ED ADMINISTRATION

Revisions to the Canadian Emergency Department Triage and Acuity Scale (CTAS) adult guidelines

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Background

The Canadian Emergency Department Triage and Acuity Scale (CTAS) has been widely adopted in emergency departments (EDs) across Canada and abroad since its initial publication in 1999.[1] CTAS continues to be revised and updated on a continuing basis. In 2001, a paediatric version of the CTAS implementation guidelines was developed and published.[2] With the ongoing improvements in computer technology, the increasing demands for clinical and administrative data and the wider application of information technology in EDs, the Canadian Emergency Department Information Systems (CEDIS) committee published a standardized presenting complaint list in 2003.[3] In 2004, a revision of the adult CTAS guidelines that incorporated the CEDIS complaint list and introduced the concept of modifiers to assist nurses in the assignment of the appropriate acuity level was published.[4] Modifiers were divided into 2 types: first order and second order. First order modifiers are defined as modifiers that are broadly applicable to a wide number of different complaints. These include vital sign modifiers (e.g., respiratory distress, hemodynamic stability, level of consciousness and fever), pain severity (e.g., central v. peripheral and acute v. chronic) and mechanism of injury. Second order modifiers are specific to a limited number of complaints. One example of a second order modifier is low blood sugar (BS) (e.g., "BS < 3 mmol/L and/or symptomatic" is a modifier for 3 complaints, including altered level of consciousness, confusion and hypoglycemia; while "BS < 3 mmol/L and asymptomatic" modifies only 1 complaint: hypoglycemia). A CTAS revisions supplement that displayed the entire CEDIS complaint list and the relevant first and second order modifiers was published (in portable document format [PDF] and Microsoft Excel format). A more sophisticated Excel application, Complaint Oriented Triage (COT) was designed (by B.U. and M.B.) in 2007. COT, along with all CTAS publications and supplementary documents, is accessible online at www.caep.ca/template.asp?id=B795164082374289BBD9C1C2BF4B8D32. In December 2006, a new combined adult and paediatric CTAS educational package was made available to certified instructors and their students. The package is maintained on a password-protected website.

Research regarding CTAS continues to be published. Studies looking at reliability and validity of CTAS using computerized decision support systems have been generally

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positive.[5–8] Studies looking at ED workload measures have found CTAS acuity to be one of the variables with strong predictive validity.[9,10]

Rationale for change

The CTAS National Working Group (NWG) meets annually, corresponds regularly and responds to feedback from members of the 5 represented organizations, individual users, hospital sites, and provincial and national bodies. Following the 2004 revision, there have been further requests that have been vetted and prioritized through the NWG. This update focuses on revisions in 5 key areas:

1. General issues including CTAS colours and rural protocol for CTAS Level V.
2. Presenting complaint list changes.
3. First order modifiers related to sepsis and bleeding disorders.
4. Second order modifiers related to chest pain, extremity injury and dehydration.
5. Mental health complaints and related second order modifiers.

Methods

The revision for CTAS was conducted in 3 phases. First, the Adult and Paediatric CTAS Provider courses, which ultimately culminated in the completion of the teaching materials for the Adult–Paediatric Combined course in December 2006, afforded an opportunity for the CTAS NWG education subcommittee to provide ongoing feedback to the CTAS NWG, including the identification of potential areas of deficiency and areas for revision. Formal feedback has been sought from the national body of CTAS instructors who have had the opportunity to teach new CTAS providers. Further feedback and constructive criticism came from CTAS providers, who were able to provide perspectives from a wide variety of settings and hospital types. In the second phase of review, care providers and working groups for specific adult patient populations, including mental health, bleeding disorders and the elderly, provided input. In the final stage, suggestions underwent review by the CTAS NWG prior to any changes being approved for publication.

This manuscript will focus only on the adult changes since the 2004 CTAS publication[4] and will not reiterate changes that were covered in that document. An article identifying the changes pertinent to paediatrics will follow in the May 2008 issue of *CJEM*.

Revisions

1. General issues

Alignment of adult and paediatric colour palettes

Rationale: The posters developed as teaching aids for adult and paediatric CTAS did not use the same colour coding system. Consensus was reached by the CTAS NWG that the CTAS level colour assignment will be as follows: Level I — blue, Level II — red, Level III — yellow, Level IV — green and Level V — white (Fig. 1).

