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ORIGINAL ARTICLE

Evaluating The Effectiveness Of Telephone Triage For Priority Emergency Ambulance Dispatch

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ABSTRACT

Emergency telephone calls (108) for an ambulance are usually dealt with "first come first served". We have devised and assessed criteria that the ambulance dispatch might use to prioritize responses. The data were collected retrospectively on consecutive patients presenting to an accident and emergency (A and E) department after a 108 emergency call. An unblinded researcher abstracted data including age, time, caller, location, reason for the call and A and E diagnosis and each case was examined for ten pre-determined criteria necessitating an immediate ambulance response – namely cardiac arrest, chest pain, shortness of breath, altered mental status / seizures, abdominal / loin pain at age >65 years, fresh haemetemesis, fall from >2 meters, penetrating injuries and major burns.

567 patients were recruited, of which 57% were males with a median age of 45 years. 434 calls came from by standers or patients themselves, 30 from general practioners, 83 from other hospitals and 20 from the police. 51% patients were admitted. 43% met at least one of the above mentioned criteria.

Most patients did not meet the criteria for an immediate ambulance dispatch.

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Introduction

The emergency ambulance service was originally designed to provide an immediate response to those with a serious illness or injury. In the state of Gujarat, India, demand for an emergency ambulance service increased from 600 calls/day (launched in August 2007) to 16,000 calls /day (in June 2009), which is a 96.25% rise. At present, in Gujarat, all emergency calls (108) demand immediate response from ambulance crews, since there is no system in place for prioritization. As a result, calls are dealt with on a "first come first served" basis whatever be the nature of the complaints. There is some evidence that many of these calls are inappropriate [1],[2],[3] and delay the response to patients with true emergencies. Various endpoints have been used to judge the appropriateness of the call – for example; clinical diagnosis, interventions and hospital admissions [1],[2],[3],[4],[5],[6] but these criteria require medical assessment and will not help an ambulance dispatcher in triage. Published

studies in which a lay person's description of the symptoms is used as a triage tool are few and that too there are none from India, though this would be a more pragmatic approach, since it requires no medical knowledge on the part of the caller.

The aim of this pilot study is to evaluate the appropriateness of emergency calls (108) for patients attending an accident and emergency (A and E) department, by applying triage criteria that might realistically be used by the ambulance dispatch.

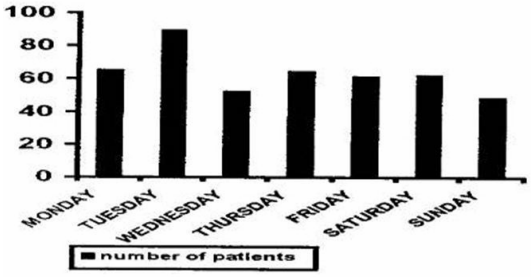
Methods

The study was conducted at the A and E department of a teaching hospital which attends to about 110,000 new attendees each year and which serves a population of around 50,00,000 people. The data were collected over three separate 7 day periods between March to May 2009. Before data collection, a set of triage criteria was devised, which the authors considered to encompass those conditions requiring emergency transport to the hospital – namely cardiac arrest, chest pain, shortness of breath, altered mental status / seizure, abdominal pain, loin pain at age > 65 years old, fresh haemetemesis, fall from >2 meters, stabbing and major burns. The criteria were based on the symptoms or mechanisms of injury that could potentially be identified by the person making an emergency (108) call.

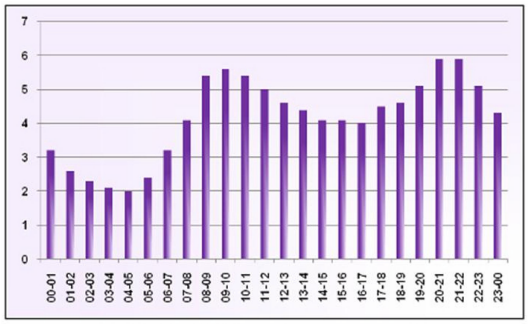
The patient care record (PCR) form and the A and E records of all patients brought by ambulance service to the department during this time were then examined and the details were recorded on a performa. Only those patients brought by the emergency ambulances of the Emergency Management and Research Institute (EMRI) were included in this study: urgent transports were excluded. The age and sex of the patient, the time and location of the incident, the person identified as calling the ambulance and the reason for the request were noted from the Emergency Response Center (ERC) database. The A and E records were reviewed for the diagnosis and the disposal of the patients. The worst documented respiratory rate, heart rate and blood pressure were also collected from the PCR forms and the A and E notes. The presenting condition of the patient was then compared with the triage criteria to evaluate whether or not the patient had a condition requiring immediate pre- hospital care and transfer to a hospital.

