ORIGINAL ARTICLE

Performance Assessment of Sri Lankan Prehospital Ambulance Service

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Abstract

Background: Ischemic Heart Disease (IHD) is the leading cause of mortality that raised demand for pre-hospital emergency care in Sri Lanka. Understanding the performance of Sri Lanka's 1990 ambulance service is essential to improve its quality and to reduce morbidity and mortality associated with the disease. This study aims to describe socio-demographic characteristics, evaluate the clinical assessment and management process of patients presenting with acute chest pain of cardiac in origin.

Material and Methods: A descriptive study conducted in Gampaha District, of the Western Province of Sri Lanka. A total of 154 records of patients rang the 1990 call center over three months with acute chest pain were selected. Composite values for treatment and examinations as a percentage were plotted on run-charts to assess performance and its variations over the study period.

Results: 47.4% of the study group were in 35-65 age group, 53.2% were males and 81.8% had a typical presentation. The median for composite value for examination as a percentage was 89.5% indicating substantial control and alignment with the reference package with normal cause variation. The median composite value for treatment as a percentage was 9.96%, a low value with normal cause variation.

Conclusion: A good control of the processes of clinical examination and treatment is apparent. A higher median for composite value for examination as a percentage attributed to the formal the ambulance staff. Although a low median was obtained for the composite value for treatment as a percentage, it was stable and pointed room for improvement.

Keywords: Ambulances, Ischemic Heart Diseases, Prehospital Emergency Care

Introduction

The demand for pre-hospital urgent care has expanded over the past decade due to the trend of rising NCD [1], changing demography of the diseases and increasing incidence of trauma. This trend is not limited to the developed world and is also seen in many middle-income countries [2]. The main goal of pre-hospital emergency care is to provide onsite medical treatment or emergency patient transport to the point of definitive care [3].

In Sri Lanka, NCD prevention and management policy aims annual reduction of 2% premature mortality (less than 65 years) over the next 10 years through expansion of evidence-based curative services and implementing individual and community-wide health promotion measures [4].Ischaemic heart disease (IHD) is the main cause of mortality related to NCD in Sri Lanka. KelumWimalaratne at el (2017) has described an increase of deaths due to circulatory diseases including ischemic heart disease and stroke has risen from 3 to 24% in the Island [5]. The mortality rate for NCD in Sri Lanka remains 20-50% higher than the developed countries. This increasing trend of NCD catalyzed urgent care needs and hospitalization costs. Most patients with acute cardiac emergencies present with chest pain [6]. Breathing difficulty and unconsciousness can also be associated with symptoms. Patients presenting with acute chest pain could have many etiologies and it is very crucial to correctly identify and treat ischemic cardiac pathology. This emphasizes the requirement of efficient and effective

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service model change and more investment in pre-hospital and emergency care.

In cardiac care pathways, the time duration to reach the appropriate care such as Percutaneous Intervention (PCI) from the patient's door is directly related to the prognosis of the patient. This is further emphasized as "platinum ten minutes" and "golden hour". The importance of well-trained and skillful EMTs with the ability to assess, manage and transfer the patient to the PCI lab safely and timely is critical to ensure effective cardiac care [7]. The primary aim of ACS patient management is to reduce door to ballooning time for percutaneous coronary intervention. It should be kept below 90 minutes. For effective outcome, early accurate assessment and primary on-site management should be performed correctly by pre-hospital responders. Failing to perform effectively results in poor outcome and prognosis [8].

Even though emergency medical services are not fully established in Sri Lanka, the Emergency 1990 Ambulance Service, has been initiated to provide pre-hospital emergency care for the public in 2016 with the financial aid of the Indian Government. Indian authorities are in the process of training 250 EMTs to man the ambulances. The service provides emergency care for requested patients on-site and transports them to the appropriate secondary care hospital. Clinical assessment and management are provided by an emergency medical technician. The operational procedures and performance standard are maintained by the ambulance service authorities. External evaluation of the performance of the pre-hospital urgent care services has not been established.

The UK ambulance system rates as one of the most effective and efficient systems in the world. Acute coronary syndrome (ACS) due to ischemia is one of the main conditions attended by EMTs in the UK. The evidence-based approach for managing pre-hospital care of patients with ACS is stated in the ambulance clinical practice guideline (2016). They were the key guidelines used in this study [9].

