Evaluation of Transient Ischemic Attack in an Emergency Department Observation Unit

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Abstract

Objective To evaluate the feasibility of a protocol for evaluation of transient ischemic attack (TIA) in an Emergency Department Observation Unit (EDOU), and assess the risk of early stroke after such an evaluation.

Methods All adult patients presenting to the Emergency Department (ED) with signs and symptoms consistent with TIA were prospectively enrolled in this observational study over a period of 3 years. Patients underwent a standardized TIA evaluation per protocol. Risk of subsequent stroke at 48 h, 1 week, 1 month, and 3 months was prospectively assessed.

Results In total, 418 patients were seen during the study period, and all were evaluated per the EDOU TIA protocol. The mean age was 73.1 (±13.3) years and 53.8% were males. Comorbidities included hypertension in 71.5%, diabetes mellitus in 20.1%, prior TIA in 19.6%, and prior ischemic stroke in 19.6% of the cohort. Brain CT, neurology consult, electrocardiogram, carotid ultrasound, and additional tests were performed, and education was given. A total of 30.4% of the patients were dismissed directly from the EDOU. The risk of stroke at 2 days was 0.96%, at 7 days 1.2%, at 30 days 1.9%, and 2.4% at 90 days.

Conclusion An Emergency Department Observation Unit Protocol for TIA is a feasible option for expedited evaluation of these patients.

Keywords Transient ischemic attack · Emergency Department · Observation unit

Introduction

Transient ischemic attack (TIA) is a common presentation to the Emergency Department (ED), accounting for 1–3 of every 1,000 ED visits in the United States [1]. The true incidence may be higher, because many patients with TIAs never come to medical attention [2, 3]. It is a high stakes diagnosis, as the risk of subsequent cerebral infarction is significant and is highest during the first 48 h following a TIA [4]. Because of this risk, many patients are hospitalized for diagnostic evaluation. In some institutions, this number is as high as 100% of patients presenting with TIA-like symptoms [5, 6]. The idea behind hospitalization of these patients is to elucidate any underlying pathology that might be thwarted from producing a subsequent infarct [7], like critical carotid stenosis, cardiac thrombus, and/or arrhythmia. Evaluation of TIA commonly consists of a combination of laboratory and imaging studies, with the goal of identifying risk factors and potential contributing mechanisms to the presenting ischemic event [5]. However, frequently TIA investigations are “negative.”

The primary objective of observation units is to provide an alternative to hospitalization for patients requiring extended diagnostic assessment or treatment not routinely
provided in the ED but for whom a lengthy inpatient stay is unlikely to be necessary. Observation units are reported to provide many benefits including improved resource use, increased diagnostic accuracy, higher patient satisfaction, and increased educational and research opportunities [8].

The use of observation units can decrease unnecessary admissions to the hospital, while still maintaining a high quality of care [9], and may improve diagnostic accuracy in certain disease processes, such as abdominal pain [10]. Appropriate patient selection is critical for maximizing the effectiveness of observation medicine; misclassification of patients could bias estimates of Emergency Department Observation Unit (EDOU) benefit.

In this study, we sought to evaluate the feasibility of a protocol for evaluation of TIA in an EDOU, and assess the risk of early stroke after such an evaluation.

Materials and Methods

This is an observational cohort study conducted at a tertiary care academic medical center with an annual ED census of 79,000 visits. The study period was from January 2004 to December 2006.

The study population included all consecutive patients aged 18 years and older who presented to the ED with a history of signs or symptoms suggestive of TIA. A TIA was defined as per the World Health Organization (WHO) criteria as rapidly developed clinical signs of focal or global disturbance of cerebral function lasting fewer than 24 h, with no apparent nonvascular cause [11]. Patients were prospectively enrolled and provided written informed consent. This study was approved by the authors’ institutional review board.

The inclusion criteria consisted of

- patients aged 18 years and older who present with symptoms suggestive of TIA;
- asymptomatic at the present time; and
- head CT negative for mass, bleed, shift, or fracture.