Level	Category
Level I —	Resuscitation
Level II —	Emergent
Level III —	Urgent
Level IV —	Less Urgent
Level V —	Non Urgent

Fig. 1. Canadian Emergency Department Triage and Acuity Scale colour scheme.

Rural protocol for CTAS Level 5

Rationale: In 2003, the Society of Rural Physicians of Canada (SRPC) Emergency (ER) Committee published a statement about the implementation of CTAS in the rural setting in *CJEM*.[11] Substantively different from the original CTAS implementation guidelines was the inclusion of a "Protocol for CTAS Level V" patients that would allow a trained registered nurse, without contacting the on-call physician, to refer patients to a more appropriate service provider or defer care to a later time. This was intended for those hospitals without onsite duty emergency physicians in order to optimize the use of limited physician resources without jeopardizing patient safety. However, some members of the National Emergency Nurses Affiliation (NENA) expressed concerns that this policy may leave nurses liable in the event of an adverse patient outcome. In 2007, the SRPC ER revised the criteria that needed to be met before the implementation of such a medical directive, incorporating the following:

a. The patient is 6 months of age or older.
b. Vital signs are deemed satisfactory by the nurse, and temperature is 35°C–38.5°C (38.3°C for age > 60 yr).
c. The patient is assessed as CTAS Level V.
d. After the nursing assessment, there is no clinical indication that the patient may require urgent physician attention.
e. In borderline cases, or where the nurse is unsure, telephone consultation between the nurse and physician has determined that the problem is nonurgent.
f. Appropriate hospital policy is in place.

g. There is local agreement between medical and nursing staff to accept the process.

Items f and g were added to the 2003 statement to ensure that nursing staff at the local level have been involved with protocol development and hospital policy, and to ensure the support for both the nurses and physicians following implementation. In small communities, having public involvement and education at the time of implementation should limit misconceptions before they arise. The revised statement is posted on the SRPC website (http://srpc.ca/librarydocs/revCtas.pdf).

2. Presenting complaint list

Rationale: When the CEDIS presenting complaint list was first published in 2003, a decision was made to limit the number of complaints in order to make it practical. The CTAS NWG recognized that the list would need to be revised after feedback from users and updated in order to address the needs of the paediatric triage nurses. For the full publication of the updated CEDIS complaint list, please see the revised manuscript published in the current edition of *CJEM*.[12] Table 1 summarizes the new or revised adult presenting complaints and associated headings. The accompanying 2008 CTAS supplement, available online at www.caep.ca/template.asp?id=B795164082374289BBD9C1C2BF4B8D32, will include all adult presenting complaints and the relevant first and second order modifiers, with all new modifications highlighted in blue.

3. First order modifiers

Temperature modifier

Rationale: There has been increasing emphasis on the importance of early recognition of adult patients with systemic infections. The feedback received by the NWG is that CTAS needs to better support the initiation of expeditious care as outlined in the "Surviving Sepsis Campaign Guidelines,"[13] based on early goal-directed therapy described by Rivers and colleagues.[14] The new CTAS modifier definitions are based on an understanding of sepsis inflammatory response syndrome (SIRS), sepsis and severe sepsis. SIRS is the systemic inflammatory response to a variety of severe clinical insults. The response is manifested by 2 or more of the following conditions: temperature > 38°C or < 36°C; heart rate > 90 beats/minute; respiratory rate > 20 breaths/minute or $PaCO_2$ < 4.3 kPa (< 32 torr); white blood cell count (WBC) > 12000 cells/mm^3, < 4000 cells/mm^3 or > 10% immature (band) forms. Sepsis is defined as the systemic response to infection, manifested by 2 or more of the SIRS criteria as a result of infection. Severe sepsis is defined as sepsis associated with organ dysfunction, hypoperfusion or hypotension; hypoperfusion and perfusion abnormalities may include but are not limited to lactic acidosis, oliguria or an acute alteration in mental status.[15] The adult temperature-based modifier recommendations are shown in Table 2, with revised definitions.

Any patient with a suspected infectious process and immunocompromise or presenting with hemodynamic compromise, moderate respiratory distress or altered level of consciousness should automatically be assigned a triage level of II; and given the evidence of circulatory, respiratory or central nervous system dysfunction, should be considered severe sepsis and treated accordingly. For patients not meeting those criteria, the only SIRS criteria generally available at triage are: temperature < 36ºC or > 38ºC, heart rate > 90 beats/minute and respiratory rate > 20 breaths/minute.

