

Fluid resuscitation in the prehospital trauma patient



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Antony Nguyen

Abstract

Introduction: Patients with traumatic acute blood loss from injury lead to a lack of perfusion in systemic and cerebral circulations. Without treatment these organ become acidosis and fail. The fundamental process of restoring, maintenance and treatment of haemorrhagic shock involving fluid resuscitation. Although minimal amount of evidence supports this practice, it is common in trauma patients in a prehospital environment intravenous are fluid administration.

Method: A comprehensive literature review was conducted using the Ovid and CINAHL databases. The information retrieved was related to clinical portfolios and medical students in an undergraduate and clinical setting.

Results: Electronic searches yielded 57 citations. A further three citations were obtained by hand searching of reference lists. With much refining, of the 57 studies, only 12 articles met the inclusion criteria and were included in our review.

Conclusion: This review has shown that the common belief in regards with a trauma victim prehospital intravenous access and fluid resuscitation is the 'standard of care'. Although there is some information on fluid resuscitation there an inadequate amount. Furthermore, the data is consistently changing and hence consequences may be detrimental. Areas that should be focused in dealing with a trauma patient is the mechanism of injury, severity of the injury, anatomic immersion and the volume of fluid required for these patients.

Keywords: head injury; injury; haemorrhage; resuscitation; intravenous fluid; venous accesses; prehospital; trauma; haemorrhagic shock; shock.

Introduction

Worldwide, injury kills more than five million people each year, which accounts for nearly 1 of every 10 deaths globally ². Internationally, 50% of the world's injury-related deaths, which accounts for almost are related between the ages of 15 and 44 years ¹⁻³. In addition, due to injury, tens of millions of individuals visit emergency departments ². One leading factor is haemorrhagic shock which associates with one third of injury deaths ¹.

Patients with traumatic acute blood loss from injury lead to a lack of perfusion in systemic and cerebral circulations. When prolonged a reduction

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in tissue perfusion and tissue oxygen delivery causes these victims often become acidosis and impels to organ failure ¹ . The fundamental component of the restoration, maintenance and management of haemorrhagic shock comprises of preserving blood pressure and tissue perfusion by resuscitation fluids ³ .

Prehospital intravenous fluid replacement is an extensively implemented advanced life support (ALS) procedure in trauma management ⁴ . In spite of an absence of evidence demonstrating assistance to prehospital fluid therapy, this method is taken into account to be standard of care ^{1, 2, 4, 5} . Additionally, the type of fluid, the suitable rate of administration, and therefore the “ resuscitations themselves remain unguided and unsupervised” ⁵ . This review will evaluate the research regarding the volumes of fluid resuscitation in the trauma patient population in an ambulance service context.

Methodology

This study is a review of the clinical reviews to evaluate the volumes of fluid when dealing with resuscitation in a range of medical and research electronic databases.

An in-depth search strategy was established to consist of both the peer-reviewed and non-peer reviewed literature, of the clinical practice related electronic search engines was commenced utilising the Ovid Medline available through the Monash University library.

In addition to a search of electronic databases, were three databases; Cumulative Index for Nursing and Allied Health Literature (CINAHL Plus), Google Scholar and Monash University Library were carried out from database inception to end of September 2013.

A majority of the articles were included if they contained data relating to fluid resuscitation and trauma victims in a prehospital environment. Some of the data extracted from included studies were appropriate for statistical analysis (i. e., Dunham 1991 and Dutton 2002).

Results

The initial search strategy generated 57 potentially relevant documents were found across the range of searches. A further three citations were attained by hand searching of reference lists. After eliminating duplicate articles and screened the titles and abstracts and full texts, 22 of these articles were considered relevant to assist in answering the research question. After reviewing the twenty two studies included in this analysis, only 12 articles met the inclusion criteria was considered relevant provided and sufficient information about the best fluid revitalisation regime for the trauma patient in the prehospital phase ^{3, 6-11}.

The remaining twelve articles which lacked information therefore the articles was excluded due to trial design or failure to report outcome variables of interest and failed to meet the criteria. As would be expected of the fluid resuscitation to trauma patients in a prehospital setting, studies reported positive effects involving different amounts of fluid bought more closely

together and thus could enhance clinical practice and allowed additional learning opportunities ^{4, 7}.

Dunham 1991

This trial was a comparison conventional fluid administration procedure and using fluid administration using the rapid infusion system in trauma patients during the first 24 hours of admission (results as shown in table 1).

Out of the trauma participants, those who received a greater amount of fluids administered had a mortality rate of 5/20 (25%), as correlated to 5/16 (31%) who obtained a smaller amounts of fluids administered by the rapid infusion system. Thus, the relative danger for death is 0. 80 (95% CI 0. 28–2. 29) ¹.

Dutton 2002

Dutton's trial was randomised and had consisted of a broad spectrum of injury such as blunt and penetrating (refer to Table 2).

The results stated the larger volume administered the rate of mortality 4/55 (7. 3%) while the group that had been given smaller doses 4/55 (7. 3%). The relative danger for death is 1. 00 (95% CI 0. 26–3. 81) ¹.

Furthermore randomised controlled trials are vital to analyse the best effective approaches for the fluid treatment of haemorrhage trauma patients ^{1, 3}.

