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Administration of Emergency Medicine

DOOR-TO-TRIAGE TIME IN A CANADIAN TERTIARY-CARE CENTER

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Abstract—Background: The interval from patient arrival to triage is arguably the most dangerous time a patient spends in the emergency department (ED), as they are an unknown entity until assessed by a health care professional. **Objective:** We sought to quantify door-to-triage time (DTT), an important factor in patient safety that has not yet been quantified in Canada. **Methods:** Data were collected from all ambulatory patients presenting to a tertiary-care ED during a consecutive 7-day period. Demographic information, arrival time (door time), triage time, and Canadian Triage and Acuity Score (CTAS) were collected. DTT was compared across variables using Kruskal-Wallis one-way analysis of variance. **Results:** Seven hundred and seventy-five patients were included in the study, representing 82.9% of ambulatory patients. DTT was variable (1–86 min) with a median of 12 min (interquartile range [IQR] 6–21 min). Patients in the 5th percentile with the longest DTT waited a median of 54 min (IQR 48–63 min). DTT varied across days of the week ($p < 0.01$); the longest wait was on Monday (median 22 [IQR 11–43] min) and the shortest on Sunday (median 8 [IQR 5–12] min). There was no relationship between DTT and CTAS ($p = 0.12$). **Conclusions:** DTT is an important variable affecting patient safety. Given site-specific factors, replication across additional centers is necessary. Additional research evaluating factors affecting DTT, different triage paradigms, and quality improvement interventions should be undertaken. © 2020 Elsevier Inc. All rights reserved.

Keywords—emergency medicine; door-to-triage

INTRODUCTION

The Canadian Triage and Acuity Score (CTAS) allows medical professionals to communicate effectively about the severity of a patient's medical concern in a standardized fashion (1,2). CTAS is composed of 5 categories, each recommending timeframes within which a patient should undergo physician initial assessment (PIA). CTAS Level 1 requires immediate physician assessment. CTAS Levels 2, 3, 4, and 5 have times to PIA of 15, 30, 60 and 120 min, respectively (3). Unfortunately, these timeframes frequently go unmet (4). Many studies have examined wait times (time from triage to PIA) and associated impacts on patient outcomes (5–7). Patients waiting for ≥ 2 h are more likely to leave without being seen (LWBS) and patient satisfaction is reduced (8,9). However, the time from patient arrival to triage, or “door-to-triage” (DTT) time has not been well quantified in Canada. Arguably, this is a time when patients are at risk, as they have not yet been assessed by a medical professional.

There is only one previous Canadian study on DTT and it reported a median DTT of 13 min (4). A few U.S. studies have measured the time from registration to triage and have shown that this interval is frequently longer than the recommended time to PIA (10). Houston et al. found that patients consistently waited more than 10 min from registration to triage and Husk et al. found the mean wait time to triage to be 18 min, and 5% of

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patients waited 49 min or longer (11,12). These studies do not account for the hidden time from patient arrival to registration. It is then evident that the complete DTT is an important measurement to be able to accurately determine the true interval from patient arrival to PIA. Doing so will permit a true determination of the level of compliance with CTAS-recommended times to PIA.

In this study, we aimed to quantify DTT time to better understand its potential impact on time to PIA.

METHODS

Study Design and Setting

A prospective cohort study was undertaken at an academic tertiary care ED (approximately 70,000 visits/year). This project was approved as quality assurance and exempt from ethics review. Data were collected from all ambulatory patients presenting to the ED for 7 consecutive days from November 27 to December 3, 2017.

As patients entered the ED doors, research assistants (9:00 AM–10:00 PM) or clerical staff (10:00 PM–9:00 AM) gave patients a time-stamped card representing “door time.” Patients were asked to give the card to the triage nurse when called. The nurse stamped the card at the beginning of the triage encounter (“triage time”). CTAS scores and patient demographics were collected. Encounters missing triage time, demographic information, or CTAS were excluded from analysis.

Data Analysis

DTT time was defined as the difference between door time and triage time. Demographic information was analyzed using proportions and medians with interquartile range, where appropriate. DTT was compared across variables using Kruskal-Wallis one-way analysis of variance.

