

AIR VERSUS GROUND TRANSPORT FOR PATIENTS WITH ST-ELEVATION MYOCARDIAL INFARCTION: DOES TRANSPORT TYPE AFFECT PATIENT OUTCOMES?

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Introduction: This study was conducted to examine whether air versus ground transport from non-percutaneous coronary intervention (PCI) centers to PCI centers affects the health and quality of life of persons with ST-elevation myocardial infarction (STEMI) 30 days after cardiac interventional treatment.

Methods: Data for the analysis were collected between January 2006 and December 2008 for 195 patients with STEMI who received no thrombolytic therapy but were transported by air or ground from non-PCI centers to PCI centers for cardiac intervention.

Results: Although the observed differences were not statistically significant because of the sample size, the study showed that at 30 days after discharge a larger percentage of ground transport patients had experienced an infarction

(17.5% vs 10.7%), stroke (4.2% vs 2.7%), or died (5.8% vs 2.7%) compared with air transport patients. The analyses should be considered relative to the clinical and operational importance of the results, particularly with regard to postdischarge status.

Discussion: Because "time is muscle" with patients who have a STEMI, it is crucial to perform studies that provide solid statistical data showing that the type of transport affects patient outcome. This knowledge could lead to the implementation of a regional transport protocol between non-PCI and PCI centers to provide a more streamlined plan of care, thus affecting patients' long-term quality of life.

Key words: STEMI; Air-medical; Ground transport; Patient outcomes

The 90-minute door-to-balloon initiative set forth by the American Heart Association and the American College of Cardiology has greatly improved the quality of care given to patients with ST-elevation myocardial infarction (STEMI).¹ Direct percutaneous coronary intervention (PCI) is the clinical standard and preferred method of reperfusion in the United States for persons undergoing STEMI.² Current national

standards of practice at PCI centers for patients with STEMI include rapid identification of the condition with a 12-lead ECG within 10 minutes of arrival at the emergency department, notification of a cardiologist, and transport to the catheterization laboratory for PCI within 90 minutes of arrival.³

Although rapid STEMI identification is standard at non-interventional centers, patients with STEMI who are transferred from non-PCI hospitals are excluded from the American Heart Association and American College of Cardiology STEMI guidelines because transportation times can greatly vary based on the distance to the tertiary care center, the type of transportation used (ie, air vs ground), weather conditions, and the availability of the transportation team. These patients typically are given thrombolytic therapy, are supported hemodynamically, and are transferred for possible interventional salvage procedures at the PCI center.²

Studies have shown that a decrease in door-to-balloon time has been successful in decreasing the mortality and morbidity of patients with STEMI.^{4,5} Because meeting the "90-minute window" often is not measured for patients with STEMI in non-PCI centers, the implementation of a

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TABLE 1

Transporting hospital, all hospitals

	N	%	Ground (%)	Air (%)
GA1	28	12.8	39.3	60.7
G1	1	0.5	100.0	0.0
G2	34	15.6	100.0	0.0
G3	2	0.9	100.0	0.0
GA2	18	8.3	94.4	5.6
G4	3	1.4	100.0	0.0
G5	3	1.4	100.0	0.0
G6	7	3.2	100.0	0.0
GA3	5	2.3	60.0	40.0
G7	7	3.2	100.0	0.0
GA4	18	8.3	33.3	66.7
GA5	28	12.8	21.4	78.6
GA6	30	13.8	40.0	60.0
GA7	8	3.7	62.5	37.5
Other ^a	3	1.4	100.0	0.0
Total	195		61.5	38.5

^aThree patients transported from physician's offices.

rapid transfer system should be considered to bridge the gap to interventional treatment. Implementation of STEMI protocols within non-PCI emergency departments and the understanding and utilization of air-medical transport helicopters and ground specialty units to transport patients with STEMI from the non-PCI centers to a PCI center have shown that it is possible to meet the "90-minute window" when transporting patients from a non-PCI center.⁶ Although these studies have determined that a shorter time to cardiac intervention improves patient outcomes, no studies have been conducted to determine whether the type of transport used affects the overall outcome of patients with STEMI.

The purpose of this study was to determine if patients with STEMI who presented to a non-PCI center had better outcomes if they were transported to a PCI center for interventional treatment by an air medical helicopter compared with a specialty ground ambulance. Analysis included 195 patients with STEMI who received no thrombolytic therapy prior to transport from non-PCI centers to PCI centers during 2006-2008. Health outcomes, including length of stay (LOS), discharge status (ie, home, rehabilitation center, or skilled nursing facility), and the occurrence of cardiac re-infarction, stroke, or mortality within 30 days of cardiac interventional treatment were compared for patients based on transportation type (ie, air or ground).

Methods

STUDY DESIGN

A prospective secondary data analysis was used for the present study. Data were collected between January 2006 and December 2008 from a group of Mid-Atlantic urban and rural hospitals and represent all patients with STEMI who received no thrombolytic therapy and were transferred either by air medical or ground transport from a non-PCI hospital to a PCI center for percutaneous coronary intervention.

Patients were transported from 1 of 14 hospitals or a physician's office (1.4%), as shown in Table 1. Approximately two thirds of patients (n = 120, 61.5%) were transported via ground and the remaining 38.5% were transported via air (n = 75). The majority of patients (92%) were transported to one receiving hospital, and the remaining 8% were transported to a different receiving hospital.

SAMPLE

The sample consisted of 195 patient records. Two thirds of the patients were men (n = 130). Overall patient age ranged from 27 to 94 years (mean [M] = 59.7, SD = 12.2). The age of patients transported by ground (M = 60.8 years, SD = 12.72) ranged from 27 to 94 years, and the age of patients transported by air (M = 59.4 years, SD = 11.98) ranged from 30 to 88 years.

HUMAN SUBJECT PROTECTION

Permission to conduct this study was obtained from the air ambulance transport company and the institutional review board used by the hospitals under study. Because this study was a secondary analysis review, a waiver of consent was obtained from the institutional review board.

MEASURES

Independent variables used in the study included transportation type (ie, air or ground) and patient demographics (ie, age at time of transport and gender). Health outcomes included LOS in the hospital (in days), discharge status (ie, home, rehabilitation facility, or skilled nursing facility), and 30-day postdischarge incidence of infarction, stroke, or mortality measured dichotomously. All variables were obtained from patient record information.

Results

DATA ANALYSIS PROCEDURES

The χ^2 statistical test was used for analyses involving categorical variables, that is, gender, discharge status, and 30-day postdischarge incidence of infarction, stroke, or mortality. Analysis of variance (ANOVA) was used for statistical comparisons involving continuous variables, age,

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