Assessment and Management of Hypotension in the Elderly Patient

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Abstract

Introduction: Elderly patients often present to the emergency department (ED) with nonspecific signs of infection and excessive fluid loss, with limited research into their management. The purpose of this audit was to assess the initial management of hypotensive elderly patients in the ED: observations within 15 min, fluid challenge within 1 h, time to assessment by a physician, and initial management of septic shock. Subjects and Methods: Online patient systems were reviewed to find 40 patients >65 years old who were hypotensive (systolic blood pressure <100 mmHg or diastolic blood pressure <60 mmHg) in the ED between 1st October 2015 and 16th November 2015. This data were used to perform a retrospective audit to assess their management. Results: Forty hypotensive patients were identified with an average age of 79.6, with 55% being male. Eighty-three percent had their observations recorded within 15 min of presentation, 35% had their observations repeated within 1 h, and 35% were fluid challenged within 1 h. Nearly 60% patients were reviewed within 1 h by a physician. About 33% patients were in septic shock with 41% receiving IVF within 1 h, and all 40 patient receiving antibiotics. Discussion: The majority of patients had their observations performed within 15 min; however, a smaller percentage was fluid challenged within 1 h with their observations rechecked. Despite a sepsis pathway, hypotensive patients were still not receiving fluids within the hour. Conclusion: Developing a fast-track protocol for hypotensive elderly patients in the ED could improve initial rehydration management and ensure observations are reported in a timely manner.

Keywords: Abdominal (and) cardiac evaluation (with sonography in) shock, elderly, emergency department, fluid resuscitation, hypotension, sepsis

INTRODUCTION

Elderly patients comprise a large percentage of hospital admissions, with leading presentations including cardiovascular disease and infections. Typical signs of infection are commonly absent, such as blunted febrile response with small declines in function resulting in a loss of independence.[1] The elderly are more vulnerable to acute stress resulting from losses in functional reserve and greater prevalence of chronic disease.[2] Furthermore, excessive fluid loss can present with nonspecific signs and symptoms.[3]

The literature on management of the hypotensive elderly patient in the emergency department (ED) is limited, which led to this derivative retrospective study being performed.

SUBJECTS AND METHODS

The aims of this retrospective study were to:
1. Review current local and national guidelines
2. Audit the current practice against the gold standards.

This study was approved by the local institution’s clinical audit department as a retrospective clinical audit and approved for publication by the departmental clinical audit lead.

The literature was searched by means of Medline and EMBASE journal searches using terms such as “elderly,” “hypotension,” “sepsis,” “emergency,” and “management.” The literature is limited with the most previous research in the elderly assessing orthostatic hypotension. No published studies on the management of hypotensive patients in the ED were found within the current literature in this area.

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Gold Standards for management of the elderly hypotensive patient were generated following a review of The College of Emergency Medicine sepsis guidelines, review of the NHS Trust Guidelines on sepsis and management of hypotension, and a review of the literature from UpToDate™.

Six questions were formulated to assess the management of the hypotensive elderly patient in the ED as follows:

1. Were observations recorded within 15 min of arrival into the ED and repeated within 60 min?
2. Were patients fluid challenged within 60 min of arrival into the ED?
3. If hypotensive after two fluid challenges, was a critical care review requested within 4 h of arrival, and were patients reviewed within 1 h of this request?
4. Were patients formally assessed by a physician and a provisional diagnosis made within 60 min of arrival into the ED?
5. In patients with a provisional diagnosis of septic shock, did they receive the sepsis six within 60 min?
6. In patients with a provisional diagnosis of cardiogenic shock, did they have a repeat fluid challenge within 2 h?

A retrospective audit was then conducted on 40 consecutive hypotensive patients in the ED over the age of 65-year-old within a 6-week window between the 1st October 2015 and 16th November 2015 in a busy ED in Merseyside, United Kingdom (with annual patient census of more than 110,000).

**Inclusion criteria**

1. Age 65 years or older
2. Hypotensive when initial vital signs measured in the ED or in prehospital (ambulance), which was defined as systolic blood pressure (SBP) <100 mmHg and/or diastolic blood pressure (DBP) ≤60 mmHg.

