Guidance when Applying the Canadian Triage and Acuity Scale (CTAS) to the Geriatric Patient: Executive Summary

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INTRODUCTION

The first of the baby boomers reached the historic retirement age of 65 in 2011, however, even prior to this emergency department (ED) visits by the elderly were on the rise, correlating with our expanding life span.[1] The average life expectancy for Canadian males/females born in 1992, 2002, and 2012 respectively is 75/81; 77/82, and 80/84 years as reported by Statistics Canada (http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/health26-eng.htm). The proportion of the population over 65 is currently 12% and expected to rise to 20% by 2030, the year that all baby boomers will have reached the age of 65. Reductions in human mortality leading to extended lifespans reflect improved living standards, education, sanitation, housing, nutrition, public health, and advanced medical care.[2] It has been proposed that medical advancements contributed 5 of the 30 year increase in life expectancy since 1900, and approximately 3.5 of the 7 year increase since 1950.[3] From an ED perspective the impact of improved therapies for reversible life threatening conditions such as ST elevation infarcts (STEMIs), cerebrovascular accidents (CVAs) and severe trauma has complemented improved pre hospital care and ED processes to support rapid effective intervention vital to patient survival. More effective prevention and improved medical management has led to an increase in elderly ED patient complexity, often with multiple chronic diseases, varying degrees of cognitive impairment and mobility challenges. Older patient ED visits increased by greater than 30% in the decade between 1993 and 2003, with the number of ED visits over the age of 75 years of age relative to their proportion of the population even higher.[4,5] This population is also subjected to prolonged ED lengths of stay, and have increased resource utilization and more frequent hospital admissions.[6-11]

Regarding triage and management challenges among older patients, the literature has identified a number of key differences from the general population, along with specific skills, knowledge and attitudes required to provide high quality care to older patients.[12-15]

Realities amongst elderly patients that make it more difficult to accurately triage and prioritize include:

- **Atypical presentations of common diseases:** triage decisions will be impacted by the ability to recognize that high acuity conditions can present with low acuity symptoms and findings: for example, chest pain is an *uncommon* symptom while fatigue and weakness are *common* symptoms of ACS in the elderly; most older people with acute confusion (delirium) will have a quiet, sedated presentation in contrast to younger patients.
- **Cognitive impairment:** dementia is a common condition in people over 80, though often not diagnosed or identified prior to the ED visit; its presence may make it difficult to gather an accurate

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set of symptoms or for the person to understand or participate in the triage process;

- **Effect of co-morbid conditions:** older people may have multiple chronic diseases, several of which can have acute exacerbations at the same time; Triage nurses focused on "identifying-the-most-serious-symptom-complex-quickly" may be challenged sorting out the different symptom complexes at play;
- **Polypharmacy:** many healthy older people take more than five prescription medications raising the possibility of drug-drug interactions and drug-disease interactions and making it difficult to determine whether symptoms and vital sign changes are caused by disease, drug, or are normal;
- **Palliative and end-of-life care:** rapidly determining where a patient is at on the main end-of-life trajectories (sudden death, organ failure, terminal disease, frailty) and their goals of care will have an impact on triage decisions

CONSIDERATIONS FOR GERIATRIC TRIAGE ASSESSMENTS

1. Interpretation of Vital sign 1st order modifiers[16]

Homeostatic mechanisms change with age leading to difficulties in maintaining internal physiological consistency. This means that the body's cardiovascular, respiratory, and neuro-regulatory systems respond differently to specific homeostatic challenges.[17] This requires careful consideration when interpreting vital signs in older patients.