Increasing cost of Accident and Emergency admission and hospital stay for medical and surgical emergencies justify the need for the effective pre-hospital system. Further, delays in presentation and in the initiation of thrombolytic therapy and coronary interventions are key hurdles that need attention to optimize ischemic cardiac care in Sri Lanka [10]. Early and accurate assessment with pre-hospital stabilization by well-trained pre-hospital responders is a mandatory need.

Current status of 1990 ambulance service utilization and performance relevant to patients with chest pain is not fully understood. The study findings will be useful for future development and in the service expansion for other areas of the country.

The aim of the study is to describe socio-demographic characteristics, to evaluate the clinical assessment and management process of patients presenting with acute chest pain and related cardiac symptoms, identified as cardiac in origin by 1990 ambulance staff of Sri Lanka.

Materials and Methods

This is a descriptive study conducted in Gampaha District of Sri Lanka from November 2017 to November 2018, collecting data from patients transferred by 1990 ambulance service in the first 3 months of 2018. All patients presenting with acute chest pain and related cardiac symptoms, identified as cardiac in origin according to the clinical record, who utilized 1990 telephone line to seek the urgent ambulance care during the study period were included in the study. A data collection spreadsheet was developed by doctors with clinical as well as healthcare management experience studying the patient clinical record maintained by the ambulance staff based on the clinical guideline of the ambulance clinical practice guideline (2016) of the UK.Before starting patients on-site and transports them to the appropriate secondary care hospital. Clinical assessment and management are provided by an emergency medical technician. Before starting data collection, each component in the spreadsheet was assessed by the clinical experts (consultant cardiologist and anesthetists) and adapted for the local setting. Data was extracted by a team of experts involving emergency medicine consultant, an expert in pre-hospital care and general physician. 154 patients were included for the study by this team. Demographic data and performance data for ambulance EMTs including clinical assessment and management details were extracted from these patient records.

In the data extraction and analysis process history taking and examination were considered as a single component (Examination Parameters). Medicinal administration and investigations were considered separately (Treatment parameters).

Examination parameters- Recording of presenting complaints with time of onset, associated symptoms and past medical history, examination and recording of pulse, blood pressure (BP), level of consciousness, oxygen saturation (SpO2) and respiratory rate (RR) were included in examination parameters.

Treatment Parameters- Measurement of random blood sugar (RBS), electrocardiogram (ECG) sublingual administration of glyceryl trinitrate (GTN), Aspirin, and O2 were considered as treatment parameters.

We used run charts, a well-recognized and accepted tool to identify variations in performance, for calculated composite value as percentages on y-axis against time in weeks on x-axis.

A composite value for treatment as a percentage- This value was calculated by giving a score of either "1" (yes) or "0" (no) depending on getting RBS, ECG administering GTN, Aspirin, and O2.

A composite value for examinations as a percentage- This value was calculated by giving a score of either "1" (yes) or "0" (no) for recording of presenting complaints with time of onset, associated symptoms and past medical history and   examination of Pulse, BP, Level of consciousness, SpO2 and RR.

Ethical clearance for the study was obtained from the National Hospital of Sri Lanka. Administrative permission was obtained by the Regional Director of Health Services Gampaha. The consent for accesses to the clinical information was obtained from the ambulance management authority.

Results

Below table shows important descriptive values revealed in the study.

Table 1: Descriptive statistics

Category	Frequency (n=154)	Percentage (%)
Age category		
18-34	24	15.5
35-64 yrs.	73	47.4
65 and above	51	33.1
Not documented	6	3.9
Sex Category		
Male	82	53.2
Female	64	41.6
Not documented	8	5.2
Hospital category		
Secondary/ Tertiary care	91	59
Primary care	63	41
Type of presentation		
Typical	126	81.8
Atypical	28	18.2
Appropriateness of symptom analysis		
Satisfactory	119	77.3
Unsatisfactory	35	22.7
Percentage of patients had CPR and get an expert-advice		
Percentage of patients had CPR	9	5.8
Percentage of patients had expert advice	6	3.9

From the patients included in the study, 47.4% were in the 35-65 age group. 53.2% of cases were males. In 81.8% the presentation was typical. Of the total study sample 77.3% had satisfactory analysis of the symptoms by the EMTs. Percentage of patients who received CPR and expert advice for further management remained low.

