Triage: The Unifying First Step of All Emergency Department Care

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The Issue

If you were to present to virtually any emergency department (ED) in Canada today – whether it be for chest pain, depression or a cut that requires stitches – your first interaction with the healthcare system would be with a triage nurse. The word *triage* comes from the French verb *triager*, which means "to sort." All EDs in Canada use the Canadian Triage and Acuity Scale (CTAS) to sort patients by how quickly they need to be seen by a doctor and where in the ED the interaction should occur. The ED triage nurse interviews each patient to determine the reason for the visit, the accompanying symptoms, and the medical history, medications and allergies; the nurse then takes the patient's vital signs (e.g., heart rate, blood pressure). This process takes approximately two minutes. With the information obtained, the nurse assigns the patient a CTAS score ranging from 1 to 5, where 1 corresponds with resuscitation (the patient needs to be seen immediately by a physician), 2 is emergent (within 15 minutes), 3 is urgent (within 30 minutes), 4 is less urgent (within one hour) and 5 is non-urgent (within two hours) (Beveridge et al. 1998). These are *recommended* wait times; in an era of ED crowding, these times may be much longer. In addition, triage is not a static process but is constantly revised and updated according to the patent's status while he or she waits to see a physician (Murray et al. 2004).

It is critical to note that the triage interview should be no more than two to five minutes in duration (Beveridge et al. 1998; Murray et al. 2004). If it is longer, the next patient (or patients) waiting to be triaged could deteriorate: a child with an allergic reaction could develop an obstructed airway and become unable to breathe; or a man with chest pain could lose precious minutes before receiving treatment for a heart attack, a loss that would increase the risk of his dying in the next 30 days. Thus, the triage interview *must* be short and, as such, it will never be possible to identify, or diagnose, *all* patients who are having a heart attack during the triage process. However, since all patients are subject to triage, including those who are ultimately determined to be having a heart attack, it is important that triage scores be accurate because they could markedly affect diagnostic and therapeutic times. Unlike the large majority of patients who come to the ED, patients who are having a heart attack constitute a patient group for whom minutes truly matter: "Time is heart muscle."

The Studies

The past few decades have seen great improvements in time to diagnosis of a heart attack (door-to-electrocardiogram [ECG] time) and time to treatment (door-to-needle time if using clot-busting medications, or door-to-balloon time if using percutaneous coronary intervention [PCI]), due in large part to systems-wide interventions in EDs and the pre-hospital setting across the Western world (Eagle et al. 2008; Gibson et al. 2008). Researchers at the Institute for Clinical Evaluative Sciences (ICES) in Toronto, Ontario, conducted a series of studies to investigate the effect of ED triage on treatment and diagnosis times of patients with acute myocardial infarction (AMI).

In a study of 82 Ontario EDs in 2000–2001, we found that 50% of patients who were ultimately determined to be having a heart attack received a low-priority triage score (CTAS 3, 4 or 5) when they arrived in an ED. These patients were half as likely as appropriately triaged patients to meet the American Heart Association (AHA) benchmark door-to-ECG time of 10 minutes (odds ratio [OR] 0.54, $p < .001$) and door-to-needle time of 30 minutes (OR 0.44, $p < .001$) (Atzema et al. 2009). Data from the same Ontario EDs in 2004–2005 showed that, among patients with AMI, receiving a low-priority triage score was associated with longer hospital lengths of stay (OR 1.25, $p < .001$), higher 90-day mortality (OR 1.50, $p = .02$) and higher one-year mortality (OR 1.37, $p = .05$) (Atzema et al. 2011b). In summary, these studies tell us that the triage score that is assigned to each and every patient presenting for emergency care in Canada, and in most of the Western world, affects evidence-based quality-of-care indices, hospital lengths of stay and death in patients found to be having a heart attack.