Respiratory

As lungs age they become less responsive to chemoreceptors and mechanoreceptors, leading to a significant decline in response to hypoxia and hypercapnia.[18,19] Decreasing elastic recoil and dilation of the airspaces, lead to increased dead space so that increased ventilation comes through higher rates of respiration rather than through greater volumes per respiration.[20,21] Accurate counting and documentation of respiratory rates is often overlooked,[22] but very important, as respiratory rates of >27 breaths per minute are highly predictive of serious adverse events and often more sensitive than pulse and blood pressure in identifying critically ill patients.[23-25]

Cardiovascular

In the cardiovascular system a number of factors lead to myocardial thickening, arterial wall stiffness, and the development of atherosclerosis and hypertension. This leads to increased workload on the heart, left ventricular wall thickening and diastolic dysfunction. Typically systolic pressure rises while diastolic pressure rises more slowly, resulting in a wider pulse pressure. A very important and often unrecognized change is a decreased response to circulating catecholamines with aging. Coupled with arterial stiffness this can lead to orthostatic hypotension, which is already a common side effect of many antihypertensive medications. Orthostatic hypotension is extremely common in older patients.[26,27] These drops in blood pressure can manifest as: cognitive disturbances, pre syncope, syncope and falls.[28,29] Please also refer to the trauma section which points out the importance of a systolic blood pressure (SBP) of less than 110 mmHg post injury in older adults.[30]

Heart rate is a reflection of both sympathetic and parasympathetic inputs and maximal heart rate decreases with age due to down regulation of beta-1 receptors, producing a decreased ability to achieve and tolerate rapid heart rates during exercise or acute illness.[31] At the same time, resting heart rate gradually increases with age.[32] This results in a narrowed physiologic range that may mask significant underlying disease and also result in a worse prognosis for many diseases such as sepsis,[33] myocardial infarction,[34] and congestive heart failure.[35]

Temperature (thermoregulatory system)

Because of decreased metabolic rate and alterations to the hypothalamus, older adults often have lower core body temperatures and altered thermoregulatory responses.[36,37] This may be due to a combination of less robust immune systems, decreased cardiac output, loss of peripheral vasoconstriction, and decreased muscle mass yielding less heat production.[38,39] Fever has been postulated to support host defense mechanisms and to decrease microbial survival; the inability to mount a fever response may make the older people more vulnerable to infections.[40] For these reasons subtle temperature changes (including *hypo*-thermia) may signify a serious infection.[41-44]

2. Interpretation of Pain 1st order modifier

Pain assessment in the elderly is complicated by a number of factors. Many older patients may be more stoic, have difficulty in expressing pain severity, or feel pain is a normal part of their existence.[45] There is also

evidence that pain perception does decrease with age. Research has suggested that older patients may have decreased A-Delta afferent fibre function, altered serotonin metabolism, and increased responsiveness to nonopioid analgesic pathways at the spinal cord level, as explanations for this finding.[46] Neurogenic inflammation is less pronounced in older people which may also lead to lower level pain signals initially, while older subjects demonstrate much longer periods of secondary hyperalgesia leading to more frequent persistent pain.[47] There are recognized age-related differences in visceral pain perception and elderly patients with acute coronary syndrome, peptic ulcer disease and pneumothorax may frequently present without pain.[48]

To try to assess the severity of pain in patients with cognitive impairment or communication issues, a number of tools have been used. An ED observational study of adult patients greater than 65 years of age, having an 18-gauge IV catheter inserted reported a significantly lower pain score using Visual Analogue Scale (VAS) than their younger counterparts.[48] A comparison of a 6-point ordinal scale of pain intensity (SPIN), using increasingly intense coloured circles to represent increasing pain, to a 10 centimetre VAS score, to a 10-point numeric rating scale (NRS) found SPIN and NRS to be the most reliable and easiest to use by patients.[49] Even in patients with some level of cognitive impairment self reporting of pain severity is the first choice, and may require different ways of phrasing the question and then allowing time for the patient to respond either verbally or through gestures.[50] The Iowa Pain Thermometer and the revised Faces Pain Scale are also of value when verbal communication is compromised.[51]

Case example

Please identify the most appropriate CTAS acuity score, presenting complaint(s), and the CTAS modifier or modifiers you would select to assign the score

