

Selected Topics: Prehospital Care



CAN EMERGENCY MEDICAL SERVICES USE TURNAROUND TIME AS A PROXY FOR MEASURING AMBULANCE OFFLOAD TIME?

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Abstract—Background: “Offload delay” occurs when the transfer of care from paramedics to the emergency department (ED) is prolonged. Accurately measuring the delivery interval or “offload” is important, because it represents the time patients are waiting for definitive care. Because recording this interval presents a significant challenge, most emergency medical services systems only measure the complete at-hospital time or “turnaround interval,” and most offload delay research and policy is based on this proxy. **Objective:** This study sought to test the validity of using the turnaround interval as a surrogate for the delivery interval. **Methods:** This observational study examined levels of correspondence, or correlation, between delivery interval and turnaround interval, to assess whether turnaround is a reasonable surrogate for delivery. Delivery and turnaround intervals were logged by Richmond Ambulance Authority (RAA) in Richmond, Virginia, United States from April 1 to December 31, 2008. A total of 1732 ambulance runs from RAA were included. **Results:** Pearson’s correlation

analysis showed a good correlation between turnaround and actual offload time (delivery), with a coefficient (r) of 0.753. A post hoc analysis explored patterns in the relationship, which is quite complex. **Conclusion:** The results show that the correlation between the delivery and turnaround intervals is good. However, there remains much to be learned about the at-hospital time intervals and how to use these data to make decisions that will improve resource utilization and patient care. Efforts to establish a method to accurately record the delivery interval and to understand the at-hospital portion of the ambulance response are necessary. © 2014 Elsevier Inc.

Keywords—emergency medical services; emergency medical technicians; emergency service; hospital; crowding

BACKGROUND

This study was presented as a poster at the National Association of EMS Physicians Annual Meeting in Phoenix, AZ, January 2010.

Note: Dr. Carter was at Yale University at the time of the study. Mr. Overton is now associated with Road Safety International. Dr. Terashima has made significant contributions to the revised methods and design of the project in response to the reviewer feedback.

Reprints will not be available.

The handover of the patient from the emergency medical services (EMS) provider to emergency department (ED) staff is an important bottleneck, at the intersection of the busy ambulance service trying to transfer care and return to service, and the busy ED struggling to find beds for waiting patients. Offload delay, a colloquial term for the delay of ambulance crew to hand over patient care at the hospital, occurs when the ED is overcrowded and there

is no bed available for the new patient (1–5). Knowing the relative contributions of a prolonged delivery interval and a prolonged recovery interval is an important step to improving our understanding of, and approaches to, surge capacity, ED crowding, and ambulance resource allocation. It is an important measure of the time patients spend waiting for definitive care.

The time associated with an ambulance response, or “time-on-task,” has commonly been divided into standard intervals, and the portion spent at the hospital is known as the “turnaround interval” (Figure 1) (6,7). The turnaround interval starts when the paramedics report to the dispatcher that they have arrived at the ED, and ends when the dispatcher is notified that the paramedics are available for another call. Only a part of this interval is involved in the transfer of patient care to the ED staff (the actual offload, technically known as the “delivery interval”); the rest is cleaning and restocking the ambulance, completing patient care reports, nourishment, etc. (the “recovery interval”). Delivery interval identifies the portion of the turnaround interval for which the hospital is accountable separately from the portion for which EMS is responsible. This interval is currently a bit of a black box, because most systems report the total turnaround interval instead of the actual delivery interval. This gap exists largely for technical reasons; most EMS systems lack a means by which the paramedics can accurately report to their dispatcher when they have completed the handover. A meaningful examination of offload delay is hampered by the lack of this measurement. Studies of offload delay have relied on the computer-assisted dispatch

(CAD)-recorded “arrive and depart hospital”-based turnaround time as a surrogate measure (8–11). One project from McMaster University, Canada used a home-made swipe card system, in which the paramedics swiped a magnetic card to mark times within the ED, in a study of the association between offload delay and response times (12). We are also aware of two studies that have been conducted with an observer physically present in the ED, manually recording times (7,13). One of these came from our group, and we can attest to the labor-intensive nature of such a study design.