Results

Over the study period, 567 patients were brought to A and E department by emergency ambulances, following a 108 emergency call. The calls were highest on Tuesdays, with a roughly even spread over the rest of the week [Table/Fig 2] There were more calls between 4pm and midnight than during the rest of the day [Table/Fig 3]. 57 % of the patients transported by the ambulances were male, with a mean age of 48 (median 45 years). 76.5 % of the calls were initiated by bystanders or by the patients themselves, 5.2 % by general practioners, 14.6 % by other hospitals and 3.5 % by police. Out of the total transported patients, 289 patients (51%) were admitted, 220 were discharged, 40 were told to come as out patient department attendees and 18 took discharge from the hospital on their own.



(Table/Fig 2) Day of emergency calls



(Table/Fig 3) Time of emergency calls

244 of the transported patients (43 %) fulfilled one or more of the pre- determined criteria [Table/Fig 1]. Altered mental status was the most common criteria to be met, followed by chest pain and road traffic accidents. 53 of the 72 patients with altered mental status, actually had a Glasgow coma scale (GCS) of less than 15 on arrival in the A and E department. There were no patients with a reduced GCS in the group who did not meet the triage criteria.

(Table/Fig 1) Number of patients who met triage criteria

Triage criteria	Number
Cardiac arrest	4
Chest pain	56
shortness of breath	29
altered mental status / seizure	72
Abdominal pain / loin pain > 65 years old	13
Road traffic accidents	50
fresh haemetemesis	2
fall >2 meters	10
Penetrating injury	10
major burns	0

24 patients had a systolic blood pressure below 100mmHg. Four of these were in the group which did not meet the triage criteria. None of these patients had an abnormal heart rate or reduced consciousness level, one had biliary colic, one had a fractured humerus, one had a fractured distal end radius and the other had taken an overdose.
67% of the patients who met the triage criteria were admitted to the hospital as compared to the other 41% who did not meet the criteria.

The diagnosis of the patients who did not meet the criteria are shown in [Table/Fig 4]. Most of the cases were soft tissue injuries, limb injuries and head/facial injuries with normal consciousness levels. Alcohol intoxication was a primary diagnosis in 14 patients. Overall, 87 patients were affected by alcohol. Patients with the complaint of smoke inhalation who had been exposed only briefly, were not short of breath, they were fully conscious and all were discharged from the A and E department. Both patients diagnosed with diabetic acidosis had a normal consciousness level on arrival at the A and E department. A hypoglycaemic patient had been given glucose before the ambulance reached the scene and was recovering by the time crew arrived.

(Table/Fig 4) Diagnosis of patients not meeting triage criteria for emergency ambulance

STI/burn/wound	44
Head/facial injury GCS 15	43
Fractured limb	40
OD/DSH	24
Alcohol intoxication	14
Abdominal pain	12
Collapse unknown cause, fully conscious	12
CVT/TIA, fully conscious	8
Smoke inhalation not short of breath	8
Chest wall injury	7
Seizure, fully recovered	6
Infection	6
Anxiety	5
Epistaxis	4
Mild pulmonary oedema	3
Headache unknown cause, fully conscious	3
COPD	2
Gastrointestinal bleed	2
Renal colic	2
Haemoptysis	2
Constipation	2
DKA or HONK	2
Arrhythmia	1
Hypoglycaemia	1
Fall, no injury	1
Corneal abrasion	1

STI= soft tissue injury; GCS= Glasgow coma score; OD= overdose; DSH= deliberate self harm; CVA= cerebrovascular accident; TIA= transient ischaemic attack; COPD= chronic obstructive pulmonary disease; DKA= diabetic ketoacidosis; HONK= hyperosmolar non-ketotic acidosis

Discussion

The response to true emergency calls can be delayed if an ambulance is dealing with some minor incident. An immediate response puts the ambulance personnel and other road users at a risk and may make no difference to the outcome of the patient.