- 82-year-old cognitively intact male presents with a 2 day abdominal discomfort, primarily lower abdomen, and no bowel movement in that time.
- His appetite is decreased but no vomiting, diarrhea, bloating or fever reported. He's had no previous abdominal surgery and his only medications are atorvastatin and nifedipine.
- When asked about pain he estimates 3/10, however, when he sits down or gets up from the chair he grimaces.
- RR 18, HR 93, BP 128/86, Temp 37.4C, O2 Sat 96%, GCS 15

Answer: CTAS Level 3-Urgent; CEDIS Presenting Complaint – Abdominal pain

Rationale: While the patient's reported pain score is mild, he's grimacing with movement in and out of the chair. This may be indicative of peritoneal irritation and also suggests a pain score higher than a 3. While pain severity does not correlate with disease severity, providing adequate pain relief is important for patient comfort and satisfaction. In addition, while his vital signs appear normal, his pulse rate is slightly elevated relative to his age, and a temperature of 37.4C in an elderly male may in fact represent a fever.

Note: Abdominal pain is a common ED presentation with a higher incidence of pathology found in elderly patients. The surgical rate for elderly patients with abdominal pain is twice that of younger patients and the mortality rates are 6-8 times higher.[52] It is also important to be mindful of non abdominal conditions that can present with abdominal pain such as acute coronary syndrome or pneumonia.

3. Domains of Care requiring special consideration

Atypical presentations of common diseases

Acute coronary syndromes are more likely to present without chest pain, the older patient especially in females and if they have diabetes. Common non-specific presenting features include: shortness of breath, dizziness, weakness, syncope, abdominal pain, or nausea and vomiting.[7,52,53] This should lead to a higher level of clinical suspicion amongst this patient group, to organize an early 12-lead ECG and timely physician assessment.

Sepsis presentations are also frequently heralded by non-specific symptoms and apparently normal vital signs, however, as discussed, minor temperature rises or drops in the elderly often indicate a serious infection. A prospective study of community acquired pneumonia patients noted a progressive decrease in the reporting of respiratory and non respiratory symptoms with age, most pronounced in the over 75 year age group. This was most notable for a lack of symptoms related to the febrile response (chills and sweats) and reporting of pain (chest, headache, myalgias).[54] In a European study of elderly community acquired pneumonia patients the absence of fever and presence of tachycardia were

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independent predictors of mortality while respiratory rate, confusion and blood pressure were not.[55]

Case example

- 74-year-old female presents a 3 day history of increasing weakness and easily short of breath (SOB) doing her daily activities but was not SOB at rest.
- She does not complain of pain but does give a history of type 2 diabetes on oral hypoglycemics, and hypertension well controlled on an ace inhibitor.
- RR 17, HR 94, BP 108/72, Temp 36.8C, O2 Sat 96%, GCS 15

Answer: CTAS Level 3-Urgent or 4-Less Urgent; CEDIS Presenting Complaint – General Weakness OR Shortness of breath

Rationale: She does meet the definition of 'mild respiratory distress' with her shortness of breath on exertion that would be applicable to either CEDIS complaint. In addition, she may meet the definition of 'frailty modifier' especially if she is unaccompanied.

Note: During her workup an ECG showed acute inferior wall ischemic changes and her troponin was significantly elevated, she was admitted to Cardiology and managed medically prior to angiography due to her delayed presentation.

