The Golden Hour in Trauma: Dogma or Medical Folklore?

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Editorial

The golden hour in trauma: Dogma or medical folklore?

The term “golden hour” is a well-known lexicon among trauma surgeons and emergency medical service (EMS) providers who care for injured patients on a daily basis. The underlying tenet of this adage suggests an injured patient has 60 min from time of injury to receive definitive care, after which morbidity and mortality significantly increase. Teleologically, this seems to make great sense, as no one would argue an injured individual should be left bleeding on the streets for an extended period of time. Nevertheless, like many holy shrines in medicine once exposed to the light of evidenced-based review, one finds the literature does not necessarily support our biases.

The vernacular “golden hour” is widely attributed to R. Adams Cowley, founder of Baltimore’s renowned Shock Trauma Institute, who in a 1975 article stated, “the first hour after injury will largely determine a critically injured person’s chances for survival” [1]. With no data or references to support his claim, the foundation for this assertion was unclear. It is widely believed Cowley stated this in an attempt to win support for a shock trauma hospital and a helicopter program that would fly any trauma victim in the state of Maryland to a trauma hospital in Baltimore within 60 min (the golden hour). Since the inception of this mantra, a companion has arisen in pre-hospital lore known as the “platinum 10 minutes.” Like the golden hour, the platinum 10 minutes places a time constraint on the pre-hospital care of seriously injured patients, stating no patient should have more than 10 min of scene-time stabilization by emergency medical personnel prior to being transported to definitive care at a trauma centre. This dogma likely arose from the military, as many battlefield fatalities occur within the first minutes post-injury [2]. Cowley’s emphasis on a golden period post-injury was integral to improving outcome at a time when many trauma patients were dying due to the lack of an organized system of trauma care and insufficient pre-hospital treatment. It is unlikely, however, that Cowley ever intended for this idea to be applied to all trauma patients decades later.

In the decades following the introduction of the concept of the golden hour, a billion dollar industry of trauma systems, trauma centres, aeromedical rescue, and advanced pre-hospital life support has emerged. In an effort to limit the time from injury to definitive care, well-intentioned ambulance crews often careen swiftly through busy streets, transporting injured patients in crowded driving conditions, or air ambulances fly in less than ideal weather, expediting prehospital periods. Rapid transport to the hospital has become a standard of care expected of EMS providers. However, a significant and growing body of evidence calls into question the benefit of rapid transport of trauma patients.

Evidence supporting the golden hour

Two of the most prominent studies finding a significant correlation between reduced out-of-hospital time and decreased mortality were from Quebec in the 1990s [3,4]. The 1993 study by Sampalis et al. [3] found that total pre-hospital time over 60 min was associated with a significant increase in odds of mortality, and the 1999 study by the same group of researchers [4] found reduced pre-hospital time to be associated with reduced odds of dying, when controlling for injury severity and patient age. Additionally, reduced pre-hospital time has been found to be beneficial in specific patient populations, including severe head injury [5,6], intra-abdominal bleeds [7], severe thoracic injuries [8–10], and rural trauma patients with long EMS transport times [11]. Two EMS studies from the United States [12,13] further supported the importance of shorter pre-hospital time periods: a 2002 study by Blackwell et al. [12] found that EMS response times of less than 5 min were associated with improved survival in a cohort of both life-threatening and non-life-threatening EMS calls, and a 2005 study by Pons et al. [13] found that EMS response times within 4 min resulted in a significant survival benefit for patients with intermediate and high risk of mortality. It is important to note that these studies [12,13] contained mixed populations, including patients with non-traumatic cardiac arrest.

Negative or inconclusive evidence for the golden hour

Despite the findings of the aforementioned studies, the validity of the golden hour and the link between pre-hospital time and outcome are far from conclusive. With the exception of patients with non-traumatic cardiac arrest [14,15], no field-based population has consistently demonstrated a significant association between response interval and survival. One of the most comprehensive investigations of time to definitive care in trauma, a 2010 prospective cohort study by Newgard et al. [16] of 146 EMS agencies transporting patients to 51 trauma centres in North America, identified no relationship between EMS intervals and in-hospital mortality among injured patients with physiologic abnormality. This finding persisted across several subgroups, including injury type, age, and mode of transport [16]. A 2012 German study by Kleber et al. [17] found similar results, identifying no significant survival advantage for trauma patients with shorter pre-hospital rescue times. This finding is supported by studies conducted in Canada [18], the United States [19–22], and Italy [23].
Despite conflicting evidence regarding the golden hour, rapid EMS transport to medical facilities remains the standard of trauma care. In the aggregate, there is significant evidence indicating that many trauma patients do not need to be rushed to the hospital [16–23], with some research even indicating a slower, smoother transport to the hospital would be beneficial for both patients and pre-hospital providers. A 2010 study by Chung et al. [24] found that increased ambulance speed negatively affects the quality of chest compression during transport. EMS workers have a documented fatality rate of 12.7 per 100,000 workers, more than twice the national average of 5.0 per 100,000 [25]. By some estimates, the risk of transportation-related injury to EMS workers and their patients may be five times the national average risk of transit injury [26]. These deaths and injuries are largely attributed to helicopter and ambulance crashes, resulting from the emphasis on shorter pre-hospital time frames [27,28].

Perspectives

Admittedly, there are limitations to studying the significance of the golden hour. For example, there are multiple time periods that may be evaluated, including time from event to 911 notification (discovery time), 911 notification to hospital arrival (EMS transport time), and hospital arrival to treatment. As a result, there are many different contexts in which the golden hour can be assessed. Also, determining precise time periods can be quite difficult. For instance, the time of injury may be missing or inaccurate in the unobserved. This inexactness results in difficulty evaluating time to definitive care and time to death [29].

Certainly there are significant potential negative effects of discarding the golden hour that must be seriously considered. Misinterpretation of literature questioning the importance of time to definitive care could have unfortunate consequences on patient care as health administrators may begin to use recent research studies as proof that they no longer need to invest in timely care of trauma patients. They may initiate transport cuts and reduce staff and funding of trauma centers. This would be a great misfortune for trauma patients, as a 2006 study by Mackenzie et al. [30] demonstrated a 25% reduction in mortality with trauma centre designation. The implications of the literature refuting the golden hour must be carefully examined before any hasty changes are made to current trauma and EMS care models.

The purpose of this article is not to completely disregard the importance of the golden hour dictum. There is an aspect to trauma care that is very time dependent. But, it is wrong to place an arbitrary time, such as 1 h, on a patient in need of definitive care. Every patient coming through the ED doors to the trauma resuscitation area is unique. For a patient who has a gunshot wound to the heart with rupture of the left ventricle, it may be a golden 5 min, not a golden hour, which makes a difference between life and death. Conversely, for a patient who is in a car accident who has an isolated tibia fracture, it may be a golden day or two. Lights, sirens, and speeding in transport of the patient may be unnecessary and may even expose the patient and EMS crew to unnecessary risk. In the year 2014, it is important to look at the evidence-based medicine that either supports or refutes our widely held beliefs. In this way, we can begin to more intelligently design a trauma care system that begins to address the needs of each patient.

Conflicts of interest

The authors have no sources of funding or conflicts of interest to declare.

References

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