
Does the Emergency Department of a Canadian Tertiary-Care University-Affiliated Hospital Meet the Time Goals Set by the Canadian Triage and Acuity Scale?

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Abstract

Objective: To determine if the Emergency Department of a Canadian tertiary-care university-affiliated hospital meets the time goals set by the Canadian Emergency Department Triage and Acuity Scale (CTAS).

Methods: The medical charts of patients who attended the nonacute area of the Emergency Department of McGill General Hospital over a 2-week period study were reviewed. Data were collected on date and time of arrival, time of triage, triage category assigned, and time of physician consultation. The patient waiting time from triage to consultation was calculated by triage category and compared to the time goals and fractile response objectives suggested by the CTAS.

Results: A total of 520 patient charts were included in the analysis. The Emergency Department did not meet the CTAS time goals or fractile response objectives for any of the 5 triage categories. The poorest performance was associated with triage Level II.

Conclusions: The failure of the Emergency Department to meet the time goals or fractile response objectives suggested by the CTAS, in addition to the long average waiting time for each triage category, may indicate a need for the investment of more resources and modifications of current practices in the ED to improve patient flow or revision of the CTAS recommendations to make them more amenable to today's limited health care environment.

MeSH Words: Triage, guidelines, prioritization

Introduction

The keystone of management of Emergency Departments (EDs) is good organization of resources. Efficient triage is important to reduce delays in ED care and to collate data so that services can be adjusted to suit patient and population needs [1]. The concept of prioritizing patients according to the seriousness of their condition or injury in order to provide timely and

appropriate treatment evolved in the military setting and was introduced to EDs in the early twentieth century [2]. Since then, several sets of guidelines and scales have been proposed to assist clinicians in assessing patient acuity [3].

The 1998 Canadian Triage and Acuity Scale (CTAS) was the first guideline formulated in Canada for triage of patients presenting to the ED (Appendix I) [4].

Table 1. Suggested time goals and fractile response objectives by triage level categories (CTAS)

Triage Level					
	I	II	III	IV	V
Ideal time to medical care	Immediate	15 min	30 min	60 min	120 min
Fractile response objective	98%	95%	90%	85%	80%

Its main objective was to recommend maximum justifiable intervals from triage to consultation with a physician (when investigation and treatment could be implemented) according to the triage category (i.e., the perceived acuity and urgency of the individual patient's condition). The guidelines stress that these time frames are only suggested ideals to improve outcome and not "established care standards" that staff are obliged to follow [4]. Recognizing that these goals cannot always be met, the CTAS assigned fractile response objectives to each category/level. For example, though Level II patients should not wait more than 15 minutes to see a physician, in about 5% of cases, this interval is longer. However, this does not imply that these delays are acceptable [4]. Table 1 shows the recommended time goals and fractile response objectives for all 5 triage levels.

At present, data on ED adherence to suggested triage times and fractile responses are available only for the National Triage Scale in Australia (New South Wales Emergency Department Information System) [5]. The aim of the present study was to investigate, for the first time, the extent to which an ED in a tertiary-care, university-affiliated hospital in Canada meets the recommendations of the CTAS.

Hypotheses

For triage Levels I, II and III, the Emergency Department of the Canadian tertiary care academic hospital always meets the time goals and fractile response objectives suggested in the CTAS guidelines.

For triage Levels IV and V, the Emergency Department of the Canadian tertiary care academic hospital does not always meet the time goals and fractile response objectives suggested in the CTAS guidelines.

Methods

Setting

The Montreal General Hospital is one of 5 hospitals comprising the McGill University Health Centre in Montreal, Quebec. It serves as an urban tertiary-care and teaching hospital and a Level I trauma center.¹ Approximately 36,000 patients visit its ED annually. At any one time, the ED is staffed by 3 attending physicians, 2 residents, and 2 medical students. The ED is split into 4 areas: ambulatory care, evaluation, resuscitation, and acute care. Triage for patients who do not require continuous monitoring is performed in the ambulatory care area.

Patients

The study group included all consecutive patients over age 14 years who presented to the ambulatory care area of the ED of Montreal General Hospital during a randomly selected 2-week period in springtime of 2006. Patients younger than 14 years were excluded because they are treated according to the pediatric guidelines. We also excluded patients who left the department before being seen by the triage nurse or a doctor, and patients whose triage charts were lacking start and finish times or time of physician consultation.

For purposes of the study, the patient charts were collected from the ED before their transfer to medical records, and the following data were recorded: date and time of patient attendance at the ED, patient sex and hospital number,

¹In North America, a level 1 trauma centre is required to have a certain number of surgeons and anaesthetists on call twenty four hours a day at the hospital, an education programme as well as preventive and out reach schemes. This standing is re-assessed every three years by the American College of Surgeons [14].