Cognitive impairment

Delirium and agitation has been reported in approximately 25% of admitted geriatric patients.[56,57] Dementia and mild cognitive impairment are also common among geriatric patients in the ED, however, often go undetected and frequently undocumented.[58-60] A 2001 prospective observational ED study screened 297 patients 70 years or older using the Oriented-Memory-Concentration (OMC) exam for cognitive impairment and the Confusion Assessment Method (CAM) for delirium, identifying 26% with mental status impairment; 10% with delirium and 16% cognitive impairment alone, while 6% screened positive for both.[61] Of concern only 17% of patients identified with mental status impairment had corresponding documentation by the emergency physician, more than a third of patients who screened positive for delirium were discharged home, and of the 44% of patients with cognitive impairment who were discharged home, only 18% had discharge plans to address the impairment. In 2003 the same study was repeated with similar rates of cognitive impairment and delirium, however, this time the screening result findings were provided to the emergency physician during the management course.[62] In no cases did it alter ED decision making, and 5 of 19 patients with delirium were discharged home. Of these, 1 returned after a fall, 2 others returned within 3 days and were admitted, and a fourth at clinic follow up was given a new diagnosis of metastatic cancer. These findings are similar to previous ED studies with Lewis et al.[63] reporting a 10% rate of delirium, infrequent relevant charting and one third discharged home; Naughton et al.[64] finding a 22% with cognitive impairment and 9.6% with delirium; Ellie et al.[58] reporting a 9.6% delirium rate with only a 35% detection rate by emergency physicians, and Gerson et al.[65] finding 33.5% moderate to severe cognitive impairment using the OMC test.

The Orientation-Memory-Concentration (OMC)[66] and Confusion Assessment Method (CAM)[67] scoring systems would be too time consuming for the triage nurse to apply during their rapid assessment. However, observing or being told by family or caregivers that a patient's behaviour is fluctuating, is inattentive, exhibits disorganized thinking or is less alert, are all clues to the possibility of delirium. For patients presenting with 'acute confusion with headache or altered LOC' is a CTAS level 2 special modifier, while 'acute confusion without headache or altered LOC' is a CTAS level 3 special modifier for the presenting complaint "Confusion". This means that patients with acute mental changes should always be triaged as CTAS level 2 or 3. Additionally the majority of elderly patients with chronic cognitive impairment would be considered 'frail' and likely to suffer or deteriorate from long ED waits, regardless of the presenting condition, especially if not accompanied by a caregiver. This would be an appropriate indication to apply the frailty modifier.

Case example

- 81-year-old male is brought in by EMS with a history of falling out of a chair at his nursing home and been unable to get up on his own. The paramedic was unable to find any evidence of injury but felt the patient needed further assessment because he appeared drowsy. He normally dresses himself, and independently takes his meals in a common dining area.

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- He has a history of NIDDM, CAD, depression, dementia and chronic pain and is taking oral hypoglycemics, a statin, buproprion, acetaminophen, recently added gabapentin.
- On assessment the patient doesn't appear drowsy, but has trouble focusing and generally his answers either don't make sense or don't address the question. He does not complain of or appear to be in pain. The paramedic is unable to provide clarity regarding his normal cognitive status.
- A finger stick glucose reads BS 12.8 mmol/L
- RR 21, HR 86/min, Temp 37.2°C, BP 118/76, O_2 Sat 94%, GCS 14

Answer: CTAS Level 2-Emergent or 3-Urgent; CEDIS Presenting Complaint –Confusion OR General Weakness

Rationale: This patient may be exhibiting signs of his dementia, however, based on the fluctuating level of alertness (drowsy for paramedics initially and now alert), inattention, and disorganized thinking; he may be exhibiting new onset delirium, possibly due to the addition of gabapentin or for other causes. It will be important to get information from the nursing home regarding his normal mental and functional status, but for a triage assignment it would be better to err on the side of this being an 'acute with headache or altered LOC' which would make his a CTAS level 2 or 'acute without headache or altered LOC' change making him a CTAS level 3. To confirm his baseline cognitive state requires collateral confirmation of family or caregivers.

Falls and trauma

Trauma related emergency department presentations among the elderly continue to increase leading to significant morbidity and mortality.[68] Unlike younger cohorts the major cause is falls, with reportedly one in five falls causing serious injury.[69] Falls occur in one in three patients over age 65 and one in two over age 85 suffer falls each year leading to significant numbers of hospitalizations.[70]

Physical weakness or deconditioning due to chronic illness, gait instability, visual impairment, slowing of reaction times, balance issues, and cognitive impairment all predispose patients to falling.[71] It is, however, also important to recognize that an acute medical event may have led to their fall, such as a cardiovascular event (e.g. dysrhythmia or aortic dissection), a neurologic event (e.g. CVA or TIA), or as a complication of a chronic condition or the medications they are taking.

