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CASE REPORT**TRIAGE AND ED OVERCROWDING:
TWO CASES OF UNEXPECTED OUTCOME**

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INTRODUCTION

Overcrowding in emergency departments (EDs) has become a serious problem for many EDs in this country.¹ As a result, patients may wait longer time periods after triage prior to evaluation by the ED physician. This places additional importance of initial "at the door" triage as potentially sick patients may be subject to very long waits. Minor misjudgments at triage are an expected part of the triage process, as medical assessments are done quickly, and with limited data. However, in overcrowded EDs, these triage misjudgments may subject some patients to increased risk of poor outcome as their condition may deteriorate during long waits. Therefore, during times of overcrowding, some patients may benefit by classification into a more acute category. Although triage of newly arriving patients in the ED is part of the daily routine operation of nearly every hospital ED in the country, very little research and resources have been allocated to this important and high-risk clinical activity. Furthermore, there are few national standards for triage and hospitals vary in the amount of time that should elapse prior to physician intervention.^{2,3} Even if patients are triaged into the appropriate category, unexpected outcomes may occur because of delays in physician availability.

In large urban hospitals, two or three triage nurses may work simultaneously and have constant lines of incoming patients waiting to be triaged for care. In smaller community hospitals, triage may occur by nurses who have other duties, but are immediately available to perform triage for the two to three patients that arrive per hour. Patients who present to the triage nurse without cardinal signs of severe illness may be placed in non-emergent triage categories, but then deteriorate during long waits in the ED waiting room. Alternatively, triage nurses may be so rushed and pressured that they increase their error rate of under-triage. The following two cases were obtained from a large western US hospital and illustrate the critical importance of triage.

Case 1: A 40 y/o man presented to ED triage with epigastric pain. Vital signs: blood pressure 145/95, pulse 116, respiratory rate 24, temperature 98.6. Because the patient's pulse was 116, and his respiratory rate was 24, he was triaged as "urgent." Since all ED beds were occupied, the patient was triaged to the waiting room. Two hours later, the patient's friend complained that the patient continued to have pain. The triage nurse told the friend that the ED was busy, and the triage nurses overwhelmed, but that the patient would be called as soon as possible. Four hours after being seen at triage, the friend said that the patient had to be seen - that he was now also having chest pain. While the friend was seeking assistance from the nurse, the patient collapsed in the waiting room and was brought into the ED and an ED physician was called to the scene. The patient was placed on a gurney and transported into a resuscitation area. A rhythm showed v-fibrillation and he received counter shock, ACLS drugs, and ACLS protocol.

His rhythm deteriorated to asystole, and after 45 minutes of CPR efforts were terminated. A corner's report showed an acute transmural myocardial infarction.

Case 2: A 47 y/o male presented to the ED complaining of headache, fever, vomiting, and myalgias. At triage, the patient had vital signs of blood pressure 140/90, pulse 70, respiratory rate of 22, and temperature 101.2° and GCS of 15. The patient stated that the headache was not the worst headache of his life, and was vague as to the intensity of onset and duration and other historical fractures. The patient was triaged as urgent. The ED was overcrowded with patients, some even laying on gurneys placed in hallways. Since the triage nurse had seen many patients that day with URI symptoms and presumed that this patient had a URI no worse than others did, the patient was sent to the waiting room. Four hours after triage, the patient's name was called as an examining space in the main ED had become available for him. He did not answer and it was presumed that he had left the ED without being seen. Four and one-half hours after triage, another patient in the waiting room came back to express concern that a man was slumped in his chair was sleeping. When approached, the patient was unarousable and was then quickly taken to the resuscitation room where he was found to have a Glasgow coma scale of five. At that time his blood pressure was 150/90, pulse 66, temperature 100.8° and the patient was bagged at a respiratory rate of 24. On physical examination the patient was found to have a laceration over the left parietal occipital area with encrusted blood. The patient was intubated with a rapid sequence technique and taken to have a head CT scan. The head CT scan revealed a large left-sided subdural hematoma with a substantial shift of structures in compression of ventricles. Neurosurgery was consulted and took the patient to the operating room where the subdural hematoma was evacuated. The patient survived neurosurgery, but developed cardiovascular instability and died 24 hours postoperatively. Family members contacted provided history of the patient being involved in an altercation the day before coming to the ED.

