

**Title: A critical appraisal of the 'golden hour'**

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**Word Count: 1474 (excluding cover page, title page, reference list, and appendix)**

**Title:** A critical appraisal of the ‘golden hour’

**Report by:** Courtney Hollis

**Clinical scenario:**

A call has been received to a multi-systems trauma patient involved in a high-speed motor vehicle accident. Paramedics note the patient has multiple injuries including blunt chest injuries, a closed head injury, a pelvic injury, and multiple limb fractures. The patient is haemodynamically unstable. Paramedics have access to critical care and high acuity resources in a metropolitan area. On scene management of all injuries is possible, however prolongs scene time and time to a major trauma centre.

**PICO (Population – Intervention – Comparison – Outcome) Question:**

In pre-hospital trauma patients, is the “golden hour” supported by evidence to improve survival and affect patient mortality?

**Search strategy:**

A search was conducted via two online databases: Medline Ovid and Embase. The search terms, limits, and results are listed in the table below. To review the PRISMA diagram of the search refer to Appendix A.

**Table 1.0: Search strategy**

<b>Database:</b>	<b>Search terms:</b>	<b>Limitations:</b>	<b>Results:</b>
Medline OVID	(Golden hour, transport time, scene time) AND (trauma, major trauma, multi-system trauma) AND (prehospital)	2013-2019, English only, humans only, abstracts available	63
Embase	(Golden hour, transport time) AND (prehospital)	2015-2019, English only, humans only, abstracts available	102

**Relevant Papers:** Five (5)

<b>Author, date:</b>	<b>Population:</b>	<b>Design:</b>	<b>Outcome:</b>	<b>Results:</b>	<b>Strengths and Limitations:</b>
(Newgard et al., 2015)	2,017 trauma patients that required ALS EMS within Canada and the U.S. were included in the study.	Randomised Controlled Trial	The primary outcome was to evaluate the association between out-of-hospital time and patient outcomes. The results were based on two groups: shock and TBI. The outcome for the shock group was a 28-day mortality and for the TBI cohort, a 6-month GOSE (Glasgow	There was no overall association between prehospital time and patient outcomes in both groups. The shock group requiring early critical hospital resources arriving after 60 minutes was found to have a higher 28-day mortality. This finding was not observed in the TBI group.	(+) Annals of emergency medicine is a high-quality journal with an impact factor of 5.352. (+) This is a strong study (RCT), conducted in the last five years. (+) This study consisted of a large sample size, collecting data from 81 EMS agencies over three years. (+) The study used multivariable logistic regression models to test for association between out-of-hospital time and outcomes in the two groups. Multiple configurations were used to evaluate the relationships.

			Outcome Scale Extended).		<p>(+) To reduce bias in the study, multiple imputations were used to handle missing data values.</p> <p>(+) The priori for the subgroup analysis found good plausibility for the findings.</p> <p>(-) Limitations were identified in the study such as: EMS provider behaviour may allow confounding and bias.</p> <p>(-) Subgroup analysis' (shock group finding an association between time and outcomes) are known to have limitations - statistical efficiency/chance.</p>
(Brown et al., 2019)	Data from 1,625 trauma patients with an ISS	Retrospective study	Determining the association between prehospital	Multivariate logistic and log-linear regression analysis were	(+) Prehospital emergency care is a good quality journal with an impact factor of 2.690.

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of >15 was collected from St Johns Ambulance Service paramedics in Perth, WA.	time and outcomes in major trauma patients. The primary outcome was a 30-day mortality, with the secondary outcome being the length of hospital stay for 30-day survivors.	completed. Inverse probability of treatment weighting (IPTW) was used as well. No significant association was found between pre- hospital on scene time and patient mortality. However, longer on- scene time resulted in longer hospital stays.	(+) This is a strong study (retrospective) that addresses the PICO question and was conducted recently – 2019. (+) This study utilises IPTW to reduce confounding. (+) The use of multivariate logistic and log-linear regression analysis is beneficial and helps prevent confounding. (-) Limitations were identified in the study including: a small sample size that may make the study prone to type II error and an inability to measure precise pre-hospital times due to inaccuracies in data collection.
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<p>(Maddry et al., 2018)</p>	<p>669 patients met the criteria (ISS of <math>\geq 10</math>) with either amputations or non-compressible torso injuries. The data was compiled from the MEDEVAC records from the U.S. military 2011 to 2014.</p>	<p>Retrospective study</p>	<p>This study was designed to determine the impact of time from MEDEVAC request to arrival to medical facilities on morbidity and mortality.</p>	<p>The patients were separated on the basis of amputation and NCTI. The group with amputation and NCTI had the highest mortality with transport time <math>&gt;60</math> minutes. The other groups didn't have any correlation between mortality and times.</p>	<p>(+) This is a strong study (retrospective), conducted within the last five years.          (-) Military medical research has an impact factor of 1.51.          (-) The sample size of the study was 669 which is relatively small.          (-) The study was conducted based on military injuries and information. Thus, it may have an impact on the value of the 'golden hour' as it was being applied in different settings. The study is reflective of combat-injured patients and not civilian trauma.          (-) The study was observational and therefore, not</p>
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randomised. There is potential for bias within the study.