**Exclusion criteria**

1. Age >65 years
2. Those patients who were not admitted or discharged
3. Patients not hypotensive prehospital or on arrival.

Patients were selected using online patient health records (Maxims, EDMS) with an ambulance/emergency services referral source. Selected patients included those admitted to medicine, surgery, or the Intensive Care Unit (ICU) during the selected time frame and with a presenting complaint code consisting of generally unwell, collapse, general deterioration, dehydration, chest infection, high temperature, urine problem, and cellulitis. From this, the first forty patients were selected who filled the criteria and data created through scanned ED documentation to determine their blood pressure on arrival, consequent vital sign recordings, ambulance crew documentation, nursing documentation, and physician documentation. Basic statistical analysis with Microsoft Excel includes data organization and basic mean and spread calculations.

**Results**

Forty patients were used in this retrospective study with an average age of 79.6-year-old (range 65–97 years old) and consisted of 22 males and 18 females. Thirty-three (83%) were hypotensive (SBP <100 and/or DBP ≤60) on arrival to ED while the remaining 7 (17%) were hypotensive in prehospital ambulance. Seven (17%) of these patients passed away.

Four (10%) patients required critical care review for being hypotensive despite two fluid challenges, with 50% of these requested within 4 h, and 3 (75%) of these referrals being reviewed within 1 h. Twenty-four (60%) patients were reviewed within 1 h by a physician, with a further 12 (30%) patients reviewed within 380 min.

Seventeen (33%) patients were in septic shock, 7 (41%) received fluids within 1 h, and the remaining ten (59%) received fluids within 6 h and 20 min, and one patient received no fluid. The remaining 33 patients had a variety of diagnoses including surgical presentations, cardiac, and gastroenterology conditions.

The source of sepsis was chest (8 patients, 47%), urosepsis (4 patients, 23.5%), soft tissue (2 patients, 11.8%), and sepsis of unknown origin (3 patients, 17.6%). Mortality in those with septic shock was three patients (17.6%).

One patient had cardiogenic shock and suffered a cardiac arrest. They were referred to ICU within 1 h and 39 min with a time to review of 20 min and consequently sent for primary coronary intervention at the regional cardiology center.

**Discussion**

The overall results of this retrospective study show that patients were not adequately fluid resuscitated within an hour and while most had their vital signs monitored on arrival to the ED very few had them rechecked. Study team recommendations were formulated to improve the management of the elderly hypotensive patient in the index ED which included:

1. Development of a fast track protocol for hypotensive elderly patients for use in ambulance triage area [Figure 1]
2. Simultaneous training session for ACES ultrasound scanning (USS) protocol for senior medical staff
3. Reaudit following completion of the above.

Numerous studies have looked at the effect of hypotension on mortality. Nonsustained hypotension in the ED confers a three[4] to four[5] times increased risk of death in sepsis patients compared to those with no hypotension. A systematic review performed by Holler et al.[6] found that the prevalence of hypotension in the ED was 4–13/1000 contacts with 12% mortality with Chou et al.[7] Similarly finding a high risk of mortality in those presenting with prehospital SBP <100 mmHg if SBP does not increase by 10 mmHg or more. Lipsey et al.[8] found the average fluid volume given over first 6 h to be 1.6 L, which failed to achieve a sustained blood pressure of >100 mmHg in 40% of cases. In their study,
56 out of 157 (35.7%) did not receive fluids, which is inferior to the 23% of patients who received no fluids in our audit [Table 1]. They also found that vasopressor (noradrenaline) had better effects at immediately increasing mean arterial pressure with sustained effect in all patients. A SBP <100 mmHg was used in this audit to define hypotension with this being consistent with the above literature and allows this audit to identify elderly patients who may benefit from intravenous fluids due to presentations such as dehydration rather than patients only in shock.