DISCUSSION

Most hospital EDs utilize triage categories that divide patients into at least three or four tiers, often referred to as emergent, urgent, semi-urgent, and non-urgent.⁴ Unfortunately, these terms have taken on new meaning in an overcrowded ED. For example, the term "emergent" is generally used to connote the highest life threatening priority, requiring immediate physician intervention usually accomplished in even the most overcrowded EDs. However, patients in an "urgent" category often do not require immediate services in the ED, but require timely evaluation in the ED because of the potential for serious occult problems. Even if an ED has a goal of physician evaluation within 20 - 60 minutes, it is nearly impossible to achieve these goals in overcrowded EDs. An "urgent" evaluation did not occur in the above two cases. While the ultimate outcomes of the above cases may not have changed had the patients been seen directly in the ED and immediately evaluated by a physician, it is possible that early aggressive intervention may have resulted in survival and functional outcome. These cases illustrate that patients' medical conditions are constantly changing, and that triage is an active and

dynamic process. Furthermore, if waits to see a physician in the ED, patients should be reassessed continually. However, this may be impossible in an ED not provided sufficient nursing staff.

Triage nurses who have responsibility for patients already triaged and waiting in the waiting room are often unable to re-evaluate patients simply because they are too busy with new patients. By rechecking vital signs and talking with the patient every two hours, patients should be re-triaged to a higher category should their conditions deteriorate. Another issue relates to changing chief complaints. In Case #1 the patient's friend complained that the patient developed chest pain two hours after arrival, yet these complaints were not acted upon immediately by the triage nurse because of overall overcrowding and dividing professional focus among too many patients.

Sorting out common illness from catastrophic illness can be difficult. In Case #2, the patient who presented with headache, fever, and vomiting appeared little different than others with URI symptoms and appeared appropriate for an "urgent" category. In most triage systems an initial increased respiratory rate of 24 in the absence of stridor would also be categorized as urgent. It is unclear if the history of trauma would have changed the triage category to emergent. In addition, the patient did not receive repeat vital signs two hours after presentation to the ED. In Case #1, the patient's respiratory rate was 24 and pulse was 116. If only EM physicians had been available and not busy with other patients. It is possible that a full triage re-assessment at two hours would have changed the patient's category to "emergent."

Triage in the ED is very high-risk, yet does not receive the attention, funding, or CQI reviews that would reflect its status as a high-risk activity. One of the major problems in large hospitals is that the triage nurse is pressured by long lines of patients, and may perform triage too briefly and too hastily to pick up subtle signs of high-risk disease. Questions have also been raised about the sensitivity and specificity of nurse triage. In a study performed at the University of New Mexico, investigators found that visual triage assessment by physicians significantly increased sensitivity in identifying those patients who had illnesses resulting in admission.⁵ In the United Kingdom, a five category triage system has been advocated to increase accuracy in identifying potentially ill patients. The rate of under-triage of patients is unclear, and has not been widely studied. The Accident in Emergency Department at the Kwong Wah Hospital in Hong Kong reported a 3.4% instance of under-triage.⁶ Although this number is relatively small, when one considers a very large ED with 50,000 patients triaged per year, potentially over 1,500 patients could be under triaged and sent to the waiting room with potentially serious and unrecognized conditions.

In conclusion, these two cases illustrate the difficulty of initial triage, and how disease states may progress rapidly after triage. Furthermore, that patients who truly require urgent intervention may not receive timely treatment in overcrowded EDs. To avoid potential unexpected outcomes, EDs must be provided with sufficient resources to prevent overcrowding and insure timely evaluation of all patients by emergency physicians.

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TOXICOLOGY REVIEW

Quinapril Overdose-Induced Renal Failure

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Background:

Angiotensin converting enzyme (ACE) inhibitor toxicity is infrequently reported and seldom produces significant clinical effects. Only 15 previous cases of intentional ACE inhibitor overdoses among adults have been published.¹⁻¹³ The most commonly observed clinical effect is hypotension,¹⁴ which is typically transitory and responsive to supportive measures and intravenous hydration. An additional 48 pediatric exposures were reported in a single case series, none of which resulted in any adverse effects related to the ACE inhibitors.¹⁵

Reversible impairment in renal function has been reported in 5 cases of ACE inhibitor overdose, but only in association with systemic hypotension (systolic blood pressure < 90 mmHg).^{3,5,12,13} We report a case of intentional quinapril overdose where the patient presented two days later with acute renal failure in the absence of clinical features of systemic hypotension. Additionally, this is the first reported case of quinapril overdose of which we are aware.

Case Report:

A 24-year-old man presented to the Emergency Department (ED) with complaints of bilateral flank pain and decreased urine output for one day. The patient admitted to intentionally ingesting 40 of his mother's 5 mg quinapril tablets two days earlier in an attempt to "get high." The patient's mother confirmed that approximately 40 of her quinapril tablets were missing.

The patient reported no early adverse effects, but had two episodes of non-bloody, non-bilious emesis and three loose stools the following day. He denied any dizziness, lightheadedness, near-syncope, or other orthostatic symptoms. On the day of presentation, the