Table 2: Rate at which time goals and fractile response objectives recommended by the CTAS were met at the ED of a Canadian tertiary-care academic hospital

Patients	Triage Level				
	I	II	III	IV	V
Total	37	107	210	123	43
Chart missing time seen by physician (excluded)	0	17	37	23	4
Left without being seen (excluded)	0	0	17	22	14
Number seen within recommended time	31	11	22	16	11
CTAS fractile response objective	98% immediate	95% within 15 min	90% within 30 min	85% within 60 min	80% within 120 min
% of patients seen within recommended time	83.8%	10.3%	10.5%	13.0%	25.6%
Median time from triage to medical care	2.5 min	46 min	95 min	180 min	150 min

duration of triage, triage category assigned, and time seen by the physician. The charts were then returned to the ED. To minimize selection bias, one researcher analysed all the charts and a second looked at a random selection, and their findings were compared. The waiting time from triage to physician consultation was calculated for each patient and compared to the CTAS criteria shown in Table 1. For each triage category level, we calculated the percent of patients for whom the CTAS goals were met out of the total patients assigned the same level.

To avoid bias, attending physicians at the ED were not informed that the study was being conducted.

Results

During the 2-week study period, 520 patients underwent triage in the ED. Of these, 146 were excluded from the analysis because they left before being seen by a physician (n=53), their charts were missing data on physician findings (n=6), triage time (n=4), or time of physician consultation (n=81), or they were moved to a different triage level on reassessment before seeing a physician (n=2).

The results of our analysis are shown in Table 2. Of the 37 Level I patients, 83.8% were seen immediately, in accordance with the CTAS suggestion for this category. As the CTAS does not define "immediately", for purposes of the study, we interpreted this notation as within 5

minutes. The longest wait for medical care among Level I patients was 40 minutes, which

occurred early on a Saturday morning. The median waiting time was 2.5 minutes.

For the other triage categories, findings were poorer. Of the 90 evaluable Level II patients, only 10.3% were seen by a physician within 15 minutes. The median waiting time was 46 minutes, or one half-hour longer than the recommended interval. Similarly, 10.3% of the Level III patients and 13% of the Level IV patients were seen within the recommended time. The longest waiting time for Level IV was 9 hours and 45 minutes; indeed 22 Level IV patients in the original sample left without being seen by a physician. Only 2 patients in this category were seen after 15 min. The median waiting time was 3 hours. Of the Level V patients, 25.6% were seen within the recommended 2 hours.

Discussion

The results of the study show that the ED of the tertiary-care, university-affiliated Montreal General Hospital is not meeting the time goals or fractile response objectives suggested by the CTAS for any of the triage levels.

The highest rate of adherence to the guidelines was noted for Level I. However, the small number of patients in this group (n=37) precludes a definitive conclusion, and further study with more patients is needed.

The lowest adherence to the CTAS guidelines was associated with Level II, although this category is the second most urgent. Level II

patients are seen in ambulatory care, and because of the volume of patients waiting in this area, they may not be recognized as such by the physician. In an attempt to eliminate this problem, triage personnel at Montreal General Hospital attach a luminous note to the charts of Level II patients to alert nurses and physicians of their need for urgent care. In addition, the triage nursing staff may sometimes inform the physician that a Level II patient is waiting. The results of our study imply, however, that these measures are insufficient for reducing the waiting time of Level II patients.

Level III was the busiest of the 5 categories during the 2-week study period, with 210 patients. Therefore, at any one time in the ED, there may have been a number of Level III patients, making it difficult for the physician to decide who to see first. One potential means of reducing the congestion is further triage of Level III patients, immediately after initial triage, by a physician on duty.

Waiting time was longest for the Level IV patients, with a median of 3 hours, and only 13% were seen within the recommended time. Surprisingly, however, 25.6% of patients in Level V were seen within the recommended 2 hours. Both the median waiting time (2.5 hours) and the longest waiting time (9 hours and 8 minutes) for the Level V category were shorter than those for Level IV. However, considerably fewer patients were assigned to Level V, and among the original sample, nearly one-third of the Level V patients left the department before consulting with a physician. Furthermore, the recommended CTAS waiting time for Level V is twice that for Level IV, so the chances of veering from the suggested guidelines are lower.

Patient waiting times may also be affected by factors that are not directly related to triage itself but which interrupt patient flow through the ED [7]:

- ED-related: administrative problems, heavy physician load, long laboratory test times.
- ED-Hospital interrelated: need for tests performed outside the ED, need for consultation with a hospital specialist.