After reviewing the ambulance performance standards in 1996, NHS executives suggested that if 90% of the life threatening calls were answered with an ambulance on scene within 8 minutes, then an additional 300,000 patients would receive care within this critical time frame[7]. If ambulances responded to 90% of cardiac arrests within 8 minutes, then a further 3200 patients would survive, half of whom would be aged less than 70 years. In a recent cohort study of

10654 patients with out-of-hospital cardiac arrest, Pell et al concluded that the reduction of ambulance response time to 5 minutes could almost double survival rates in arrests which are not witnessed by ambulance personnel[8]. Ambulance personnel must therefore be relieved of inappropriate requests for an emergency response, so that they can deal promptly and effectively with patients who genuinely require immediate care.

The key issue is to direct emergency ambulances to the right patients in an appropriate time frame. However, parallel issues are equally important- in particular, the safety of the attending crew. From August 2007 to May 2009, there were 70 road traffic accidents involving ambulance vehicles in the state of Gujarat, India. (EMRI statistics) Undoubtedly, if the number of immediate responses was reduced to deal only with those patients in genuine need of the "blue lights and siren", then the number of ambulance vehicle accidents would fall and crew safety would improve.

The fact that many requests for immediate response are not appropriate has already been recognized and acknowledged. Our conclusion that 55% calls for emergency ambulances do not merit an immediate response reflects the findings in other studies [2],[3],[4],[5],[6],[7],[8],[9]. After reviewing ten studies, Snooks et al found that nine of them reported an appropriate use 30-35% of patients brought to A and E department by 999 ambulances.[10] But "inappropriate use" can be difficult to define. Many studies have used retrospective and subjective opinions based on the evaluations made by ambulance personnel or medical staff [1],[9],[11] Others have used admissions to the hospital as an end point – though admission to the hospital does not translate into the need for an immediate transfer. In a study of paediatric patients brought to the hospital by an ambulance, Kost et al used a set of criteria based on the medical records following attendance to the emergency department, to access whether an emergency ambulance was justified and found that in 28% cases, it was not [5]. While these studies illustrate that a sizeable proportion of emergency calls are inappropriate, they start at the point of knowing the patient's diagnosis and make judgment from there. A practical solution has to be based on the caller's description of the problem.

This study may be criticized on several grounds: The data abstraction was unblinded, investigations were retrospective, the sample was small, our reason for taking the calls from ERC records was not ideal and listening to taped transcripts of all the calls was not feasible. The results should be viewed as a pilot data which provides the groundwork for further studies. Such studies should be prospective by applying criteria consistently and the follow up should be in terms of patient outcome and in terms of the acceptability to patients and the medical staff.

It has been suggested that there is a void in public education and awareness on how to use the emergency ambulance service [11]. However, it is unreasonable to expect a lay person caller to make an informed judgment on the level of response required. Many inappropriate emergency calls are perceived as justified by the caller [3]. A system is therefore needed, which allows a decision to be made by the ambulance dispatcher, based on the information available at the time of call. Pre- determined criteria such as those defined in this study, which can easily be understood by the caller and which represent the symptoms that may require immediate transfer of the patient to the hospital, are a practical solution. This then empowers the ambulance dispatcher to decide where it is best to disperse resources, directing the emergency ambulance to those needing immediate attention, and arranging a response in the appropriate time frame (eg. in 30 mins for those needing urgent transfers only). The triage criteria can be effective in

excluding those calls which do not require an emergency response and yet be safe enough to ensure that patients who genuinely need a rapid response are not missed. They therefore tend to be over-inclusive, so as to be safe. This appears to be the case in this study, where 23% of patients warranting an immediate dispatch were discharged without admission.

The emergency response system may be better served by a two tier response system – immediate and urgent. This would allow the ambulance service to respond to more true emergencies within the given time frame. Restriction of the blue light and siren responses to genuine emergencies would also improve road safety.

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