Falls lead to fractures, with hips being extremely common, and are accompanied by significant morbidity and mortality risk.[72] Blunt head trauma is more likely to lead to subdural hematomas due to lower elasticity and higher fragility of bridging veins, accompanied by age related cerebral atrophy.[7] Often the trauma event appears to be minor with no apparent loss of consciousness and the symptoms of the subdural do not become apparent for days to weeks requiring a high index of clinical suspicion.[73,74]

The literature is critical of triage decisions around the care of the elderly both in the pre hospital and in the emergency department, reporting consistent under-triage, believed to be due to a failure to recognize potential major injuries and/or a lack of appreciation for the impact of comorbidities on patient outcomes.[75-77] An increased mortality has been reported among elderly patients with pulse rates greater than 90 beats/minute and systolic blood pressures less than 110 mmHg. In addition lower reporting of pain, cognitive deficits, hearing impairment can all confound initial examinations, requiring a lower threshold for up-triaging in this patient population.[78-80] A recent study of trauma patients over the age of 65 determined that a systolic blood pressure (SBP) of less than 110 mmHg conferred the same mortality risk as an SBP of less than 90 in younger adults, recommending a prospective study to see if it warrants a change to the National Trauma Triage Protocol used to determine which patients are transport to a trauma center.[30]

Case example

- 75-year-old female on her way to visit her husband (who is admitted upstairs for a knee replacement) twisted her ankle getting out of the car. She did not fall and suffered no additional injuries. Her family got her in a wheelchair and brought her to the ED as she was unable to walk due to pain on standing.
- Her ankle appears swollen laterally but not obviously deformed, neurovascularly intact and she only complains of mild pain while sitting. She is cognitively intact and otherwise healthy living independently with her husband (who is also well except for his knee problem). Her only medications are for osteoporosis.
- Her family will be waiting with her to be seen.

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- RR 17, HR 82/min, Temp 36.9°C, BP 132/86, O_2 Sat 97%, GCS 15

Answer: CTAS Level 5-Non Urgent or 4-Less Urgent; CEDIS Presenting Complaint – Lower Extremity Injury

Rationale: Despite her age, this patient is very healthy and has family members (health advocates) to stay with her while she waits. Based on 'no obvious deformity' and mild pain it would be appropriate to triage her as a CTAS level 5. Knowing older adults either have a higher threshold for reporting or appreciating pain a case could be made for assigning a CTAS level 4 knowing that she cannot stand on her ankle due to pain. There is clearly no indication to assign the frailty modifier to this patient based on her underlying good health and family members to stay with her.

Note: A 2011 systematic review of triage nurse ordering of distal limb radiographs following isolated injuries, showed that comparing triage nurse to ED physician ordering there was no statistical difference in number of X-rays ordered or positive fracture rate. What was significantly different was a much shorter patient length of stay when the triage nurse ordered the X-ray.[81]

Polypharmacy

Older patients are much more likely to suffer from more than one chronic disease state leading to multiple drugs being prescribed, often by more than one health care provider.[82] A US publication reported 44% of men and 57% of women over the age of 65 were taking 5 or more medications per week, making them particularly susceptible to adverse drug events (ADEs).[83] ADEs may account for up to 10% of elderly ED visits and 10-17% of their hospital admissions.[7,84-86] Common drug categories causing adverse reactions include cardiovascular, diuretics, antibiotics, hypoglycemics, sedatives, opioid analgesics, anticholinergics, and anti-inflammatory medications.[87] Age-related changes in drug absorption and distribution as well as changes in lean body mass and metabolism of medications due to alterations in organ functions, all combine to increase sensitivity to drug effects.[88,89]

Examples of medication affects that impact triage decision making.