- Hospital-related: need for transport to the department, low bed availability.
- Patient/other-related: need to wait for patient's relatives, need for social worker intervention; need for ambulance.

For example, too few doctors working each shift can lead to longer waiting times for consultation. In Montreal General Hospital, although the physician shift schedule is designed to complement the departmental activity, in some cases the addition of a physician may help the ED to meet demand. Too few consultation rooms can also slow triage, as may a high number of patients awaiting speciality consultation, transport to the radiology department, or treatment. At the ED of Montreal General Hospital, patients already seen by a physician but awaiting laboratory results or further consultation with a specialist are sometimes returned to the waiting room or the corridor to facilitate patient flow. This may be understandable for ambulatory patients, but is it acceptable in terms of both patient care and dignity for sick, nonambulatory patients who need privacy and rest? This practice cannot replace the provision of more radiology services, more rooms or cubicles to consult with patients, more beds in the admitting ward.

Another way to lower patient load, and thereby waiting times, is by incorporating an open-access primary care facility within the ED. One study in the Netherlands found that this scheme led to fewer self-referrals to the ED [12].

Patients categorized to Level III or IV may require more in-depth, staff-intensive investigation, which coupled with the often limited space available, may create a backlog that prolongs waiting times. We suggest introducing a "see-and-treat" policy for the management of Level III and IV patients wherein those with minor complaints are seen and treated in order, as they arrive at the ED [9], and only those believed to have more serious conditions undergo triage. This method requires the presence of experienced senior clinicians and nurses who are able to safely assess, treat, and discharge patients with minor complaints [9]. In addition, the staff must be able to continue functioning when other parts of the ED are busy. Although not yet thoroughly researched, the see-

and-treat method has been implemented in a number of EDs across the UK, significantly reducing waiting times [10]. This is, of course,

only a short-term solution, though it does at least ensure that patients with minor complaints are seen promptly. It could even be limited to short periods during the busiest times of the day [10]. Nevertheless, it should not be used to mask the underlying problem of long waiting times or prevent physicians from seeking and correcting its source [11].

We should also not overlook the 10.2% of patients who left the department before consulting with a doctor. The reasons could not be determined by the design of the study, although we assume the finding may have been at least partly due to the long waiting times [8]. Most of the patients who left before seeing a physician were categorized to Level V. To alleviate the problem, short of actually reducing triage-to-physician consultation times, EDs could announce estimated waiting times to reassure patients and lower their expectations [8]. This recommendation is based on the concept of disconfirmation proposed in an earlier study, which suggested that “customer satisfaction is determined by the magnitude and direction of the gap between expectations and perceptions of performance” [8].

It is noteworthy that waiting times are emphasized in the CTAS because they are apparently associated with perceived quality of care and patient satisfaction and may play a role in improved outcome [4]. Nevertheless, the waiting time should not be considered the most important part of care in the ED. Focusing too much on adherence to time criteria may cause physicians to “under-triage:” patients; that is, to assign them to a lower triage category with a longer “acceptable waiting time” that the ED can meet. Although the ED may, as a result, appear more efficient, this practice is unethical and dangerous and will ultimately lower the quality of patient care. We did not find any evidence of under-triage in this study.

There were some cases in which not only did the ED fail to meet the suggested times of the CTAS, but the waiting times were exceptionally and perhaps unacceptably long. For example, one Level III patient waited over 12 hours to see a physician, and one Level II patient waited nearly 4 hours. We found it reassuring that these

patients were reassessed by the nurses while they were waiting, and some were moved to another triage level if deemed necessary. However, at the

new level, the waiting time was sometimes even longer.

At the same time, of course, several Level V patients, who presented when the department was quiet, were seen almost immediately.

We detected no effect of either time of day or day of the week on the length of waiting time. In some cases, a patient triaged to a lower level was seen before another patient with a more urgent problem, even though the two presented at the same time. This may have been due to human error (for example, the physician selecting the chart from the front of the stack without checking the triage category) or to physician bias for or against a particular presenting complaint.

To better highlight the problem of waiting time, and to ensure its proper evaluation, ED staff should be encouraged to clearly record the times patients arrive and the times they are seen and to convert to the 24-hour clock for clarity. (In some cases, before we confirmed the arrival dates and times by computer, we mistakenly understood from the charts that the patient had waited only minutes when in fact he or she had waited more than 12 hours.) Furthermore, the use of a computerized system throughout the ED might perhaps not totally eliminate human error, but it would help reduce problems and omissions in recording patient arrival/consultation times and make service audits more efficient.

