**////Title: The Critical Intervention Screen: Improving Safety in the Transport of Trauma Patients**

**////Stand-first**:

Lights and sirens on ambulances are used in emergencies to accelerate the transport of critical patients to hospital but unfortunately, can increase the risk of motor vehicle collisions. Emergency medical service personnel are those most commonly injured during these collisions and the general public account for the majority of fatalities. Shane Urban at UC Health University of Colorado Hospital, USA, set out to develop a novel, prehospital triage tool that can determine when best to use lights and sirens during the transport of trauma patients.

**////Body text:**

The use of emergency lights and sirens (L&S) by ambulances is a topic of considerable debate in emergency medical services (EMS). Using L&S shortens the transport time to the hospital and is critical to life-saving efforts in emergency situations. However, using L&S on ambulances increases the risk of traffic accidents, endangering the lives of EMS personnel, their patients and also the public.

The use of L&S is most beneficial to trauma patients who require critical intervention upon hospital arrival. A trauma patient is someone who has suffered a physical injury, usually categorised as a blunt or penetrating wound, that ranges from minor to life-threatening. Importantly, the speed at which trauma patients can be treated impacts their chances of survival.

Providing care to acutely injured patients presents several challenges to EMS workers who must be mindful of the environment they are in. Frequently working in chaotic and rapidly changing situations, EMS workers need to make important decisions quickly.

The decision to use L&S is currently determined by factors such as the distance the patient is located from hospital, the time of day, the weather conditions and the condition of the patient. Currently, the decision to use L&S is made either based on established protocols or the judgements of the EMS provider.

Shane Urban and his colleagues from UC Health University of Colorado Hospital in the USA set out to evaluate the current use of L&S in their trauma centre and ultimately, develop an evidence-based tool to aid EMS professionals in quickly making the decision whether to use L&S when presented with trauma patients in the field.

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First, the researchers reviewed existing EMS protocols for using L&S and found no explicit mention of L&S versus non-L&S decisions. They then contacted local EMS agencies and found that no EMS agency that replied to their query had a specific L&S protocol.

Next, the researchers studied records from 1,296 patients gathered over an 18-month period and collected data from the hospital trauma registry, pre-hospital trip sheets and the electronic health record to identify the cohorts of patients most likely to benefit from emergency transport. Of these patients, 217 had received a critical intervention and 112 had received a critical intervention within 20 minutes of arriving at the hospital.

To define the necessary components for the proposed critical intervention screen, the researchers searched the records for the most frequently used interventions. These critical interventions were administered to trauma patients within the first 20 minutes of arrival at the trauma centre.

They found the most frequently administered critical interventions included intubation (administering a tube to keep the airway open so that air can reach the lungs), chest tube placement (implementing a chest tube that can drain blood, fluid, or air from around the lungs, oesophagus, or heart), invasive vascular access (the ability to enter the vascular system of the patient to administer fluid and medications), thoracotomy[tho-ra-co-tomy] (an incision made between the ribs to access the thoracic[tho-ra-sic] cavity), resuscitative[re-sus-ci-ta-tive] endovascular balloon occlusion of the aorta (which involves placement of an endovascular balloon in the aorta to control bleeding), packed red blood cell administration (the injection of packed red blood cells into a vein) and finally, delivering the patient to an operating theatre.

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Next, the researchers looked for factors readily available to prehospital providers that could predict the need for critical intervention which could be used to develop predictive models for their critical intervention screen. They found five factors that were most predictive of the need for critical intervention.

These factors include a patient with a penetrating injury to the abdomen, back or thorax, impairments to consciousness as assessed by the Glasgow Coma Scale Motor (GCSm) score, a need for assisted ventilation, and finally low systolic blood pressure (where systolic blood pressure was less than 100).

Next, to make a simplified predictive model for ease of use, they identified the three most predictive factors which were 1) GCSm (the level of consciousness of a patient based on motor responses), 2) a penetrating injury to the trunk, and 3) the need for assisted ventilation.

Assisted ventilation, GCSm score and penetrating trauma to the trunk were found to be highly associated with a need for time-sensitive intervention, an observation which is consistent with prior studies.

The researchers then tested their simplified screening tool to determine how well it could predict which patients would require critical intervention. They compared the decisions made by EMS personnel based on normal L&S practices and those predicted using the critical intervention screen.

Overall, they found the EMS were able to reliably identify 91% of these patients and use L&S correctly. They identified that occasionally L&S was employed by EMS in situations where the use of L&S was unlikely to have improved the clinical outcome for the patient.

Interestingly, when using the critical intervention screen, the specificity of identifying a patient that needed critical intervention in the first 20 minutes of arrival at the hospital was significantly improved compared to usual L&S practices. They also found that using the critical intervention screen did not compromise the ability to identify patients that require critical interventions.

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The critical intervention screen developed by Shane Urban and colleagues provides an easy to remember and simple predictive framework for EMS workers in the field. Data were collected retrospectively, and the intervention was validated using the same dataset used in its development, so further work using external datasets is necessary. However, the results from this study overall suggested that using the critical intervention screen could lead to an important 25% reduction in the use of L&S compared to current practices.

Consequently, employing the critical intervention screen in trauma centres would reduce the risk of fatalities and injury related to using L&S during the transport of trauma patients. The critical intervention screen is the first easy to use, trauma-specific protocol for EMS developed to date and represents a promising new method to limit the risk of motor collisions and improve the safety of EMS personnel, patients and the public.

This SciPod is a summary of the paper ‘The Critical Intervention Screen: A Novel Tool To Determine The Use Of Lights And Sirens During The Transport of Trauma Patients’, from Prehospital Emergency Care. DOI: https://doi.org/10.1080/10903127.2021.1961040

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