Lights and Siren: A Risky Business?

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> The Fates and Furies, as well as the Graces and Sirens, glide with linked hands over life.
>
> —Jean Paul Friederich Richter, *Titan*

Emergency medical services (EMS) vehicles use lights and siren to reduce response and transport time. During the last few decades, objective data have continued to mount against the routine use of this traditional practice. Patient outcomes are infrequently improved, and the use of lights and siren places the public, patient, and EMS provider at potential risk by increasing the frequency and severity of ambulance crashes.[1]

To determine whether there was a direct association between ambulance crashes and the use of lights and siren, Watanabe et al[2] performed a retrospective cohort study that looked at 2016 data from the National EMS Information System database. After analyzing 19 million 911 response calls throughout the year, they determined a positive correlation with the use of lights and siren and increased ambulance crashes. During the response phase, crash rates were 4.6 in 100,000 ambulance runs and 5.4 in 100,000 ambulance runs without and with lights and siren use, respectively (adjusted odds ratio 1.5). During the transport phase, crash rates were 7.0 in 100,000 ambulance runs and 17.1 in 100,000 ambulance runs without and with lights and siren use, respectively (adjusted odds ratio 2.9). The adjusted odds ratios of 1.5 and 2.9 may seem modest, but consider the implications in terms of effect on patients and EMS providers, as well as innocent bystanders. More than 20 years ago, Wolfberg[3] noted that EMS vehicle crashes were associated with medicolegal risk and subject to insurance claims of greater than $10,000.

Important limitations focus on the study design, which relied on the National EMS Information System, a reliable but incomplete database not inclusive of all EMS agencies in the country and data recording that is highly dependent on agency and provider self-reporting. Factors such as weather, traffic conditions, transport conditions, or transport distance would contribute significantly to the understanding of the topic, as would details of number of people (including patient, EMS provider, and third party) and types of injuries associated with the crashes.

Traditionally, the use of lights and siren has resided at the crossroads of the public safety and medical fields, with the use often dictated by the norms of the former.[4] In 1994, the National Association of EMS Physicians and the National Association of EMS Directors (now known as the National Association of State EMS Officials) published a joint position statement on the use of lights and siren during EMS response and transport and recommended close oversight by EMS medical directors to ensure that it is necessary.[5] Furthermore, they suggested the use of standardized protocols and emergency medical dispatch prioritization to guide the use of lights and siren. The degree to which the joint position statement has been implemented across the spectrum of EMS agencies is not known and is ripe for study. Given that nearly 25 years has transpired since the joint position statement was last updated, it may be time for revision.

During the last 3 decades, there have been multiple studies that have shown that ambulance crashes are not only responsible for 59% of occupational EMS fatalities but also are a great burden of injury and death for persons not in the ambulance. Bui et al[6] performed a mixed-method review looking at interventions to prevent emergency service vehicle incidents and found 2 studies that investigated reducing the use of lights and siren: the Fire Department of the City of New York estimated a 32% reduction in crashes during their test period with updated lights and siren protocols. They had similar results in other departments, with reported reductions in crash rates as high as 78%. Colorado Springs estimated a 10% to 20% reduction in Code 3 driving (ie, use of lights and siren) after restricting lights and siren use.[6] Other studies have shown that the use of lights and siren may shorten response intervals by only a few minutes, thus giving more

justification that EMS protocols should reflect a focused and infrequent use of lights and siren. But even so, gaps in knowledge remain, such as the proportionate burden on the public in terms of private motor vehicle crashes and civilian injuries associated with ambulance events. Also, not well explored is the response phase and its associated risk: many out-of-hospital responses involve fire-fighting vehicles or even private vehicles driven by volunteers, and crash research in this context is very limited.

In a recent piece, Wolfberg[7] opined that "citizens and elected officials demand fast EMS responses, mistakenly equating 'faster' with 'better'…even though quality usually has nothing to do with speed." Adjusting the public's expectations on the use of lights and siren is undoubtedly a major component in the drive toward reducing its use. Obtaining hard data on lights and siren use may require taking a lesson from the cardiac arrest experience. Since the 1980s, Utstein-style guidelines have been created for multiple aspects of resuscitation both inhospital and out-of-hospital, resulting in uniform definitions and reporting structures that have led to significant advances in our understanding, with resultant changes in our clinical practice. Stakeholders such as the National Association of EMS Physicians and National Association of State EMS Officials should reconvene to develop uniform definitions and guidelines for the reporting of ambulance crashes. The revised guidelines should reflect new technologies such as global navigation systems and "black box" vehicle event recorders. This will encourage agencies to collect data that promise to improve individual crash investigations and, when reported to a database, significantly enhance the ability to conduct research. The goal is to strengthen the hand of EMS medical directors to provide evidence-based education to out-of-hospital leaders and providers, and to engage the community at large in a campaign of cultural change toward reduced use of lights and siren.

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