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Prehospital fast track care for patients with hip fracture: Impact on time to surgery, hospital stay, post-operative complications and mortality a randomised, controlled trial

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ABSTRACT

Introduction: Ambulance organisations in Sweden have introduced prehospital fast track care (PFTC) for patients with suspected hip fracture. This means that the ambulance nurse starts the pre-operative procedure otherwise implemented at the accident & emergency ward (A&E) and transports the patient directly to the radiology department instead of A&E. If the diagnosis is confirmed, the patient is transported directly to the orthopaedic ward. No previous randomised, controlled studies have analysed PFTC to describe its possible advantages.

The aim of this study is to examine whether PFTC has any impact on outcomes such as time to surgery, length of stay, post-operative complications and mortality.

Methods: The design of this study is a prehospital randomised, controlled study, powered to include 400 patients. The patients were randomised into PFTC or the traditional care pathway (A&E group).

Results: Time from arrival to start for X-ray was faster for PFTC (mean, 28 vs. 145 min; $p < 0.001$), but the groups did not differ with regard to time from start of X-ray to start of surgery (mean 18.40 h in both groups). No significant differences between the groups were observed with regard to: time from arrival to start of surgery ($p = 0.07$); proportion operated within 24 h (79% PFTC, 75% A&E; $p = 0.34$); length of stay ($p = 0.34$); post-operative complications ($p = 0.75$); and 4 month mortality (18% PFTC, 15% A&E $p = 0.58$).

Conclusion: PFTC improved time to X-ray and admission to a ward, as expected, but did not significantly affect time to start of surgery, length of stay, post-operative complications or mortality. These outcomes were probably affected by other factors at the hospital. Patients with either possible life-threatening conditions or life-threatening conditions prehospital were excluded.

Introduction

Elderly patients with hip fractures due to a low-energy trauma are common in ambulance and emergency care. In Sweden the yearly incidence is around 18,000 patients (mean age over 80 years) and the number is increasing [1]. This group of patients is one of the most challenging for the healthcare system, considering total care. Patients with hip fractures require surgery and subsequent care in orthopaedic wards [1]. Pre- and post-operative complications associated with hip fractures are common and cause longer hospital stay, increased mortality and suffering for the patients [2,3].

Several studies describe the importance of a short waiting time from hospital admission to surgery [4–8]. Some studies support the conclusion that a waiting time under 24 h reduces post-operative complications, length of stay and mortality [9,10]. Guidelines for start of surgery vary in different countries, between 24 and

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48 h. The Swedish national guidelines recommend surgery within 24 h and quality indicators for good and safe care should focus on fast assessment to surgery [11,12].

Acute assessment starts as soon as the ambulance reaches the patient and continues during transport to hospital. The ambulance nurse takes care of the patient according to existing guidelines [13]. The standard process for ambulance commission is immediate transport to the emergency and accident ward, A&E. A patient often stays for several hours in A&E for care and assessment before transport to an orthopaedic ward for surgery [11,14]. Several studies show various advantages in introducing fast track systems in A&E [14–18].

During the last decade, registered nurses have participated in ambulance care and a majority of Swedish ambulance and hospital organisations have implemented prehospital fast track care pathways, in order to improve hip fracture care [19–22]. This means that the ambulance nurse starts the pre-operative procedure actually in the ambulance and leaves the patient at the radiology department instead of the A&E. When the diagnosis is confirmed, the patient is transported directly to the orthopaedic ward.

The aim of this study was to compare prehospital fast track care and transport with the A&E pathway, using a randomised, controlled design and focusing on the following patient outcomes: time to radiographic investigation, time to surgery, post-operative complications, length of stay at the hospital and mortality. The assumed advantages of fast track pathways for patients with hip fractures have not been sufficiently studied. This seems actually to be the first randomised, controlled study on this subject, since to date no other studies have been published.

