evident in the tagging of victims and in setting priorities for treatment and transport. The results of this study are the subject of this article.

Background

Triage is typically based on a method called Simple Triage and Rapid Treatment (START). The system was developed in the 1980s as a way to manage the chaos of a multiple-casualty scene. Most versions of START begin by separating ambulatory or walking wounded patients: Those able to move to another area are asked to do so. These patients are identified with green tags. Often they receive little or no further assessment until medical resources are abundant.

For those remaining, START uses a series of three physiological screens—respirations, pulse or perfusion, and mental status—to classify victims as “immediate” or “delayed.” As shown in *Figure 1*, a victim is classified as “immediate” and given a red tag if their respiratory rate, pulse/perfusion or mental status meet certain criteria. If these criteria aren’t met, the victim is classified as “delayed” and yellow-tagged.



REUTERS/Gene Blevins

The triage strategy is to send red-tagged victims for treatment first, followed by the yellows. While there are not objective criteria for differentiating patients within the groupings, worst-patient-first is the suggested and typically practiced protocol. There is no adjustment to this process for the number of casualties, the abundance/scarcity of resources or blunt/penetrating trauma.

The Study

In 2003, the Pennsylvania Department of Health's EMS Office initiated a demonstration program involving six of the state's EMS regions, representing 29 counties and 279 emergency personnel, including first responders, EMT-Basics, paramedics, RNs, emergency physicians and a few regional- and state-level EMS policy makers. All used color-coded tagging to set triage priorities on hypothetical patients, though their protocols varied slightly. Regions A, B and C all used START. Region D did not know it by name but used a START-like protocol based on respiratory rate, pulse and mental status. Region E extended START, using physiological screens and subjectively adjusting for observable injury and severity. Region F is rural and had no mass-casualty triage protocol at the time.

Each region, depending on its number of participants, was involved in one or two sessions that included tabletop triage exercises. Teams of 3–5 personnel were challenged to tag simulated victims as immediate, delayed, ambulatory or expectant. Teams then prioritized the victims for transport and treatment. Patient information was provided on profile cards that included a description of observable features of each victim and their injuries. Additional data on pulse rate, respiratory rate, blood pressure, capillary refill, pulse oximetry and motor response were provided as well. The distribution of victims, if they were tagged according to standard START protocol,⁶ would have been 25 immediates and 20 delayed. Victim severity within each category was within allowances of the protocol.

The tabletop was expected to show inconsistencies in setting priorities within tag categories, as current protocols give no explicit guidance for ordering within groupings. The tabletop was not, however, expected to show

Region (teams)	Red	Yellow	Green	Black
Region A (11)	10–40	2–15	3–19	0–17
Region B (3)	10–20	7–20	1–10	3–10
Region C (13)	7–40	4–20	0–11	0–13
Region D (19)	4–44	1–20	0–29	0–13
Region E (19)	6–22	7–19	7–22	0–11
Region F (5)	13–26	13–18	3–11	0–11
Range	4–44	1–20	0–29	0–17

a wide inconsistency in tagging.

Results

Tagging of Victims Shows Wide Variability—The tabletop exercise required participants to use their current protocols to tag victims with red (immediate), yellow (delayed), green (ambulatory) and black (expectant) tags. All regions used some variety of color-coded tagging to indicate patient severity; per protocols, decisions were typically based on objective criteria. In practice and in this exercise, however, most of the 70 teams based their decisions at least in part on subjective and sometimes lengthy discussion and debate.

The numbers of victims tagged with each color varied widely within and across regions. As shown in *Table 1*, the number of red-tagged victims—those identified as top priority for transport and treatment—ranged from four to 44 out of 45 victims. Even Region B, with only three teams, ranged from 10–20. Likewise, the yellow-tagged ranged from 1–20, and the green-tagged from 0–29 even though, by the standard START protocol, there were no greens in the exercise. The black-tagged ranged from 0–17—again, despite there being no expectants by standard START protocol.

Triage Priorities Suggest Almost-Random Selection of Victims for Transport and Treatment—After tagging the victims, participants sorted them by priority for transport and treatment. A comparison of the top 10 victims across the teams within each region and across regions indicated a complete lack of consistency. In some cases this was extreme: A victim deemed a first priority by one team was selected as the last priority by another team

within the same region. In Region B, for example, and as shown in *Table 2*, Victim No. 22 was selected as the first priority by Team 1, 45th by Team 2 and 44th by Team 3. Victim No. 30 was chosen as the top priority by Team 2 and the 45th priority of Teams 1 and 3. In fact, *every* victim appearing as one of the three lowest priorities for one team also appears as a top-10 priority for another team. The implications are astounding: As a victim, you get one triager and you go immediately to the hospital. Get a different triager, and you're deferred at the scene. Triage should not be luck of the draw!

Similar situations were observed in all sessions. Across all regions, 40 of 45 patients were selected at least once among the bottom three, and all 45 were in at least one top-10 list:

- *Region A:* More than half of patients shown as bottom-three priorities also appear in top-10 lists. Victim No. 19 appears five times as a low priority and three times as a top priority.