In the absence of a viable way to measure the delivery interval on any significant scale, we have relied on the turnaround interval as a surrogate without being certain of the validity of this proxy. There is little literature to date describing the relationship of the turnaround interval to its component parts, the delivery and recovery intervals. On the one hand, knowing only the total turnaround interval describes the availability of ambulances for the community or population at large; it does represent the true time during which the ambulance is at the ED and technically not available to be dispatched for another response. On the other hand, attempts to decrease the turnaround interval depend heavily on an understanding of where delays arise; solutions and accountability will depend entirely on the cause. This root cause analysis remains a source of considerable controversy, due to the challenges of measurement, and reliance on literature that no longer reflects our changing ED practice environment as phenomena like ED crowding and ambulance diversion evolve.

The objective of this study was to assess whether the total turnaround interval is a reasonable surrogate for

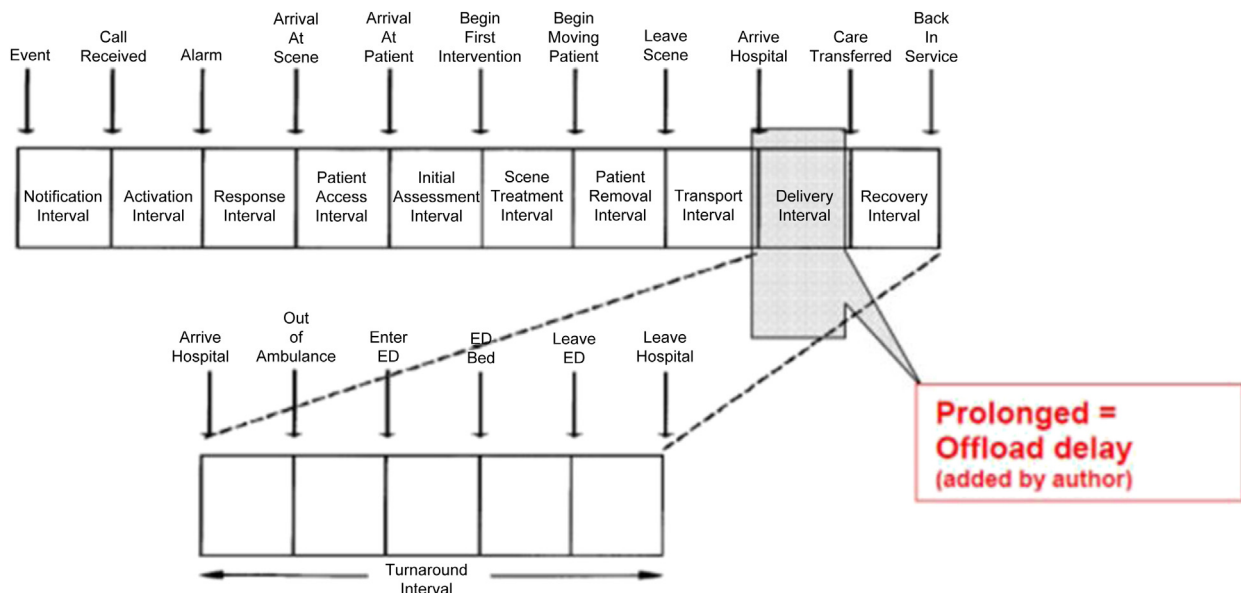


Figure 1. Spaite's time-interval model of the emergency medical services response with adaptation by Cone (6,7). ED = emergency department. Reprinted with permission from Cone DC, Davidson SJ, Nguyen Q. A time-motion study of the emergency medical services turnaround interval. *Ann Emerg Med* 1998;31(2):241–6.

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