Patients and methods

This prehospital randomised, controlled study was carried out between July 2012 and May 2014 at the ambulance and hospital organisation in the Region of Halland, Southwestern Sweden (total population 300,000 at the end of 2013; 22% aged ≥65 years). The Region of Halland has two emergency hospitals. Eligible patients were cared for in the ambulance after a low-energy trauma with a suspected hip fracture (for specific inclusion criteria, see below). The patients in the study were consecutively included by an ambulance nurse and randomised by using a closed, opaque envelope either to care in the fast track programme or to the traditional care pathway with transport to A&E.

Patients in the study

All the patients in the study were treated following the ambulance organisation's guidelines, using pain treatment, oxygen therapy and intravenous liquid substitution. The rapid emergency triage and treatment system (RETTS) was used. The RETTS is a triage and priority model, consisting of two parts that in combination result in a priority assessment of the patients.

It is based on vital signs and the emergency symptoms and signs (ESS) code depending on the reason the patient called for help. Objective vital signs including blood pressure, oxygen saturation, breathing frequency, heart rate, body temperature and degree of consciousness result in a triage colour: red, orange, yellow or green. Red means life-threatening condition, orange means possible life-threatening condition, yellow means not a life-threatening condition but requiring emergency hospital care and green means no requirement for any limitation on waiting time [23]. Only healthier patients who were triaged by RETTS as yellow or green were considered for inclusion. Specific parameters for yellow or green are: Saturation > 90% without oxygen, respiratory rate 8–25, pulse <120 or >40, alert or sudden signs of des orientations, body temp >35 or <41° C. Patients treated with warfarin or suffering from bleeding were also included.

A specific checklist was used for including patients. The checklist incorporated questions and tick boxes about previous hip surgery, other concurrent injuries or severe illness, support for ID-bracelet, 12-Lead ECG, documentation to call the receptionist/triage nurse, the admission nurse in the orthopaedic ward and the orthopaedic surgeon on duty. Exclusion criteria were head injury, symptoms of myocardial infarction, other fractures or earlier surgery on the affected hip. All participants received written and oral information from the ambulance nurse and, if the participant gave consent, the ambulance nurse obtained their informed consent with a written signature. If participants were unable to give their consent because of dementia or cognitive deficits, a relative was allowed provide consent. It was possible for the ambulance nurse to call the on-call orthopaedic surgeon for advice when unsure about the patient's condition.

Prehospital fast track care (PFTC), intervention group

The patients randomised to PFTC were transported directly to the department of radiology. The ambulance nurse called the receptionist or the triage nurse at the A&E and asked for an X-ray referral to be sent to the radiology department. A 12-Lead ECG was administered in the ambulance and sent in to a database at the hospital. The patient was prepared for examination at hospital admission and given an ID-bracelet. The ambulance nurse reported the patient's condition to a nurse in the orthopaedic ward. If the X-ray verified a fracture, the patient was then transported directly to the orthopaedic ward for pre-operative care including blood sampling. Otherwise, the patient was transported to A&E for further assessment.

Accident and emergency (A&E), control group

Patients randomised to A&E were transported to the A&E and the ambulance nurse reported the patient to the admissions nurse. The patient was prioritised according to the RETTS and the A&E guidelines. An A&E nurse gave the patient an ID-bracelet and administered blood tests and an ECG. The patient was placed in an examination room or a corridor along with other orthopaedic patients to wait for the orthopaedic surgeon. Following examination by the surgeon, the patient was moved to the department of radiology for radiographic examination and then back to the A&E. At the A&E, the patient waited for the decision about treatment. Thereafter the patient was admitted to the ward. The A&E nurse reported the patient to the orthopaedic ward and the patient was transported to the ward.

Data collection

Data for all the patients was collected from various systems. From the ambulance patient care records, data on time and date, gender, age and arrival at hospital was collected. The hospital's medical record system provided data on lead time for X-ray start (minutes), length of stay at the hospital (days), post-operative complications and in-hospital mortality. The Swedish National Hip Fracture Register provided data on the American Society of Anesthesiologists (ASA) classification, type of fracture, the presence of dementia, start of operation (hours) and 4 month mortality.

Sample size and power calculations

The planned sample size was a total of 400 patients, 200 in each group The study was powered to detect a reduction in the