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Accuracy of Field Triage of Trauma Patients

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Field triage is important in regionalised trauma systems. We found triage imprecision resulting in over-utilisation of hospital resources and adverse outcomes from deprived immediate access to the trauma team.

Introduction

Globally, every year, approximately five million people die from injuries and many more become permanently or temporarily disabled. Trauma constitutes a major global public health problem that places a significant human and financial burden on individuals, families and societies (Sasser et al. 2005). The most advantageous way to reduce the impact of injuries is through primary prevention initiatives that avoid injuries from happening or reduce their severity. When primary prevention is unsuccessful, harm from injury may be minimised through effective pre-hospital and hospital-based trauma care (Sasser et al. 2005).

Regionalised trauma care with specialised trauma centres reduce in-hospital trauma mortality, and this tendency increases with injury severity (MacKenzie et al. 2006). Major trauma victims may therefore benefit from bypassing the local hospital and instead being transported directly to the closest trauma centre. However, if transportation time to the trauma centre is long, it may be more advantageous to transport to a local healthcare facility so a patient's condition can be stabilised prior to inter-hospital transfer for definitive treatment (Sasser et al. 2005). Early detection of major trauma may therefore enable emergency medical service (EMS) providers to appropriately match the needs of each victim to the resources available.

Field Triage

The process of classifying patients according to injury severity in order to determine the suitable level of care is called "field triage" and triage protocols for EMS providers are recommended (Sasser et al. 2005). Civilian, day-to-day field triage protocols for diagnosing major trauma have been refined over the past three decades. The American College of Surgeons, Committee on Trauma (ACSCOT) have pioneered this progress through periodical revision of the "Field triage decision scheme" (Mackersie 2006). Field triage protocols traditionally focus on physiological derangement ("vital signs"), obvious anatomical injury, preinjury health status ("comorbidity") and mechanism of injury.

However, the detection of major trauma remains a challenge due to volatile evolution of symptoms, occult injuries, and the complexities of evaluating patients in the field. If patients only suffering minor injuries bypass the local hospital or activate the trauma team at the trauma centre (overtriage; false-positives), the regional hospital will be overwhelmed and its scarce human and financial resources consumed. However, if major trauma victims are denied access to the potential benefits of immediate expert assessment and resuscitation provided by a trauma team (undertriage; falsenegatives), avoidable deaths may occur (Sasser et al. 2005). Sensitivity and specificity are often negatively correlated making optimal field triage a balance between patient safety and optimal resource utilisation. ACS-COT therefore describes 5 percent undertriage as acceptable and associated with an overtriage rate of 25 - 50 percent (ACS-COT 2006).

Challenges

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Scandinavia is sparsely populated with time-consuming and weather-dependent patient transport. More than 200 Scandinavian hospitals receive major trauma victims, most with low trauma admission rates. In an attempt to optimise patient outcome, immediate trauma care is increasingly delivered via multidisciplinary trauma teams. Several Scandinavian papers confirm a tendency of imprecise activations of these trauma teams (Kristiansen et al. 2009).

In a recent analysis of 7 years (2001-07) of trauma registry data from Oslo University Hospital, Ullevål, a major Norwegian trauma centre, we documented imprecise activation of the trauma team (Rehn et al. 2009). Overall undertriage was 10 percent. Paramedic-manned prehospital services provided 66 percent overtriage and 17 percent undertriage,

anaesthesiologists -manned services 35 percent overtriage and 2 percent undertriage. Falls, high age and admittance by paramedics were significantly associated with undertriage. Patients subject to undertriage had an ISS-adjusted Odds Ratio for 30-day mortality of 2.34 (95 percent CI 1.6-3.4, $p < 0.001$) compared to those correctly triaged to trauma team activation. We concluded that anaesthesiologists perform precise field triage, whereas paramedics have potential for improvement. Skewed mission profiles make comparison of differences in triage precision counterproductive, but criteria or the use of them may contribute. However, the massive undertriage among paramedics is of grave concern as patients exposed to undertriage had increased risk of dying.

Since triage decisions may be influenced by multiple factors, including prehospital transportation distances, resources locally available as well as legal considerations there are no unanimous guidelines for field triage (Cone et al. 2004). A recent combined expert consensus and literature review resulted in an extensive report on the ACS-COT "Field triage decision scheme" (Sasser et al. 2009; Lerner 2006). This report recommended the systematic evaluation of trauma victims for physiological derangement, obvious anatomical injury, mechanism of injury, and pre-injury health status in order to identify those patients with highest probability of having sustained major trauma. In general, "vital signs" criteria are considered highly specific (i.e., when positive, the patient is a major trauma victim), but not very sensitive (i.e., if negative, the patient may still be a major trauma victim). Therefore, vital signs can never be utilised as the only field triage criterion. In the Oslo study (Rehn et al. 2009), a Triage-Revised Trauma Score (RTS) < 12 in the emergency department reduced the risk for undertriage compared to RTS = 12 (normal value). However, the general tendency of failure to document physiological variables was confirmed as RTS was documented by anaesthesiologists in 64 percent of the patients compared to 33 percent among paramedics.

The Oslo-study also confirmed the link between utilising mechanism of injury as the single criteria for trauma team activation and excessive overtriage. Mechanism of injury was triage criterion in 34 percent of the cases, of which only 26 percent were major trauma victims. This resulted in overtriage of 74 percent.

Conclusion

Some under- and overtriage is inescapable, and trauma managers should prepare for handling mistriage most effectively. One promising contribution to efficiently identify patients subject to undertriage is to establish ED triage protocols as a safety measure. Further, by establishing a reduced trauma team that analytically evaluates patients with undecided injury panorama, the hospital recognises the complexity of evaluating patient in field by lowering the threshold for trauma team activation. This two-tiered system may contribute to reducing the undertriage rate while minimising the impact of overtriage. In our opinion, this is a beneficial combination.

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