Graph 1- Composite value for treatment as a percentage for patients with chest pain diagnosed as cardiac in origin in the prehospital setting.
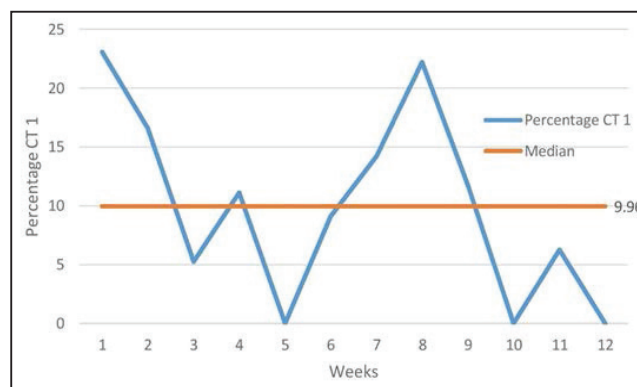
Percentage CT1- Composite value for treatment as a percentage in y-axis. Timescale in weeks in the x-axis.

The number of runs indicated in the chart are within the random variation of the process. The median value for the composite value for the treatment is 9.96%. There were no shifts, trends or any astronomical values. Number of runs indicated in the chart are within the random variation of the process.

Graph 2- Composite value for examinations as a percentage for the patients with chest pain diagnosed as cardiac in origin in the prehospital setting
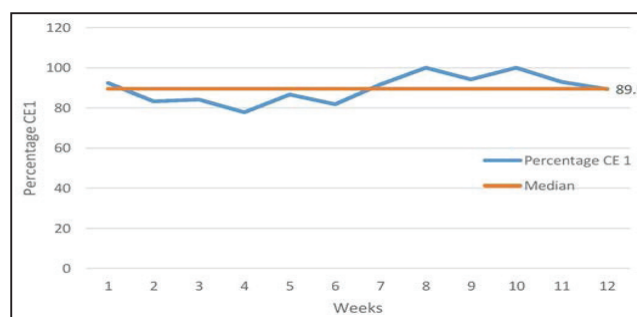
Percentage CE1- Composite percentage value for examinations in y-axis. Timescale in weeks in the x-axis.

The median value is 89.5% with no shifts, trends or astronomical values. Number of runs recorded in the chart are not outside the random variation of the process.

Discussion

This study revealed that nearly half of patients were between the ages of 35 – 65, the economically productive group, closely resembling national NCD data 11. The fact that a substantial fraction of patients (18%) having atypical presentations emphasize the need for specific skills to initiate specific treatment.

Graph 2 (Run chart for Composite value for examinations as a percentage CE1) does not display any shifts, trends or astronomical values which indicates that

the process is under substantial control and closely follows the reference package value. The existing gap between the value obtained in the study and the reference package can be filled by applying modern training techniques, close monitoring of the performance and introducing clinical guidelines, protocols and routine skill appraisals. Largely, examination and description of the symptom by ambulance staff was satisfactory with space for improvement. Composite percentage of examinations maintained at a higher value could be attributed to the formal training process the ambulance staff received.

Graph 1 (Run chart for composite value for treatment as a percentage) displays a low median value (9.96%). This can be attributed to lack of proper authority and legal coverage to give emergency drugs. Furthermore, the composite value for treatment as a percentage has not varied over the study period. Absence of trends and shifts, as well as astronomical values, exhibit a common cause variation of the context in this clinical situation. This means, the elements related to context and human resources were managed within control to maintain a stable process; a potential room for improvement.

A high composite value for examinations as a percentage (89.5%) indicates the positive potential of the EMT staff towards the patient's clinical assessment.

The pain management was one of the main components of the reference package. We excluded this in this study because the administration of opioids was not legally permitted for the EMTs. Although we considered administration of GTN and aspirin; a very limited number of patients received them only if these were prescribed in patients' own clinical notes. These causes are attributed to the low median percentage value for the treatment. Reason for this lower, unsatisfactory performance needs to be investigated further. The variation of performance over the study period without any sift or trends shows the potential ability of the organization to maintain good control over the clinical processes and show the opportunity for effective changes in services. The study had certain limitations essentially, limited time period and based in a limited geographic area.

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