The validity of the results in the present study could have been strengthened by a longer monitoring time, which would have led to the inclusion of more patients, especially in categories I and V. We retrieved the charts directly from the ED to ensure that we included all patients who presented to the ED within the predefined study period. Had we retrieved them from the hospital database, patients transferred to a hospital ward from the ED may still have been hospitalized at the time of retrieval, and their file would have been missed.

Conclusion

This present study shows that the ED of a major Canadian tertiary-care, university-affiliated medical center is not meeting the triage-to-physician waiting times suggested by the CTAS

guidelines. This finding may indicate a need for reorganization of patient emergency services with investment in additional resources or

revision of the CTAS recommendations in the context of today's limited health care environment. This work should encourage further such studies in EDs in Canada and worldwide.

References

1. Encarta. Encarta MSN. 2007; Available at: http://encarta.msn.com/dictionary_/triage.html. Accessed March 15, 2007.
2. Robertson-Steel I. Evolution of triage systems. *Emerg Med J* 2006; 23(2):154-155.
3. Fan J, Al Darrab A, Eva K, Fernandes CM. Triage scales in the emergency department: A systematic review. *Ann Emerg Med* 2005; 46(3):S41.
4. Beveridge R, Clarke B, Janes L, Savage N, Thompson J, Dodd G, et al. Canadian Emergency Department Triage and Acuity Scale (CTAS) implementation guidelines. *Can J Emerg Med* 1999; 1(2 suppl):S1-S54.
5. New South Wales Department of Health. NSW Health - Hospital Information - How triage works. 2007; Available at: <http://www.health.nsw.gov.au/hospitalinfo/triagetest.html>. Accessed March 18, 2007.
6. Wikipedia Contributors. Level 1 Trauma Center. 2007; Available at: http://en.wikipedia.org/wiki/Level_1_trauma_center. Accessed April 5, 2007.
7. Miro O, Sanchez M, Espinosa G, Coll-Vincent B, Bragulat E, Milla J. Analysis of patient flow in the emergency department and the effect of an extensive reorganisation. *Emerg Med J* 2003; 20(2):143-148.
8. Fernandes CMB, Price A, Christenson JM. Does reduced length of stay decrease the number of emergency department patients who leave without seeing a physician? *J Emerg Med* 1997; 15(3):397-399.
9. NHS Modernisation Agency. See and Treat. 2007; Available at: <http://www.wise.nhs.uk/cmsWISE/Service+Thmes/emergency/seeandtreat/seeandtreat.htm>. Accessed April 7, 2007.
10. Emergency Services Collaborative. See and Treat. 2002; Available at: <http://www.modern.nhs.uk/esc/8237/See%20&Treat.pdf>. Accessed April 7, 2007.

11. Leaman AM. See and Treat: a management driven method of achieving targets or a tool for better patient care? One size does not fit all. *Emerg Med J* 2003;20(2):118.
12. van Uden CJT, Winkens RAG, Wesseling GJ, Crebolder HFJM, van Schayck CP. Use of out of hours services: a comparison between two organisations. *Emerg Med J* 2003;20(2):184-187.

Competing Interests: None declared

Funding: None declared.

This manuscript has been peer reviewed

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Appendix 1



The Canadian Association of Emergency Physicians
L'Association canadienne des médecins d'urgence



National Emergency Nurses Affiliation Inc.
L'Affiliation nationale des infirmiers/infirmières
d'urgence incorporée



L'association des Médecins
d'urgence du Québec

The Canadian E.D. Triage and Acuity Scale

Patients should have an **INITIAL TRIAGE ASSESSMENT WITHIN 10 MINUTES*** of arrival