RESULTS

Nine hundred and thirty-five walk-in patients were captured using this method, which represented 82.2% of all ambulatory patients registering in the study timeframe (935 of 1137). After exclusion of 160 patients who lacked either recorded triage time or CTAS, 775 patients were included in the final analysis.

Median age was 42 years (interquartile range [IQR] 29–73 years) and 57.1% were female. Triage distribution was as follows: 0.6% CTAS-1; 26.9% CTAS-2; 48.2% CTAS-3; 23.8% CTAS-4, and 0.5% CTAS-5.

DTT was variable, with a median of 12 min (IQR 6–21 min) (Figure 1). DTT varied across days of the week

($p < 0.01$) with the longest DTT median on Monday at 22 min (IQR 11–43 min) and shortest DTT on Sunday (median 8 min; IQR 5–12 min). No relationship between DTT and CTAS was found ($p = 0.12$).

DISCUSSION

DTT time is a potential cause of delay to patient assessment and can impact patient outcomes, especially if it is not taken into consideration when implementing CTAS-recommended timelines. These timelines are important for the following reasons: 1) because they prioritize those with critical illness or injury to receive care first; 2) as a validated triage system, CTAS provides an estimate of how long patients can safely wait before receiving medical care; and 3) CTAS creates a framework for efficient use of health care resources, as it determines which patients are in greatest need of receiving the most support. Although CTAS recommends targeted intervals from triage to PIA, it does not account for time awaiting triage. Patients might wait longer than recommended before PIA. For example, although the CTAS guidelines suggest that Level 2 patients should undergo PIA within 15 min of arrival, we found that many CTAS 2 patients waited more than 15 min just to be triaged.

Houston et al. found that patients waited, on average, 10 min from arrival to triage (11). As more patients registered, the time from registration to triage increased. A 2017 Canadian study of 536 patients determined the mean DTT was 13 min (range 0.5–98.5 min) and found that for 10% of their patients, DTT exceeded CTAS recommended time to PIA (3). The results of our study confirm the work of these investigators, and have important clinical ramifications (3,11). Namely, for time-sensitive diagnoses, a long DTT could seriously impact patient morbidity and mortality. In the case of acute ST-elevation myocardial infarction, many patients will wait 1.5 to 2 h before presenting to the ED (13). A further 30-min DTT delay may limit the effectiveness of critical interventions, such as percutaneous coronary intervention (14).

DTT may also contribute to the number of patients who LWBS. Patients waiting for ≥ 2 h are more likely to LWBS (7,8,15). One study found that 60% of patients who LWBS subsequently sought care for their original symptom elsewhere. Of those, 73% received tests or medications and 4% were admitted to hospital (9). Another study found that 3% of LWBS patients were later admitted to hospital for the same medical issue (15). These studies imply that patients with moderate CTAS scores might have serious medical conditions. Delays in assessment could contribute to poor patient outcomes.

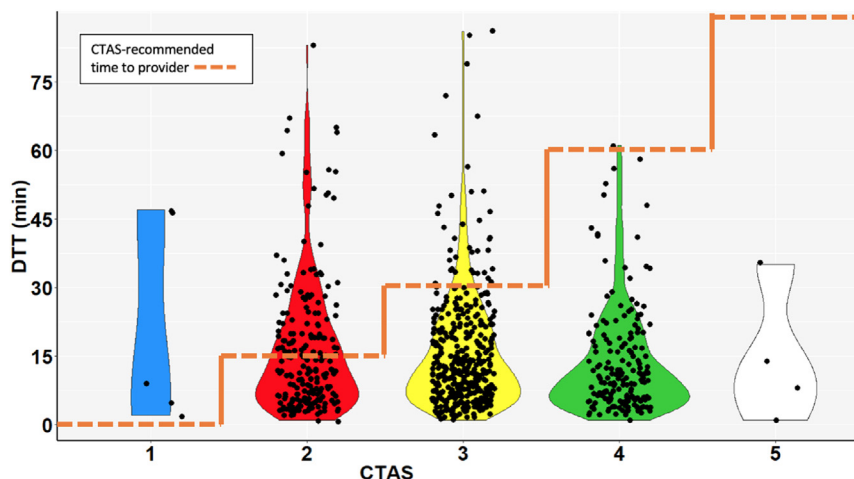


Figure 1. Door-to-triage time (DTT) by Canadian Triage and Acuity Score (CTAS).