Table 1. New or revised adult presenting complaint

CEDIS complaint category	Previous complaint	New or revised complaint
Cardiovascular	Unilateral reddened hot limb: DVT symptoms	Unilateral reddened hot limb
Environmental	No previous	Near drowning
Gastrointestinal	No previous	Oral or esophageal foreign body
Genitourinary	Testicular or scrotal pain and/or swelling	Scrotal pain and/or swelling
Mental health and psychosocial issues	Depression or suicidal; hallucinations, violent behaviour, homicidal, bizarre or paranoid behaviour, no previous	Depression, suicidal or deliberate self harm; hallucinations or delusions, violent or homicidal behaviour, bizarre behaviour, concern for patient welfare
Neurologic	Dizziness or vertigo	Vertigo
Obstetrical–gynaecological	Vaginal pain or dyspareunia	Vaginal pain or itch
Opthalmology	Discharge, eye; itchy or red eye; periorbital swelling and fever	Eye redness or discharge; periorbital swelling
Respiratory	Cough	Cough or congestion
Skin	Bruising — history of bleeding disorder	Spontaneous bruising

CEDIS = Canadian Emergency Department Information System; DVT = deep vein thrombosis.

Patients with all 3 positive plus evidence of an infection and an unwell appearance should be assigned a level II. Patients with < 3 SIRS criteria positive but an unwell appearance should be assigned a level III. Patients who appear well and whose only SIRS criteria is a fever, or documented fever prior to presenting to the ED, are a level IV.

Bleeding disorder modifier

Rationale: Patients with bleeding disorders who present with major and moderate bleeds require rapid factor replacement.[16–18] Modifiers have been developed with input from the Canadian Hemophilia Society. Patients with congenital bleeding disorders and significant factor deficiencies usually require rapid factor replacement. Patients on anticoagulants or with severe liver disease with prolonged prothrombin or partial thromboplastin times are at risk for massive bleeding and may also require rapid intervention.[19,20] Definitions for major and minor bleeds are described in Box 1. While the ED patient population with congenital or acquired bleeding disorders is limited, these modifiers are applicable to all CEDIS trauma complaints plus any nontrauma complaint that deals with bleeding, thus the decision to consider these first order modifiers (changes will be included in the online CTAS 2008 supplement).

The goal of identifying bleeding disorder patients is to provide factor replacement as quickly as possible for major

Table 2. Revised adult CTAS temperature modifiers

Temperature,* age, condition	CTAS level
Adults ≥ 16 yr (> 38.5°C)	
Immunocompromised†	II
Looks septic‡	II
Looks unwell§	III
Looks well¶	IV

CTAS = Canadian Emergency Department Triage and Acuity Scale.
*Temperature modifiers may be applied based on a documented history of recent fever even if the patient is afebrile at triage.
†Immunocompromised — patients with neutropenia (or suspected neutropenia), chemotherapy or those who are taking immunosuppressive drugs, including steroids.
‡Looks septic — patients have evidence of infection, have 3 SIRS (Systemic Inflammatory Response Syndrome) criteria positive, or show evidence of hemodynamic compromise, moderate respiratory distress or altered level of consciousness.
§Looks unwell — patients have < 3 SIRS criteria positive but appear ill-looking (i.e. flushed, lethargic, anxious or agitated).
¶Looks well — patients have fever as their only positive SIRS criteria and appear to be comfortable and in no distress.

Box 1. Classification of bleeding severity and acuity score modification

Life- or limb-threatening bleeds
Level II — first order modifier
- Head (intracranial) and neck
- Chest, abdomen, pelvis, spine
- Massive vaginal hemorrhage
- Iliopsoas muscle and hip
- Extremity muscle compartments
- Fractures or dislocations
- Deep lacerations
- Any uncontrolled bleeding

Moderate, minor bleeds
Level III — first order modifier
- Nose (epistaxis)
- Mouth (including gums)
- Joints (hemathroses)
- Menorrhagia
- Abrasions and superficial lacerations

Table 3. New and revised second order modifiers

Presenting complaint	Revised modifier	CTAS level
Chest pain, noncardiac features	Other significant chest pain (ripping or tearing)*	II
Upper extremity injury; lower extremity injury	Obvious deformity†	III
Nausea and/or vomiting; diarrhoea	Severe dehydration‡	I
General weakness	Moderate dehydration§	II
	Mild dehydration¶	III
	Potential for dehydration**	IV
Pregnancy issues > 20 weeks††	Presenting fetal parts, prolapsed cord	I
	Vaginal bleeding, third trimester	I
	Active labour (contractions ≤ 2 min)	II
	No fetal movement or no fetal heart tones	II
	Headache with or without edema, abdominal pain or hypertension	II
	Postdelivery	II
	Active labour (contractions > 2 min)	III
	Possible leaking amniotic fluid	III