On a positive note, in the five intervening years between the two studies, major improvements in triage were observed. Between studies, there was an 18% improvement in appropriate triage scores (CTAS 1 or 2) assigned to heart attack patients: from 49.7% in 2000–2001 to 66.7% in 2004–2005 (Figure 1). We found that certain heart attack patients enjoyed a disproportionate improvement over time compared with others. For example, there was a great improvement in appropriate triage from 2000–2001 to 2004–2005 in patients with chest pain and in ambulatory patients (those who did not arrive by ambulance), whereas elderly patients and those with diabetes experienced much smaller degrees of improvement. However, the most

important determinant in receiving an appropriate triage score when experiencing a heart attack was not a patient characteristic at all but, rather, the hospital to which the patient presented (Atzema et al. 2011b). In other words, the greatest influence on the assigned triage score was not related to the patient but to the system the patient encountered. This study highlights two important points about ED triage of heart attack patients: (1) it can be improved substantially, even in a relatively small amount of time, and (2) the system in place at the ED, and not the individual ED triage nurse, needs to be the focus of future efforts if major improvements in triage are to be made.

Next Steps

Hospital-Level Predictors of Receiving a Low-Priority Triage Score, and Interventions

Given that the ED where a patient presents is the greatest determinant of whether the patient receives an appropriate triage score (Atzema et al. 2010, 2011b), and that triage scores impact treatment times, the ED triage system at each hospital needs to be the focus of future interventions if we are to improve the critical treatment times for patients experiencing a heart attack. ED systems with an emphasis on speed and recorded times for heart attack patients (e.g., those with a PCI laboratory on site or that monitor door-to-needle times) highlight for all staff involved the time-sensitive nature of a heart attack. This, in turn, *imbues a sense of urgency in the care for these patients.* Systems interventions should not be instituted at a single organizational level, such as the level of nursing in the ED. Instead, these interventions must be supported across the organization (e.g., hospital administrators, ED managers), both in practice and financially, with ongoing feedback provided.

Triage ECGs should become a standard part of the system of care that is established to look after heart attack patients, and funding should be available to purchase additional ECG units as necessary. Agreements need to be negotiated between nursing and ECG technician groups regarding who can perform an ECG when the technician is delayed. This negotiation involves being cognizant of optimal patient care and must be overseen and endorsed by hospital administration. E-triage, software that offers guidance to the triage nurse, could be instituted at lower-volume sites (those that see fewer than 100 patients with

FIGURE 1.

Triage scores of patients (%) who were found to be having a heart attack, in Ontario emergency departments, 2000–2001 and 2004–2005
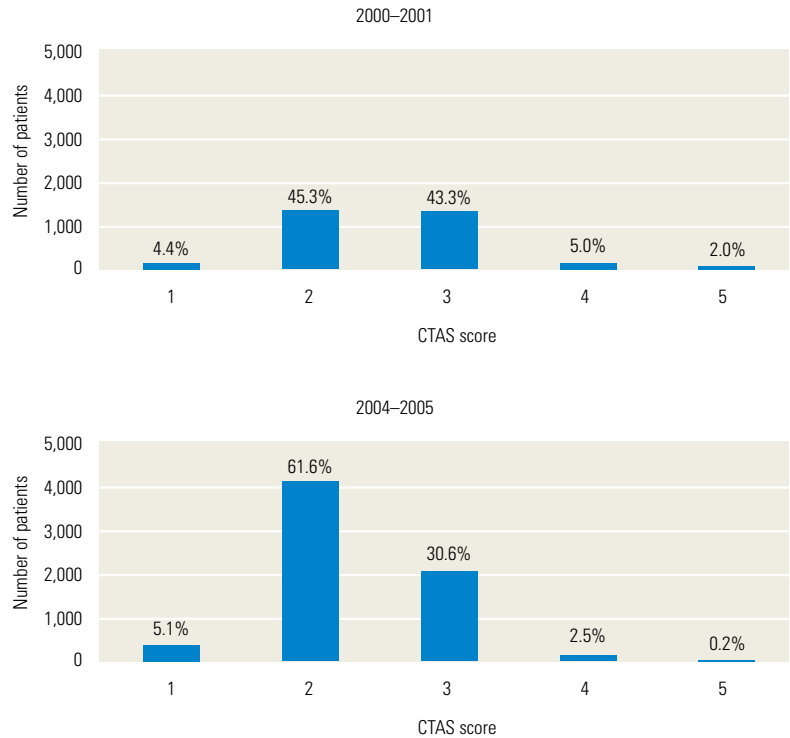
CTAS = Canadian Triage and Acuity Scale.