Limitations

A limitation of this study was that it was restricted to a period of 1 week. In addition, as research assistants were not present overnight and registration staff were responsible for data collection, some patients might have been missed. However, the most ambulatory patients were captured using this method.

CONCLUSIONS

The time patients spend in the ED before triage is an important but overlooked metric. This study found DTT was frequently greater than CTAS-recommended time to PIA, suggesting there may be an opportunity to provide more timely patient care. Furthermore, it is crucial that EDs are aware that DTT needs to be taken into account when considering CTAS-recommended timelines. DTT factors are site-specific and replication across additional centers is necessary. Additional research evaluating factors affecting DTT time, different triage paradigms, and quality-improvement interventions should be undertaken.

REFERENCES

- Dallaire C, Poitras J, Aubin K, Lavoie A, Moore L, Audet G. Inter-rater agreement of Canadian Emergency Department Triage and Acuity Scale scores assigned by base hospital and emergency department nurses. *CJEM* 2010;12:45–9.
- CTAS National Working Group. The Canadian Triage and Acuity Scale. Version 2.5, 2012. Available at: https://caep.ca/wp-content/uploads/2017/06/module_1_slides_v2.5_2012.pdf. Accessed July 24, 2020.
- CTAS Score. Available at: <https://handbook.bcehs.ca/clinical/checklists-reference/ctas-score/>. Accessed February 12, 2019.
- Betz M, Stempien J, Trevidi S, Bryce R. A determination of emergency department pre-triage times in patients not arriving by ambulance compared to widely used guideline recommendations. *CJEM* 2017;19:265–70.
- Minick P, Clark PC, Dalton JA, Horne E, Greene D, Brown M. Long-bone fracture pain management in the emergency department. *J Emerg Nurs* 2012;38:211–7.
- Pines JM, Localio AR, Hollander, et al. The impact of emergency department crowding measures on time to antibiotics for patients with community-acquired pneumonia. *Ann Emerg Med* 2007;50:510–6.
- Pines JM, Hollander JE. Emergency department crowding is associated with poor care for patients with severe pain. *Ann Emerg Med* 2008;51:1–5.
- Hobbs D, Kunzman SC, Tandberg D, Sklar D. Hospital factors associated with emergency center patients leaving without being seen. *Am J Emerg Med* 2000;18:767–72.
- Bobrovitz N, Lasserson DS, Briggs ADM. Who breaches the four-hour emergency department wait time target? A retrospective analysis of 374,000 emergency department attendances between 2008 and 2013 at a type 1 emergency department in England. *BMC Emerg Med* 2017;17:32.
- Rowe BH, Channan P, Bullard M, et al. characteristics of patients who leave emergency departments without being seen. *Acad Emerg Med* 2006;13:848–52.
- Houston C, Sanchez LD, Fischer C, Volz K, Wolfe R. Waiting for triage: unmeasured time in patient flow. *West J Emerg Med* 2015;16:39–42.
- Husk G, Ansari A, Coleman P, Waxman D. Waiting for triage. *Ann Emerg Med* 2005;46(suppl):44.
- Goldberg RJ, Spencer FA, Fox KAA, et al. Prehospital delay in patients with acute coronary syndromes (from the Global Registry of Acute Coronary Events [GRACE]). *Am J Cardiol* 2009;103:598–603.
- Levisman J, Price MJ. Update on the guidelines for the management of ST-elevation myocardial infarction. *Am J Cardiol* 2015;115(suppl):3A–9.
- Fraser J, Atkinson P, Gedmintas A, Howlett M, McCloskey R, French J. A comparative study of patient characteristics, opinions, and outcomes, for patients who leave the emergency department before medical assessment. *CJEM* 2017;19:347–54.

ARTICLE SUMMARY

1. Why is this topic important?

Door to triage time has not been well quantified in Canada.

However, studies have shown that patients with extended wait times are less likely to be satisfied with care and more likely to leave without being seen.

2. What does this study attempt to show?

This study attempts to show the door to triage time at our institution.

3. What are the key findings?

Door to triage time was variable with a median [IQR] of 12 [6-21] minutes.

4. How is patient care impacted?

Door to triage time is an important metric to consider when determining CTAS recommended time to physician initial assessment.

Patients may be waiting longer to be triaged than anticipated which increases risk to patient safety.