The exclusion criteria consisted of

- patients with symptoms lasting longer than 24 h and
- patients with acute ischemic or hemorrhagic stroke.

The EDOU is a 10-bed unit managed by emergency physicians and with dedicated nursing staff. Admission to the EDOU is predicated by the emergency physician’s prospective estimate that a patient will most likely be discharged within 24 h.

The study protocol was based on recommendations for standardized evaluation of TIA [7]. All patients had the same initial evaluation, including a head CT, electrocardiogram, laboratory tests, carotid Doppler study, and neurology consult.

The EDOU TIA protocol is summarized as follows:

**Triage:**

Patients with chief complaint, signs symptoms of TIA are triaged to a critical evaluation area—a 12-bed, high acuity area, with specific resources—and the triage nurse notifies the emergency medicine attending on duty.

**Emergency Department (Critical Area) Evaluation:**

1. Determine time of onset of symptoms.
2. Order a head CT.
3. O₂ by nasal cannula.
4. Check glucose levels at bedside. If <60 mg/dl, give 1 amp. Dextrose 50%.
5. Obtain an oral temperature. If >38°C, give 1 g Tylenol®.
6. Request neurology consult.
7. Give 324 mg aspirin unless intracranial hemorrhage or true allergy.
8. Electrocardiogram and laboratory tests: complete blood count, electrolytes, magnesium, calcium, coagulation studies, troponin (stroke panel).
9. Do not anticoagulate.

If it is deemed that the patient is not having an acute stroke but rather a stable TIA, then:

1. Order carotid ultrasound for anterior circulation symptoms.
2. Transfer to EDOU.

**EDOU:**

1. Obtain bilateral carotid ultrasound.
2. Call neurology service to inform that the patient is back from carotid ultrasound.
3. Patient education (patients watch a video “Recognizing and Preventing Stroke” while in the EDOU).
4. TIA/stroke education materials provided by nurse.
5. Patient will be evaluated by neurology consult in EDOU. Based on neurology service recommendation, patient disposition decision is made by emergency medicine attending. One of the three options is utilized for each patient:
   - Patient discharged home with TIA follow-up neurology clinic appointment no later than 72 h.
   - Patient admitted to inpatient stroke service.
   - Patient admitted to alternative service if non-neurological diagnosis present.
6. Additional tests for patient such as laboratory, chest X-ray, magnetic resonance imaging, echocardiogram may be ordered by neurology consult as needed in consultation with the emergency medicine physician.
7. Patient observation for recurrent cerebrovascular ischemia symptoms assessing every 2 h vital signs and neurological function assessment. Discharged patients should be given a prescription for Aspirin or alternative antiplatelet agent, and a follow-up appointment in neurology clinic within 72 h.

The TIA subtype was categorized following the TOAST classification [12] as follows: large vessel disease, cardioembolic, small vessel disease, other causes, and unknown causes. All patients were prospectively followed up via telephone and review of medical records for up to 90 days after initial presentation of their TIA, to assess for subsequent event.

The outcome data were blinded to initial allocation of the patients. The data collected were tabulated and statistical analyses performed using JMP software, SAS institute, Version 7.0. Analyses were used according to the distribution of the data, to compare the variables between EDOU and admitted patients.

Results

A total of 418 patients were seen in the ED and all of them were evaluated by the EDOU TIA protocol during the 3-year period.

The mean age was 73.1 (±13.3) years and 53.8% were male. Comorbidities included hypertension in 71.5%, diabetes mellitus 20.1%, prior TIA 19.6%, and prior ischemic stroke 19.6% of the cohort. Table 1 summarizes demographics and comorbidities of the overall cohort.

Of the 418 patients, 69.6% were admitted after completing the TIA protocol due to high-risk factors identified during the EDOU evaluation. A total of 127 (30.4%) patients were discharged following EDOU evaluation.

