

Emergencies on the train and railway stations managed at a railway station emergency care center

Kundavaram P. P. Abhilash, Parth Sharma, Vaikunth Ramesh, John Samuel J, Vinod P, Prasanth Arun, Cornelius AG

Department of Emergency Medicine, Christian Medical College, Vellore, Tamil Nadu, India

ABSTRACT

Background: With the increasing focus on setting up emergency care centers in railway stations across India by the government, there are no baseline data in India, or the world, about the profile of patients presenting with emergencies on the trains and at the railway stations. **Materials and Methods:** This retrospective study included all people who presented with any medical emergency to the Emergency Care Center (ECC), Katpadi Railway Station in South India, between January 2017 and December 2017. Details were obtained from the register maintained by the emergency nurses stationed at the ECC. **Results:** Among 1076 patients who presented to the ECC during the study period, the mean age was 37 years (standard deviation: 19.01) with two-thirds (66.1%) being males. A quarter (23.4%) were trauma-related and 76.6% were medical emergencies. Sharp force injuries [58.8% (151/252)] was the predominant mode of trauma, while laceration [57.1%] (144/252) was the predominant type of injury sustained. Common nontrauma presenting complaints included fever (27.5%), headache (17.9%), nausea/vomiting (17.9%), and abdominal pain (15%). The maximum number of cases was in the summer months of May-June with heat-related symptoms, while the maximum number of fever cases was recorded during the monsoon season. The majority (905/1076; 84.1%) were able to continue their journey further, and 13.9% required referral to a nearby hospital. During the 1-year study period, 2 patients with trauma and 18 with various medical conditions died at the railway station or at a hospital after resuscitation at the ECC. **Conclusions:** Trauma, fever, headache, and vomiting are the most common emergencies among patients traveling by rail and at the railway stations. Establishing well-equipped ECCs across the country to handle trauma and other medical emergencies during travel is part of primary care provided and is the need of the hour.

Keywords: Emergencies, Indian Railways, railway station, train, trauma

Introduction

The Indian Railways is the largest rail network in Asia and carries approximately 23 million people every day around India connecting more than 8000 stations.^[1] This is equivalent to transporting the entire population of Australia between the 29 states of India. Any means of travel, by road, air, or rail, carries with it a danger of major or minor trauma and unexpected medical emergencies. Incidents and news reports of passenger

accidents and diseases and emergency conditions, which require immediate first aid and medical attention, are on the rise over the past few years. With a recent growing public concern of the emergency health facilities at public spaces, governments around the world have been forced to cater to this demand. This has led to public outcry over deplorable health facilities at public places such as railway stations and bus stand. Setting up emergency healthcare centers at these places of need is akin to setting up primary healthcare centers and would boost the healthcare of the traveling public. In October 2011, our hospital at the request of the Indian Railways set up an Emergency Care Center (ECC) at a major railway station (Katpadi junction) in Tamil Nadu which witnesses a daily traffic of about 18,000 passengers,

Address for correspondence: Dr. Kundavaram P. P. Abhilash, Department of Emergency Medicine, Christian Medical College, Vellore - 632 004, Tamil Nadu, India. E-mail: kppabhilash@gmail.com

Received: 09-11-2019

Revised: 18-12-2019

Accepted: 31-12-2019

Published: 28-02-2020

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_757_19

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Abhilash KP, Sharma P, Ramesh V, Samuel JJ, Vinod P, Arun P, *et al.* Emergencies on the train and railway stations managed at a railway station emergency care center. J Family Med Prim Care 2020;9:807-11.

11 originating trains, and 67 passing through trains.^[2] This ECC has since catered to passengers as they travel in the blistering heat of Indian summers and erratic monsoons with innumerable health adversities and accidents.

There are very little published data on medical emergencies and trauma occurring on the trains and railway stations in India. Most studies from the West describe a cohort of patients who presented to the emergency department (ED) hospitals. Hence, we undertook this study to describe the profile of patients with both major and minor medical emergencies managed at the ECC, on the trains and on the platform of a railway station. To the best of our knowledge, there is no similar study on this subject from India.