The College of Emergency Medicine[9] performed an audit in 2013 on the management of septic shock against the guidelines published by the UK Sepsis Trust. They had 8,099 cases from 180 EDs across the United Kingdom. They found median values of 62% for vital signs recorded within 15 min, 40% had fluids within 1 h, 84% had serum lactate measured, 77% had blood culture taken, 94% had antibiotics, 38% had urine output measured, and 45% received high flow oxygen. Their standard is set at 75% of patients in the ED for fluids given within 1 h, and recommend all sepsis patients to receive up to 30 mL/Kg of crystalloids in 500 mL boluses as soon as sepsis is identified. While the audit performed by the College of Emergency Medicine was aimed at septic patients rather than the homogenous group of elderly hypotensive patients, the results can correlate and this retrospective study showed similar findings in terms of checking vital signs within 15 min [Table 2] and fluid resuscitation within 1 h. It falls short in measuring serum lactate, giving oxygen routinely, and monitoring urine output. Elderly patients have more chronic conditions and are therefore more likely to present in septic shock.[10]

Nasa et al.[11] reported mortality increased with age in those patients who were in septic shock/severe sepsis in ICU. Liao et al.[12] found lactate, a single episode of hypotension, and age were all independently associated with in-hospital mortality in systemic inflammatory response syndrome patients in the ED.[9] In their study, lactate was missing in 51% of their patients while 18% had lactate missing in our study [Table 3]. Heppner et al.[13] found the introduction of a sepsis bundle pathway reduced length of stay and reduced mortality in ICU, which was currently in use in the ED for this audit.

A well-known tool used widely in the ED is ACES. The purpose is to establish existence of a hypovolemic state in patients with undifferentiated hypotension, with aims to shorten the period taken to establish a diagnosis including abdominal aortic aneurysm, free fluid (hemoperitoneum), tamponade, pulmonary embolism, cardiogenic, and distributive/septic. A six-view protocol is utilized involving views from cardiac, inferior vena cava, aorta, right upper...

Table 1: Patients fluid challenged in the emergency department

| Fluid challenged within 1 h | Fluid challenged after 1 h | Not fluid challenged |
|-----------------------------|---------------------------|---------------------|
| Number of patients          |                           |                     |
| 14                          | 17                        | 9                   |
| Percentage                  | 35                        | 42                  | 23                  |

Figure 1: Example of fast-track protocol (pro forma) for use in ambulance triage areas (original)


There are no conflicts of interest.

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**Table 2: Patient observations performed in the emergency department**

| Observations reported within 15 min | Observations recorded after 15 min | Observations not recorded | Observations repeated within 1 h |
|------------------------------------|-----------------------------------|---------------------------|----------------------------------|
| Number of patients | 33 | 6 | 1 | 14 |
| Percentage | 83 | 15 | 3 | 35 |

**Table 3: Patients with a provisional diagnosis of septic shock who received the sepsis six within 60 min**

| Sepsis six | Completed (%) | Not completed (%) |
|-----------|---------------|-------------------|
| Blood cultures | 71 | 29 |
| Urine output | 0 | 100 |
| Fluids | 94 | 6 |
| Antibiotics | 100 | 0 |
| Lactate measured | 82 | 18 |
| Oxygen given | 24 | 76 |

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**Conclusion**

Nonsustained hypotension is linked with increased mortality risk, which can be improved through timely fluid resuscitation in the ED. This retrospective audit showed that patients were not sufficiently fluid resuscitated within 1 h and vital signs not adequately repeated to ensure an improvement in blood pressure. This could be overcome through the use of a management guideline (with incorporation of USS ACES Protocol) in ambulance triage areas.

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**Conflicts of interest**

There are no conflicts of interest.

quadrant, left upper quadrant, and pelvis. Ultrasound is commonly used by consultants and middle‑grade staff in the ED in this audit; however, ACES is not currently in use as highlighted by our retrospective study. This is a deficiency in management of the hypotensive elderly patient in this trust’s ED which aims to be rectified with further departmental training.

This retrospective study found that most patients had their vital signs recorded within 15 min but often was not repeated within a timely manner. Very few hypotensive patients had fluid resuscitation within an hour with some patients receiving no fluids, and most elderly hypotensive patients had not been reviewed by a physician within 1 h. The results of this study are in line with the Royal College of Emergency Medicine Severe sepsis audit regarding fluid resuscitation of the septic patient. With the literature being limited in terms of management of the hypotensive elderly patient in the ED, this retrospective study highlights an important research area which can be used as a baseline for further studies.