CTAS = Canadian Emergency Department Triage and Acuity Scale.
*Currently "other significant chest pain (ripping, tearing or pleuritic)" is a level III modifier. However, the description of ripping or tearing chest pain is more commonly associated with an aortic dissection, so has been changed to a level II modifier to be consistent with the acuity of that presentation.
†Concerns were expressed that patients with obvious fractures but without severe pain may have care delayed, which may result in increased morbidity. Obvious deformity should effectively identify patients with displaced fractures or dislocations requiring acute reduction.
‡Severe dehydration — marked volume loss with classic signs of dehydration and signs and symptoms of shock.
§Moderate dehydration — dry mucous membranes, tachycardia, plus or minus decreased skin turgor and decreased urine output.
¶Mild dehydration — stable vital signs with complaints of increasing thirst and concentrated urine and a history of decreased fluid intake or increased fluid loss or both.
**Potential for dehydration — no symptoms of dehydration but presenting cause of fluid loss ongoing or difficulty tolerating oral fluids.
††The 2004 adult CTAS revisions listed these "Pregnancy issues > 20 weeks" descriptors as new complaints. Upon review, it has been decided that they better fit the role of second order modifiers, specific to this single CEDIS (Canadian Emergency Department Information System) complaint.

bleeds and initiate factor replacement rapidly for minor or moderate bleeds. Of note, many of these patients may carry *Factor First* cards (accessible at www.hemophilia.ca/emergency and www.hemophilia.ca/urgence) that include personalized treatment recommendations. The classification and targets for infusion of prothrombin complex concentrate or fresh frozen plasma for patients with acquired bleeding disorders are the same.

4. Second order modifiers

Additions and modifications to previous modifiers

Rationale: Feedback to the CTAS NWG indicated that revisions were required for the chest pain, noncardiac features to better identify aortic dissection, extremity injuries, dehydration and pregnancy issues > 20 weeks (Table 3).

5. Mental health complaints and second order modifiers

Rationale: The 2004 adult CTAS revisions introduced a series of second order modifiers to support the CEDIS mental health complaints. Adoption initially, however, was felt to be inconsistent owing, in part, to a lack of clear definitions and limited content in the CTAS educational package. A multidisciplinary work has been created to address some of these deficiencies; further research is planned to support this work. Table 4 outlines the revised mental health complaints and the relevant second order modifiers with Table 5 providing the relevant definitions.

Discussion

There are a number of keys to assigning the individual patient the most appropriate triage acuity score using CTAS.

1. Obviously unstable patients are placed immediately in a resuscitation area. The triage level should be assigned post hoc based on first order modifiers.
2. Apparently stable patients should be triaged using the relevant presenting complaint with the highest associated triage score.
3. Familiarity with first order modifiers and their definitions is essential to appropriate and timely application.
4. Key second order modifiers must be used to ensure patients with selected complaints are not undertriaged.
5. Clinical instincts are important and uptriage is both appropriate and necessary if the patient appears sicker than your assigned triage score would indicate.
6. If there is no access to an ED information system with integrated triage decision support, the COT Excel-based document should be available as a rapid reference on a computer that is easily accessible at triage.

Concurrent and ongoing activities

A revised CEDIS complaint list is published in this issue of *CJEM*[12]; changes are incorporated in the adult CTAS revisions. An article detailing paediatric CTAS revisions will be published in the May 2008 issue of *CJEM* and it will also incorporate the newly revised CEDIS complaint list. Revised CTAS Adult and Paediatric Combined course teaching materials are being updated and will be available for the NENA annual meeting in May 2008. It is anticipated