Discussion

This review established inadequate evidence for or against the utilisation of small or larger volume intravenous fluid administration in management of uncontrolled haemorrhage. However, in some victims, vigorous fluid resuscitation could further beneficially, the results from clinical trials are inconclusive ^{4, 5, 9, 12, 13}. The leading factors that need to be contemplated when addressing fluid replacement for the trauma patient is the assessment of hypovolaemia, when to administer fluid, which type of fluid, and the volume to administer.

The utmost applicable prehospital approach to resuscitative fluid intervention for trauma patients comprises of classifying anatomic involvement (i. e., head injury versus chest injury); identifying the mechanism of injury (i. e. penetrating versus blunt versus specific injuries); and the present physiological responses (i. e., heart rate, blood pressure, oxygen saturation, respiratory rate, skin perfusion, and conscious state) ^{6, 7, 9}. Unfortunately, vital signs and haemorrhage are not as reliable as is generally assumed ^{3, 13}.

Fundamentally, there are different responses when dealing with haemorrhage and injury. Bradycardia is a common response to pure haemorrhage ¹¹. Tachycardia and increased blood pressure often presents itself in trauma patients which related by the feedback of the injury to compensate ¹¹. Nevertheless, in the incidence of substantial tissue damage, bradycardia could transpire.

In higher social-economic countries, a growing number of paramedics receive training on advance life support in regards with intravenous cannulation, intubation, and the administration of intravenous fluids ⁶. In earlier stages of shock, it is easier for a placement of a venous line before hypovolaemia has progressed and compensatory mechanisms such as peripheral vasoconstriction have befallen ^{9, 12, 13}. As a result, paramedics will engage and be encouraged to use specified skills in trauma.

In a prehospital setting, a study shows that paramedics attend a minor fraction of trauma patients that require intubation (1%), while but a greater fraction (18%) are given intravenous fluids ¹. The quandary that paramedics every so often face when challenged with a hypovolemic trauma patient is basically the balance between:

- administering fluid; thus increases the lag when transferring, possible rebleeding, and increased haemorrhage or
- withholding fluid; thus allowing the possibility organ ischemia and death from the decreased blood volume and plasma to the organ, before arrival to the hospital ⁶.

The appropriate interventions when attending a trauma patient at a scene is to start rapid fluid infusion as soon possible to restore and maintain adequate perfusion quickly ^{11, 12}. However, the efforts to replace fluid could delay the time taken to hospital. Although a prompt successful cannulation can save time once patients arrive to hospital it is also clear that repetitive unsuccessful tries will impede the progress at the same time. Time is of an

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essential in a prehospital trauma related incident, a method to balance the benefits to be enlarged by gaining venous is to undertake cannulation en route ^{1, 3, 10, 11, 13}. Furthermore, under certain conditions, increasing the patient's blood pressure via fluid resuscitation before controlling of haemorrhage may have negative outcomes.

In today's ever-growing practice of paramedicine, the management for prehospital fluid therapy for trauma patients is consistently been updated. When cannulation and fluid administration takes priority rather than "loading and going", it further delays the conveyance of reliable care in hospital ⁷. One rule to note is trauma patients with severe head injury and with minimal or no prehospital fluid resuscitation is expected to have escalated morbidity and mortality rates ⁷. Hypotension head injury patients must be treated as soon as possible to preserve and re-establish an adequate cerebral and systematic perfusion.

The detailed study of 235 trauma patients (blunt and penetrating), Dalton calculated the benefits of prehospital venous access and fluid administration ⁴. The review of article stated that 80% of patients were given less than 600 ml of fluid in the prehospital environment, irrespective of hypotension en route, scene embrangement or mechanism of injury ⁴. Overall, the final result was indistinct as the investigation was incompetent to recognize such benefits from fluid therapy and suggested withholding fluid administration ^{1, 4}.

In the prehospital phase of patient care, it is important that “ strategies are straightforward, reflecting the difficulties of treating trauma victims on scene and in transit, without detailed diagnostic information” ⁶ . Excessive or abusive fluid administration causes injury to patients and one method to reduce this risk is to administer limited boluses of fluid at an interval ¹¹ . Ambulance Victoria Clinical Practice Guidelines states that patients with isolated neurogenic shock may be given up to 500 ml Normal Saline to correct hypotension ¹⁴ . However, is there risk to patients? AV suggests up to 40 ml/kg when a patient’s blood pressure remains under 100 mmHg. A majority of the articles suggested starting at a 250 ml boluses and then reassessing to ensure management of the hypotension is accomplished ^{1, 3, 6, 7, 10, 13} . This indicates the mean arterial pressure (MAP) of as a minimum 90 mmHg. However in a backdated case matched reviewed of severe trauma patients, 217 patients who had been treated with fluid replacement were far worse, in terms of mortality, than who did not obtain fluid ¹ .

In prospective of deficiency of information whether or not the effectiveness of existing resuscitation guidelines and the latent for harm. Thus further investigation is essential in a prehospital setting as fluid administration perhaps could be identified as a risk factor.

Conclusion

Regardless of the commonly belief that prehospital intravenous access and fluid resuscitation is the ‘ standard of care’, there is insufficient information to upkeep this discipline. This is due to the indefinite benefits and possible threats of prehospital cannulation and fluid administration as well as the <https://assignbuster.com/fluid-resuscitation-in-the-prehospital-trauma-patient/>

time spent on scene and applicable volumes of replaced. Thus these trauma patients are not a standardized group but should be individualised rendered to the mechanism of injury, severity of the injury, anatomic immersion, particular patient features and the estimated transport period to conclusive medical intervention at hospital.

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