Materials and Methods

Design

We conducted a retrospective descriptive analysis of adult patients presenting with medical emergencies and trauma to the ECC between September 2016 and August 2017.

Setting

This study was conducted at the ECC set up by our hospital at the Katpadi Railway Station in South India. A trained emergency care nurse was stationed at the ECC in three 8-h shifts daily. They responded to any health condition, emergency, and accident that were informed by the respective train guard or the ticket-collector or the station master at the platform. Vital signs and temperature recordings were measured only for triage priority 1 and 2 patients and in a few others when indicated, but not for everybody. Emergency first aid care was delivered either at the platform or within the train, before such individuals were managed definitively. The first aid measures included dressings and splinting for trauma and administration of analgesics, anti-pyretics, antacids, anti-emetics, and so on. After administering first aid, the passengers, if deemed fit, were allowed to continue their travel. Otherwise, they were referred to higher centers for definitive care. A register was maintained of all such patients by the ECC staff and this has been the primary source of data for our study.

Participants

All train travelers to and from Katpadi junction and visitors at the Katpadi Railway Station who presented with a medical emergency or trauma during the study period were included in the study.

Variables

Patient data were obtained through the ECC register database. Details of history and physical examination findings and demographic details were recorded on a standard data collection sheet. Details of their emergencies were noted, these being broadly categorized into medical (nontrauma) and traumatic conditions (like those following accidents). The variables included age, sex, vital signs, presenting complaints, mode and

type of trauma sustained, and triage priority which is defined as follows:

- i. Triage priority 1: hemodynamically unstable patients, those with airway, breathing or circulation compromise, or head injury with Glasgow Coma Scale (GCS) <8
- ii. Triage priority 2: hemodynamically stable patients requiring urgent medical attention, patients with stable airway, breathing and circulation with long bone injuries, dislocations, stable abdominothoracic injuries, and head injury with GCS 9 or more
- iii. Triage priority 3: hemodynamically stable patients and those with minor trauma.

Outcome variables

The outcome variables included the percentage of patients who were able to continue travel, those who required referral to a hospital, and the mortality rate.

Bias

All consecutive patients who were seen and managed by the ECC were included in the analysis.

Sample size calculation

As we wanted to study the seasonal pattern in the various emergencies, we included all patients over a 1-year duration.

Statistical analysis

The data were entered into Microsoft Excel (version 15.12.3) and analyzed using Statistical Package for Social Sciences (IBM Corp. Released 2015; Version 23.0, IBM SPSS, Armonk, NY, USA). Continuous variables are presented as mean (standard deviation). Categorical and nominal variables are presented as percentages. Patient confidentiality was maintained using unique identifiers, and the register was ensured access to only members of the group involved in the entry of the data. The Institutional Review Board (IRB Min No. 11026) approved this study on 06.12.2017.

Results

During the 1-year study period, the ECC attended to 1076 medical emergencies at the Katpadi Railway Station. The strobe diagram is shown in Figure 1. The mean age of these patients

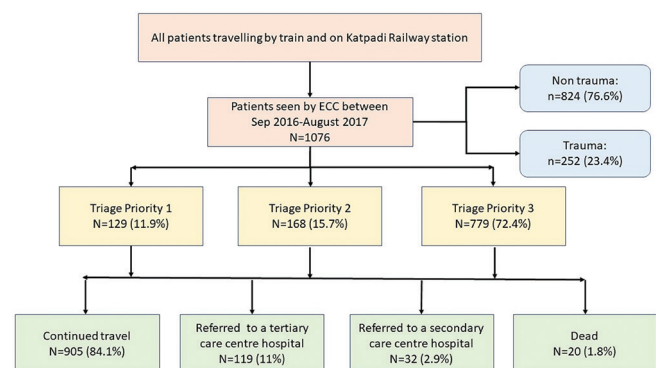


Figure 1: Strobe diagram

was 37 years (standard deviation: 19.1), with two of every three patients being male. While most of the cases were categorized as triage priority 3 (72%), but a significant 12% were categorized as triage priority 1 conditions. The baseline characteristics of the 1076 patients are shown in Table 1.