Table 4. Mental health complaints and second order modifiers

CEDIS presenting complaint	Description	CTAS level
Depression, suicidal or deliberate self harm	Attempted suicide or clear suicide plan	II
	Active suicidal intent	II
	Uncertain flight or safety risk	II
	Suicidal ideation, no plan	III
	Depressed, no suicidal ideation	IV
Anxiety or situational crisis	Severe anxiety or agitation	II
	Uncertain flight or safety risk	II
	Moderate anxiety or agitation	III
	Mild anxiety or agitation	IV
Hallucinations or delusions	Acute psychosis	II
	Severe anxiety or agitation	II
	Uncertain flight or safety risk	II
	Moderate anxiety or agitation, or with paranoia	III
	Mild agitation, stable	IV
	Mild anxiety or agitation, chronic hallucinations	V
Insomnia	Acute	IV
	Chronic	V
Violent or homicidal behaviour	Imminent harm to self or others, or specific plans	I
	Uncertain flight or safety risk	II
	Violent or homicidal ideation, no plan	III
Social problem	Abuse physical, mental, high emotional stress	III
	Unable to cope	IV
Bizarre behaviour	Chronic, nonurgent condition	V
	Uncontrolled	I
	Uncertain flight or safety risk	II
	Controlled	III
	Harmless behaviour	IV
	Chronic, nonurgent condition	V

CEDIS = Canadian Emergency Department Information System;
CTAS = Canadian Emergency Department Triage and Acuity Scale.

that an updated version of COT will be posted on the website after May 2008. At the CTAS NWG meeting in June 2008, work will be undertaken to create educational and reference posters that reflect the 2008 versions of the CTAS.

Conclusion

CTAS documents continue to be updated and revised based on feedback from both users and expert consensus, and the changing ED environment. ED overcrowding has continued to worsen and the importance of being able to prioritize patients to be seen based on acuity and risk has continued to grow. The rollout of new standardized CTAS educational materials across the country has led to higher overall triage levels in some sites and lower ones in others, leading to constructive feedback and obvious areas of further research needs. These changes will require ongoing tracking. The CTAS NWG will continue to meet, welcomes all feedback and will plan future revisions as new evidence and practice environment changes demand.

Competing interests: None declared.

Table 5. Mental health definitions relevant to the second order modifiers

Mental health term	Definition
Suicide-related terms	
Suicide attempt	self injurious behaviour with a nonfatal outcome accompanied by evidence (explicit or implicit) that the person attempted to die[21]
Suicidal intent	subjective expectation and desire for a self-destructive act that would end in death[21]
Suicidal ideation	thoughts of serving as an agent of one's own death. Suicidal ideation may vary in seriousness depending on the specificity of suicide plans and the degree of suicidal intent[21]
Uncertain flight or safety risk	patients threatening violence toward themselves or others; patients exhibiting uncontrolled anger, restlessness, paranoia or hallucinatory behaviour; or patients unable or unwilling to cooperate with a suicide risk assessment and who pose a flight risk[22,23]; these patients require close observation based on site resources and capability. (note: if a family member is willing to stay, and both parties appear comfortable to wait, "hospital-assigned" close observation may not be needed)
Anxiety and agitation definitions	
Severe anxiety or agitation	extreme unease, apprehension or worry with signs of excessive circulating catecholamines; or dangerously agitated and uncooperative and does not calm down when asked[24–28]
Moderate anxiety or agitation	clear unease, apprehension or worry but no obvious tachycardia or tremulousness; or signs of agitation and does not consistently obey commands (e.g., will sit or calm down when asked but soon becomes restless and agitated again)[23–27]
Mild anxiety or agitation	mild unease, apprehension or worry but can be reassured; or restless but cooperative; obeys commands[24–28]
Hallucination- or delusion-related definitions	
Acute psychosis	may present with extreme self-neglect, disordered or racing thoughts or both, speech pattern impairments, impaired reality testing with "lack of insight," may be responding to hallucinatory or delusional thoughts or both, which may be accompanied by hostility[25–29]
Paranoia	delusions of a persecutory nature — being followed, poisoned or harmed in some way; ideas of reference — the belief that people are talking about you; may be accompanied by extreme fear, agitation or hostility[25–29]
Chronic hallucinations	known history of hallucinations with no recent change in nature, and/or frequency, or in patient's level of distress related to them[25–29]
Chronic, nonurgent condition	patient is well known to the emergency department and triage nurse with a recurrent complaint that has either been fully dealt with, or patient is just looking for food, warmth or temporary shelter
Bizarre behaviour definitions	
Uncontrolled	bizarre, disoriented or irrational behaviour, not controlled by verbal communication and reasoning, and placing the patient or others in physical danger[25]
Controlled	bizarre, irrational behaviour that is viewed as threatening but controllable through verbal support and reasoning; patient is accompanied by a friend or family member[25]
Harmless behaviour	bizarre or eccentric behaviour (usually of long standing with no recent change from the patient's norm) that is of no threat to the patient or others and requires no acute intervention[25]

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