i) As discussed earlier, aging generally leads to increasing blood pressure and an increased resting heart rate. Antihypertensives, antiparkinsonian medications, antidepressants, and prostate and erectile dysfunction medications can all lower the blood pressure and predispose patients to falls or syncope due to orthostatic hypotension.[90] Cardiovascular drugs such as beta blockers and calcium channel blockers can limit the heart's ability to speed up in times of stress.[91] This is important assessing patients with possible infections, volume loss or trauma to not be reassured by a 'normal' pulse rate and blood pressure as these may represent hemodynamic instability of shock camouflaged by the medications. A trauma study found mortality rates in patients without head injury to be higher among patients over the age of 65 on beta blockers.[92]

ii) Anticholinergic medications inhibiting sweating, increase the risk of heat stroke in the summer months, can induce cognitive impairment and may precipitate delirium.[93,94]

iii) Opioids, anxiolytic agents, and antidepressants all have CNS depressant effects that may be additive and increase the risk for cognitive impairment and falls.[95]

iv) With aging, the frequency of patients with chronic atrial fibrillation rises with many placed on warfarin for stroke prevention. Numerous antimicrobial agents, non steroidal anti-inflammatory agents, cimetidine and some herbal preparations potentiate the effects of warfarin and prolong the INR.[96,97]

Case example

- 85-year-old-male was observed suddenly falling on the sidewalk, with no obvious trip, and had difficulty getting up so EMS were called. He does complain of left sided chest and hip pain, but has no obvious deformities. He is able to give his name, address and phone number, but isn't sure why he is at the hospital or how he got here. No friends or family are with the patient.
- He is well groomed but doesn't know the date and cannot spell WORLD backwards. He has equal strength in all 4 limbs.
- Accessing his electronic health record you see he is on the following medications: metformin, lisinopril, metoprolol, warfarin, and l-dopa-carbidopa (sinemet).
- A finger stick glucose reads BS 15.8 mmol/L
- RR 22, HR 76/min, Temp 36.9°C, BP 108/82, O_2 Sat 95%, GCS 14

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Answer: CTAS Level 2-Emergent; CEDIS Presenting Complaint – Multisystem trauma – blunt, Syncope / pre-syncope

Rationale: He is complaining of chest and hip pain, and it is not clear whether this is his normal cognitive function or if he suffered a head injury during the fall. There was also a question of why he fell, which is why syncope is a consideration. Important features of the presentation that should drive the triage nurse toward a CTAS level 2 assignment are: i) the pulse rate and blood pressure are low for a patient of his age, and especially in a painful stress situation. This may be a masking effect of the metoprolol; ii) a possible head injury in a patient on warfarin warrants early physician assessment, and at the very least checking the INR; iii) based on the story of falling without warning, this may be an example of syncope with 'no prodromal symptoms' a CTAS level 2 special modifier.

CONCLUSION

The proportion of ED visits by older patients will continue to grow along with the expanding geriatric population. Like the paediatric population they provide unique challenges for the triage nurse process as they try to safely and fairly prioritize each patient. Physiologic changes require vital signs to be assessed differently. Cognitive impairment often limits the ability to gather an accurate reason for the visit unless accompanied by a caregiver, and also makes it more difficult to determine the level of suffering. Acute cognitive changes in the form of delirium need to be recognized and not attributed to dementia. Minor trauma can have devastating outcomes among older patients so there needs to be that awareness when assessing these patients. Polypharmacy is the norm for elderly patients attending the emergency department and may be the cause of the visit or may disguise some of the presenting features. It is also important to try to determine patient and family expectations in terms of care based on the patient's 'goal of care' determination. Patients with terminal conditions, chronically deteriorating quality of life, may have medical directives limiting care, however, this should have no impact on triage acuity. Ensuring that all members of the care team are aware of the patient and family's wishes, however, is very important. As we attempt to improve our overall emergency department care of the elderly, triage is the first important step in that process.

Keywords: triage, CTAS, elderly, geriatric, safety, prioritization

Conflicts of interest: None to declare.

SUPPLEMENTARY MATERIAL

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