The risk of early stroke was as follows: 4 patients had an ischemic stroke within 2 days yielding an incidence of 0.96% (2 strokes in the admitted group and 2 in the dismissed from the ED group), 5 patients had a stroke within 7 days (incidence of 1.2%, 2 strokes in the admitted group and 3 in the dismissed from the ED group), 8 at 30 days (1.9%; 3 in the admitted group and 5 in the dismissed from the ED group), and 10 within 90 days (2.4%; 5 in the admitted group and 5 in the dismissed from the ED group).

There was no clinical or statistical significance for all the trends. The lost to follow-up rate was 5%.

Following the TOAST classification, the most frequent etiology was unknown (35.4%), cardioembolic (25.8%), and large vessels disease (24.9%). Most of the subsequent ischemic strokes were seen in the large vessels disease group; including 3 of the 5 events at 7 days, 4 of the 8 events at 30 days, and 5 of the 10 events at 90 days.

Discussion

EDOUs have been in existence for more than 15 years and are used primarily for chest pain as well as for other ED presentations. Observation medicine is integrated into the Emergency Medicine Residency curriculum [13] with approximately 2/3 of the 136 residency programs having an EDOU [14]. Feasibility and cost-effectiveness have been well-established for the evaluation of low-risk chest pain in EDOUs for over a decade [15, 16]. Modeling after the success of these "chest pain units," other disease processes have also been successfully managed in this expedited manner, including acute asthma exacerbation [17, 18], acute decompensated congestive heart failure [19], and atrial fibrillation [20]. Still more presenting complaints being investigated for such expedited evaluation include syncope [21] and overdose [22, 23].

In addition to cost-effectiveness, EDOUs have also been reported to decrease ambulance diversion hours and ED overcrowding and also decrease the "left without being seen" rate [24].

In this era of rising health care costs, hospitalizing patients with TIA-like symptoms solely for the purpose of performing investigations poses a problem. An estimated 80% of patients who present with TIA are on Medicare, which in turn translates to a substantial gap in reimbursement for the hospital. There are also other challenges with hospital admission for TIA. For example, many inner city hospitals lack sufficient bed capacity. In a survey done by the Lewin group for the American Hospital Association, 62% of hospitals nationwide report being beyond their capacity [25]. In addition, for those who are otherwise

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<th>Table 1 Demographic characteristics of the cohort</th>
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<td>Age (years, mean ± SD)</td>
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<td>Gender: male/female</td>
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<td>Prior TIA</td>
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<td>Other causes</td>
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healthy, remaining in the hospital overnight sometimes places a significant burden on their family or work environment. For patients who have dementia, the unfamiliar hospital environment may pose an undue amount of psychological stress and lead to a condition such as sundowning.

Although our study did not survey patient comfort specifically, it is felt for the above reasons the EDOU TIA protocol is likely more comfortable for patients. From a practical standpoint, the protocol provided more efficient utilization of resources, including decreased utilization of hospital beds within the inpatient stroke unit. In addition, all patients had expedited follow up in the outpatient TIA clinic.

An additional benefit was our ability to integrate patient education into our practice. While patients waited in the EDOU for their investigations and neurology consult, they were also given the opportunity to watch an educational video about stroke warning signs and risk factors. Each patient also received a “TIA education packet” with detailed brochures from the Mayo Clinic and American Stroke Association.

In a systematic review by Giles [6], the overall risk of stroke was estimated to be 3.1 (95% CI: 2.0–4.1%) at 2 days and 5.2% (95% CI: 3.9–6.5%) at 7 days. When single emergency departments were evaluated, the risk at 7 days was 5.8 (3.7–8.0). In comparison, in our cohort the risk of stroke at 2 days was 0.96%, and 1.2% at 7 days.

In this study, we demonstrate the feasibility of evaluating and managing patients with a TIA within an emergency department setting. In terms of safety, we do not note any significant difference in adverse events (acute stroke, myocardial infarction, or death) at 7, 30, or 90 days follow up.

Conclusion

Evaluation of TIA by way of an EDOU protocol is feasible and appears to provide a reliable way to safely discharge TIA patients.

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References


