ORIGINAL ARTICLE

When is a door not a door? The difference between documented and actual arrival times in the emergency department

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Emerg Med J 2006;23:442–443. doi: 10.1136/emj.2005.029868

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Accepted for publication
6 December 2005

Objectives: An observational study to determine the difference between documented ambulance arrival times and the actual arrival times of patients from the ambulance into the emergency department.

Methods: In a busy, purpose built, modern emergency department with easy access, we recorded the time that ambulance borne patients were wheeled over the threshold of the clinical area and compared this to the times recorded by the ambulance trusts as the official ambulance arrival times.

Results: 352 ambulance arrivals were observed. Data were incomplete in 34 instances (9.5%) and were not included in the analysis. For the remaining 318 arrivals, the median time difference was 2 min 1 s (range 5 s to 21 min 45 s). In a subgroup of chest pain patients (45 patients), the median time difference was 2 min 11 s (range 23 s to 5 min 38 s). The difference between the chest pain group and the remaining patients was not significant ($p=0.528$).

Conclusions: There is inevitably some delay between the arrival of an ambulance and the arrival of the patient into a clinical area. This study quantifies that difference. In an era of stringent time related standards, this paper highlights the need for accurate recording of times to enable us to carry out valid audit of these standards. This study supports the redefining of an arrival time as the time when the patient arrives in the clinical area.

Emergency departments and their trusts are constantly judged on national and local time standards. These include "door to ECG"¹ and "door to needle"² times, time to triage, and time to analgesia.¹ One of the most challenging targets is a door to needle time of less than 30 min for more than 75% of acute myocardial infarct (AMI) patients eligible for thrombolysis.² For ambulance borne AMI patients, the arrival time is defined by the Myocardial Infarct National Audit Programme (MINAP)³ as the time when the ambulance parks outside the emergency department.

There is an inevitable delay in moving a patient from the ambulance into the clinical area of the department where they can be assessed and actions initiated. We aimed to establish exactly what that delay was and to determine what impact this might have on attaining our standards. As far as we are aware, there are no other studies addressing this issue.

STUDY ENVIRONMENT

The emergency department is a modern, purpose built unit opened in 2003. It has a dedicated ambulance arrival area and drop-off zone. The maximum distance from the drop-off zone to the clinical area is 44 m and the minimum distance is 35 m (34 and 25 m, respectively, for a patient being taken directly into the resuscitation area). The path into the department is level. There are two sets of automatic sliding glass doors and the ambulance crews are required to push a doorbell to announce their arrival.

This department receives patients from three different ambulance trusts. At the time of the study, the mean number of ambulance arrivals between 08:00 h and 24:00 h was 363 per week.

METHODS

Representative sampling was used to minimise ambulance crew bias. A dedicated observer was present in the department daily, for two designated 4 h periods between 08:00 h

and 24:00 h over a 2 week period (table 1). Ambulance arrivals between 24:00 h and 08:00 h (18% of all ambulance arrivals) were excluded for convenience.

During observation periods, the arrival time in the emergency department of consecutive ambulance borne patients was recorded using a radio controlled atomic Staver SpaceTimer clock. The emergency department arrival time was defined as the moment the ambulance borne patient entered the clinical area where emergency department staff could initiate any form of assessment or treatment. This was either at the point where patients are routinely received for triage or on direct entry into the resuscitation room. The ambulance call sign and a patient identifier were also recorded.

Ambulance arrival times outside the emergency department were routinely recorded when the ambulance crews pressed the arrival button on their global positioning system (GPS) recorders. These times were supplied retrospectively by the ambulance trusts from a centrally held database. The times shown on the departmental atomic clock and the ambulance GPS recorder were identical. The ambulance arrival times were recorded to the nearest second and the departmental arrival time to the nearest 15 s. We measured the difference between the documented ambulance arrival time outside the emergency department and the patient arrival time in the clinical area.

We collected data on all patients arriving by ambulance. We also compared the specific subgroup of patients with chest pain to determine whether there was any significant difference in timing for this group. Individual ambulance crews were not informed about the study and were unaware when the observer was in the department.

Abbreviations: AMI, acute myocardial infarct; GPS, global positioning system; MINAP, Myocardial Infarct National Audit Programme

Table 1 Timetable for ambulance patient arrival time observers

Time	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
08:00–12:00 h	X		X		X		X		X		X		X	
12:00–16:00 h		X		X		X		X		X		X		X
16:00–20:00 h	X		X		X		X		X		X		X	
20:00–24:00 h		X		X		X		X		X		X		X

RESULTS

In total 352 ambulance arrivals were recorded. Of these, 15 did not have obtainable ambulance arrival times. In a further 19 cases the recorded ambulance arrival times were later than the departmental arrival times as recorded by the observer. Of the remaining 318 patients, 45 presented with chest pain.

The median time difference between the ambulance arrival times and the departmental arrival times for all patients was 2 min 1 s (range 5 s to 21 min 45 s, interquartile range 1 min 32 s to 2 min 47 s). The median time difference for patients with chest pain was 2 min 11 s (range 23 s to 5 min 38 s, interquartile range 1 min 41 s to 2 min 46 s). This was not significantly different.

DISCUSSION

As the emergency department is a modern, purpose built unit, delays in moving the patient from an ambulance into the clinical area of the department would be expected to be minimal. There are unlikely to be many departments where the delivery route is significantly shorter, more direct, or has fewer obstacles. These time differences, therefore, probably represent a minimum for emergency departments around the country.

The median time difference of 2 min 11 s is entirely appropriate given that ambulance crews are required to offload a patient safely and bring them into the department. However, given our strict time standards, this difference does represent a significant portion of time when the patient has officially arrived at the emergency department, but the emergency staff are unable to perform any assessment or initiate any treatment. In the case of AMI patients receiving thrombolysis, this represents 7% of the time in which we are expected to treat them.

As regards the 15 cases with no ambulance arrival times, the transmission of data through the GPS system is occasionally not complete due to poor reception. In these cases the data need to be completed manually which is not done uniformly. In the 19 cases where the ambulance arrival time occurred after the departmental arrival time, the time difference was presumably due to a delay in pressing the arrival button on the GPS recorder. This may have been due

either to the urgency of transfer of the patient or human error in omitting to press the button until after arrival.

CONCLUSIONS

This study demonstrates a small but significant delay between the recorded arrival of an ambulance outside an emergency department and the delivery of the patient to the clinical area of the department. This delay is inevitable and it is difficult to see how it can be significantly reduced. There is no less delay in patients who present with chest pain despite the well known time pressure for investigation and thrombolysis in AMI.

When so much depends on achieving time based standards within the emergency department (door to needle times and total time in the department have direct influence on potential star rating of a given trust), it is important that arrival times are recorded accurately. We would therefore suggest that the time the ambulance pulls up outside the department should no longer represent a patient's arrival time. Instead the time at which the patient actually arrives in the clinical area should be accurately documented as the official arrival time.

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This study received funding from the Audit Department of the Royal United Hospital, Bath, to pay for the observers

Competing interests: none declared

Ethical approval was not required for this study

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- 3 **Royal College of Physicians**. *Myocardial Infarction National Audit Project (MINAP)*. London: Royal College of Physicians Clinical Effectiveness and Evaluation Unit, http://www.rcplondon.ac.uk/college/ceeu/ceeu_ami_home.htm.