heart attack per year). Because nurses at these sites see fewer of these patients, they get less practice in recognizing them, and so lower-volume sites are much more likely to mis-triage heart attack patients (Atzema et al. 2010, 2011b).

Lastly, we have also found that if a hospital is meeting the AHA benchmark door-to-ECG time of 10 minutes without routinely meeting the benchmark door-to-needle (reperfusion) times, the reperfusion times can be improved by further shortening the door-to-ECG times. Four minutes is the optimal door-to-ECG time or, rather, the door-to-ECG time at which the highest proportion of patients meet the AHA benchmark door-to-needle time (Atzema et al. 2011c).

Patient-Level Predictors of Receiving a Low-Priority Triage Score

Even though the system is the most important factor in appropriate ED triage, there are certain patient characteristics that individual triage nurses need to be cognizant of if they are to improve their triage of patients with a heart attack. A high index

of suspicion is needed when interviewing elderly patients and patients with diabetes (who should receive an early, preferably immediate, ECG) (Atzema et al. 2010, 2011b). A third of heart attack patients do not experience any chest pain with their event and may present with only generalized weakness, fatigue or shortness of breath: the preponderance of these patients are elderly or have diabetes (Canto et al. 2000).

In another study, we reported that 10% of heart attack patients have a past medical history of depression (Heo et al. 2008). Given that the lifetime risk of major depression is 11% in men and 21% in women (Heo et al. 2008), this rate of depression in heart attack patients is not surprising. However, these patients receive lower priority-adjusted triage scores compared with the same heart attack patients without a history of depression noted on their chart (Atzema et al. 2011a). Previous depression should not be used as a factor to rule out heart attack as the cause of a patient's symptoms. Unfortunately, however, sorting out who is having a heart attack is a very difficult task, both during the triage interview *and* during the full ED evaluation, given that less than 10% of patients who present to the ED with chest pain (the second most common reason to come to the ED, after abdominal pain [National Center for Health Statistics 2008]) are ultimately found to be having a heart attack (Lindsell et al. 2006). If resources were unlimited, all patients with chest pain, weakness and shortness of breath could be assigned a high-priority triage score, but doing so in the current environment would paralyze the ED. Thus, triage nurses actively look for an alternative to heart attack as an explanation for these symptoms. As such, it is not surprising that a charted history of depression is used to decrease the suspicion of a heart attack. Yet our study suggests that depression should not be used in this manner; it may be safer to consider depression as a mild risk factor for having a heart attack – as some studies have suggested (Ariyo et al. 2000; Ferketich et al. 2000) – rather than as a reason to discount a patient's symptoms.

Ongoing Monitoring of ED Triage

Timely feedback on multiple levels – individual triage nurses, ED physicians, the ED department – is critical to improve diagnostic and therapeutic times in heart attack patients. Hospital monitoring of the triage of these patients is a way to ensure that they are receiving optimal care. It can also be used as a marker for overall triage accuracy at the site (unlike heart attacks, many other disease states are not specifically assigned an appropriate triage score in CTAS, making them difficult to assess [Beveridge et al. 1998]). Currently, data used to provide feedback to staff are often delayed by months or even years, rendering the data ineffective. Given that heart disease is one of the most common causes of death in the Western world (Statistics Canada 2007) and that ED triage affects quality-of-care indices and death in these patients (Atzema et al. 2009,

2011b), we propose that hospitals should monitor the accuracy of ED triage in heart attack patients. HQ

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