TRIASGE LEVEL I - RESUSCITATION	USUAL PRESENTATION	SENTINEL DIAGNOSIS
Time to NURSE Assessment IMMEDIATE* Time to PHYSICIAN Assessment IMMEDIATE*	Code / Arrest Major Trauma Shock States Near Death Asthma Severe Respiratory Distress Altered Mental State (unconscious, delirious) Seizures	Traumatic Shock Pneumothorax - Traumatic / Tension Facial Burns with Airway Compromise Severe Burns > 30% TBS Overdose with Hypotension / Unconscious AAA AMI with Complications / CHF / Low BP Status Asthmaticus Head Injury - Major / Unconscious Status Epilepticus
Time to NURSE Assessment IMMEDIATE* Time to PHYSICIAN Assessment 15 MINUTES*	Head Injury (Risk Features ± Altered Mental State) Severe Trauma Altered Mental State (lethargic, drowsy, agitated) Chemical Exposure - Eyes Allergic Reaction (Severe) Chest Pain - Visceral, Non-Traumatic ± Associated Symptoms Overdose (conscious), Drug Withdrawal ABD Pain (Age >50) with Visceral Symptoms Back Pain (Non Trauma, Not MSK) GI Bleed with Abnormal Vital Signs CVA with Major Deficit Asthma Severe (PEFR <40%) Moderate / Severe Dyspnea / Difficulty Breathing Vaginal Bleeding - Acute, Pain scale >5 ± Abnormal Vital Signs Vomiting and/or diarrhea (with suspicion of dehydration) Signs of serious infection (purpuric rash, toxic) Chemotherapy or immunocompromised Fever (age ≤ 3 months) Temp ≥ 38.0 (rectal) Acute Psychotic Episode / Extreme Agitation Diabetes: Hypoglycemia, Hyperglycemia Headache (Pain Scale 8 - 10/10) Pain Scale 8-10 (CVA, Back, Eye) Sexual Assault Neonate (< 7 days old)	Head Injury Trauma, Multiple Sites, Multiple Rib Fracture, Neck Injury / Spinal Cord Alkaline / Caustic Ocular Burns Anaphylaxis AMI, Unstable Angina, CHF, Chest Pain NOS, Gastroesophageal Reflux Unspecified Drug / Medicinal Overdose, "d.t.'s" AAA, Appendicitis, Cholecystitis Gastrointestinal Bleed, Hypotension CVA Severe Asthma COPD, Croup Spontaneous Abortion Ectopic Pregnancy / Rupture Epiglottitis, Meningitis, Sepsis Acute Psychotic Episode / Agitation Hypoglycemia, Diabetic Ketoacidosis, Hyperglycemia Migraine Renal Colic, LBP / Strain (Disc), Keratitis, Iritis
Time to NURSE Assessment 30 MINUTES* Time to PHYSICIAN Assessment 30 MINUTES*	Head Injury, Alert, Vomiting Moderate Trauma Abuse / Neglect / Assault Vomiting and/or diarrhea (≤ 2 years) Signs of infection Mild / Moderate Asthma (PEFR > 40%) Mild / Moderate Dyspnea Chest Pain - No Visceral Symptoms (Sharp/MSK) - No Previous Heart Disease GI Bleed with Normal Vital Signs Vaginal Bleeding Acute, Normal Vital Signs Seizure, Alert on Arrival Acute Psychosis ± Suicidal Ideation Pain Scale 8 - 10 / 10 with minor injuries Pain Scale 4 - 7 / 10 (Headache, CVA, Back)	Head Injury Anterior Dislocated Shoulder, Tibia / Fibula Fracture, Bimalleolar, Trimalleolar Ankle Fracture Pylonephritis Asthma without Status / COPD Bronchiolitis / Croup, Pneumonia Chest Pain NOS (MSK, GI, Resp) GI Bleed, No complications Spontaneous Abortion Seizure Acute Psychosis ± Suicidal Ideation Migraine, Renal Colic, LBP / Strain (Disc)
Time to NURSE Assessment 60 MINUTES* Time to PHYSICIAN Assessment 60 MINUTES*	Head Injury, Alert, No Vomiting Minor Trauma ABD Pain (Acute) Earache Chest Pain, Minor Trauma or MSK, No Distress Vomiting and diarrhea (>2 years/no dehydration) Suicidal Ideation / Depression Allergic Reaction (Minor) Corneal Foreign Body Back Pain (Chronic) URI Symptoms Pain Scale 4 - 7 Headache (Non Migraine / Not Sudden)	Head Injury, Alert, No Vomiting Colles Fracture, Ankle Sprain Appendicitis, Cholecystitis Otitis Media / Otitis Externa Chest Pain NOS (MSK, GI, Resp), Gastroesophageal Reflux Suicidal Ideation / Depression Urticaria Corneal Foreign Body LBP / Strain URI
Time to NURSE Assessment 120 MINUTES* Time to PHYSICIAN Assessment 120 MINUTES*	Minor Trauma, Not Necessarily Acute Sore Throat, No Resp Symptoms Diarrhea alone (no dehydration) Vomiting alone normal mental status (no dehydration) Menses Minor Symptoms ABD Pain (Chronic) Psychiatric complaints Pain Scale < 4	LBP / Strain URI Gastroenteritis Vomiting Disorders of Menstruation Dressing Changes Cast Changes Constipation Symptoms / Neurotic, Personality and Nonpsychotic Mental Disorders Unspecified Superficial Laceration(s)

* TIMES TO ASSESSMENT are operating objectives, not established standards of care. Facilities without onsite physician coverage may meet assessment objectives using delegated protocols and remote communication.

Corporate Sponsor(s) acknowledgement here.