- *Region C:* Victims No. 1, 4 and 30 all appear as first and last priorities.

- *Region D:* Victim No. 30 appears multiple times as a top-10 priority and a bottom priority, and also appears as both the first and last priority. There were no victims common to all top-10 lists; in fact, no victim was observed to be in more than half of the top-10 lists.

- *Region E:* This region had the least overlap of any region between top-10 and bottom-three priorities, yet 39 different victims appear at least once in a top-10 list, and 18 appear as a bottom-three. Victim No. 30 appears twice as the highest priority and twice as the lowest priority. Victim No. 44 appears as a first and second priority, yet also appears three times as a last priority.

Region B	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	43rd	44th	45th
Team 1	22	20	27	1	21	44	5	19	42	16	2	17	30
Team 2	30	44	1	11	13	23	45	18	39	29	2	20	22
Team 3	1	2	16	18	4	17	31	9	45	3	21	22	30

• *Region F:* This region had only one common victim, No. 5, among the top-10 lists of all five teams.

What cannot be seen from these lists but was occasionally observed during the exercise was the teams' tendency to disregard tag colors when determining priority. This was curious and indicated a lack of trust in the tagging.

There were also suggestions that additional colors were needed to refine the prioritization. Colors such as orange, "really red" and yellow-green were suggested in a tongue-in-cheek manner. One firefighter in Region C characterized the dilemma of prioritizing tagged victims as "There are reds, and there are reds!"

Participants said they expected variations in the selection of top 10s, but most were shocked at the level of inconsistency.

Other Factors—Participants said they considered other factors beyond their protocols during actual triage situations. Participants said field triage is based on the experience of the triage and transport officers at the scene, but they acknowledged that such officers would often triage differently. One paramedic even said that if he were asked to repeat the exercise the next day, he would expect a different result.

Additional factors consistently mentioned as influencing triage decisions included:

- Type of trauma
- Age of victim
- Number of transport and treatment resources available
- Type and proximity of treatment facilities
- Access/egress characteristics (i.e., processing capacity) of scene
- Potential that victim will survive
- Cycle time of ambulances to the scene
- Weather (for helicopter transport)

Participants acknowledged that considering such factors further complicates field triage decision-making, and expressed doubt that any protocol could be so inclusive as to encompass all of them.

Conclusion

START and START-like protocols lead to strikingly inconsistent results. The tagging of victims is widely variable. This seems due to two primary factors:

1) Emergency responders cannot be expected to remember the precise START decision tree when it is rarely used (most often in annual exercises). They must instead utilize the flowchart-type START protocol.

2) Emergency responders openly

acknowledge a lack of confidence in the protocol and rely on their experience and best judgment in making triage decisions. They realize this requires them to "play God," so to speak, and for many it's one of the most emotionally challenging aspects of their job.

The inconsistency in setting priorities within START and START-like protocols is extensive, but not surprising. Such protocols offer no explicit guidance to differentiate priority within the categories of immediate and delayed, and categories can contain wide variations in severity. A victim might be red-tagged due to a high respiratory rate, yet have a normal pulse and mental status, while another red-tagged patient with a high respiratory rate might also have significantly abnormal pulse and mental status. This leads to survival rates for red-tagged victims that range as high as 97%.⁷ This surely indicates that immediate-need victims aren't being as accurately identified as the protocol intends.

Further, the protocol does not account for resources. Study participants openly acknowledged that their strategies in the tabletop exercise would be different if resources were more constrained or more abundant.

As well, START protocols are not scalable. The best strategy for a 20-victim incident is not the same as for a 200- or 2,000-victim incident, yet the protocols provide no guidance or adjustment. Emergency responders try to adjust on their own.

Every group of participants was asked what the goal in a mass-casualty event should be, and every group said to "save as many lives as possible." The goal of START is "to do the greatest good for the greatest number." This goal is not explicit and cannot be measured.

The ramifications of these inconsistencies are significant. They may cost lives. Imprecise and subjective START and START-like triage protocols unnecessarily burden emergency responders with making life-and-death decisions under impossible circumstances. The tag color is the only tool at their disposal, yet they consider the availability and timing of resources, the patient's prognosis and many other factors as they try to save as many lives as possible.

The wide use of color-coded tagging gives a false sense of interoperability. While it is true that many EMS regions use color-coded tags, not only did this study uncover profound differences from one region to the next, but the level of inconsistency within regions makes the strategy almost random, and interoperability a complete misnomer.

As Dr. Carlton said, "Triage is broken!" ■

The data and conclusions presented herein were drawn from an unpublished 2004 report provided to the Pennsylvania Department of Health and participating EMS regions. The results are not unique; similar tagging and ordering inconsistencies were seen in comparable sessions in New Jersey and Florida.

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The report included all data and results by region, and also included results from tests of the Sacco Triage Method. The authors wish to acknowledge their affiliation with the Sacco Triage Method (STM), an evidence-based triage methodology recently peer-reviewed in Academic Emergency Medicine. The STM will be covered in the September issue of EMS Magazine.

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