(-) The impact of transport time is affected by the availability of pre-hospital resources and thus, may differ in determining the effectiveness of the 'golden hour' in civilian populations.

(Kim et al., 2017)	2,257 patients had data collected from the Korean EMS trauma registry throughout 2012.	Cross-sectional study	The aim of this study was to determine what impact pre-hospital time has on the survival of severely injured patients. The primary outcome was	For this study, severe trauma patients were required to: have an AVPU response of $\leq V$ , systolic BP of $< 90$ mmHg, or a respiratory rate of $< 10$ or $> 29$ . Patients with ISS of $< 9$	(+) Prehospital emergency care is a good quality journal with an impact factor of 2.690. (+) This is a recent study, conducted within the last five years. (+) This study consists of a large sample size: 2,257 patients. (+) The study utilises multi-linear regression
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in-hospital mortality. were excluded. analysis to adjust for confounders. It was found that longer prehospital times didn't increase mortality. (-) Time variables in EMS data collection may not be accurate. An electrical system was not used. (-) Scene data was used to determine injury severity to meet the inclusion criteria. Thus, patients that deteriorated after initial assessment were not included.

(Dinh et al., 2013)	1,034 adult patients with severe head injuries from the NSW, Australia trauma registry from 2000-	Retrospective study	The objective was to determine the effect of patient outcomes in the golden hour of trauma.	It was concluded that a benefit exists for patients with severe head injuries that arrive to hospital earlier. However, the time frame	(+) Injury has an impact factor of 2.137. (+) This study is a strong article (retrospective). (+) Multivariable Cox proportional hazards models were utilised to adjust for priori in this study.
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<p>2011 were included.</p>	<p>may extend beyond the 'golden hour'. There was evidence within the study to support improved outcomes of patients that arrived after the 'golden hour'.</p>	<p>(-) This study was conducted in 2013.          (-) This study was conducted from a single trauma centre registry with a relatively lower volume of major trauma patients.          (-) This study only considers the effects of the 'golden hour' on head injury patients.          This does not comment on generalised trauma patients.</p>
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**Comments:**

The 'golden hour' is a concept used to create a sense of urgency within the pre-hospital field. However after analysing up to date literature, it is evident that the 'golden hour' is not backed by evidence. Numerous studies show that pre-hospital on-scene time either has no association with patient outcomes or benefits the patient.

Majority of the studies within this critical appraisal agree that the 'golden hour' is not backed by evidence. The resources available within the pre-hospital setting in metropolitan areas of developed countries allow for extensive treatment on scene of major trauma patients.

As there is limited randomised controlled trials in regard to the ‘golden hour’ concept, further studies addressing this would be beneficial.

### **Considerations:**

Based on the findings present, the ‘golden hour’ concept is not supported by literature. It would be beneficial to consider focusing on the available pre-hospital treatment options and interventions for major trauma, instead of a scene to hospital time of <60 minutes. The interventions available in metropolitan areas mirrors many ED resources. Studies and funds should be invested into the access and implementation of more advanced prehospital interventions.

### **Clinical points:**

Utilising clinical judgement is vital for management of major trauma patients. As a clinician, identifying the resources required for the patient and how to access that is pertinent. As the pre-hospital setting continues to advance, further management options will become available for trauma patients. Ensuring safe practice and working for the patient’s best interests is important.

### References

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## Appendix:

### Appendix A: PRISMA diagram of search strategy