Trauma patients comprised a quarter (23.4%) of all cases. Sharp force injuries [58.8% (151/252)] was the predominant mode of trauma, while laceration [57.1% (144/252)] was the predominant type of injury sustained. The mode of injury and type of injury sustained by the patients are shown in Table 2. There were two instances of amputation of a limb and two of crush injury under the railway tracks in the period following a railway accident at the site. The latter two succumbed to their injuries. Patients

with medical symptoms comprised 76.6% (824/1076) of all patients. Table 3 shows the common presenting symptoms, the most common being fever (27.5%), headache (17.9%), nausea/vomiting (17.9%), and abdominal pain (15%). Among the others, the significant symptoms which could herald significant disease included chest pain (2.0%), unresponsiveness (4.2%), breathing difficulty (2.5%), and seizures (1.8%).

We studied the seasonal pattern of the common presenting complaints. The peak incidence of cases was in the summer months of May–June with heat-related symptoms, while the maximum number of fever cases was recorded during the monsoon season [Figure 2].

While the majority (905/1076; 84.1%) did not require referral for their complaints and were managed at the clinic, the remainder was referred to nearby health centers [Table 4]. These included primarily a tertiary care hospital (11.0%) and a secondary hospital (2.9%), both of which are within a 10-km radius from the station. During the study period, 18 of the patients who were found unresponsive had a cardiac arrest and cardiopulmonary resuscitation was initiated at the railway station and transferred to a secondary/tertiary care hospital by an ambulance. However, none of them could be revived. The mortality rate was 1.8% (2 trauma and 18 nontrauma cases).

Table 1: Baseline characteristics of the patients presenting to the ECC

	Number	Percentage
Male sex	708	66.1
Trauma cases	252	23.4
Nontrauma cases	824	76.6
Triage priority status (n=1076)		
Priority 1	129	11.9
Priority 2	168	15.7
Priority 3	779	72.4
Examination findings		
Pulse rate (n=277)		
Tachycardia (>100 bpm)	67	24.2
Bradycardia (<60 bpm)	33	11.9
Blood pressure (n=216)		
Hypertension (SBP>140 mmHg)	31	14.3
Hypotension (SBP <90 mmHg)	36	16.7
RR (n=164)		
Tachypnea (RR >20 breaths per minute)	93	56.7
RBS levels (n=37)		
Hypoglycemia (RBS <50 mg/dL)	3	8.1
Hyperglycemia (RBS >200 mg/dL)	11	29.7

ECC=Emergency Care Center, SBP=systolic blood pressure, RR=respiratory rate, RBS=random blood glucose

Table 2: Details of trauma sustained (n=252)

	Number	Percentage
Mode of injury		
Sharp force injury	151	58.8
Blunt force injury	66	29.8
Musculoskeletal sprain	29	11.5
Burns	6	2.4
Type of injury		
Laceration	144	57.1
Abrasion	38	15
Musculoskeletal pain (sprain)	29	11.5
Hematoma	20	7.9
Fracture	6	2.4
Burns	6	2.4
Puncture wound	5	1.9
Amputation	2	0.8
Crush injury	2	0.8

Discussion

The Indian Railways, being the largest rail network in the world, carries an astounding number of passengers daily. Compared with road traffic accidents, the incidence of rail-related emergencies may be much lesser. However, rail-related accidents and emergencies too are associated with significant morbidity and more worryingly grossly underreported. That was the void in literature our study aimed to fill.

Our country needs to improve its healthcare system, mainly at the community level where healthcare facilities are far and few in number with limited access. The traveling public constantly face this problem and many common emergencies are addressed late. Setting up ECCs at major railway junctions and bus stations would boost the emergency needs of the community. With railway transportation being a significant mode of transportation in developing countries like India, Turkey, and South Africa, it is important to know and understand the spectrum on emergencies and the associated mortality and morbidity. According to the open government data on train-related accidents, there were 47,814 fatalities due to train-related incidents in India between 2003 and 2015.^[3] In contrast, the United states encounters 1200 fatalities and 18,000 injuries every year due to railway-related accidents.^[4] The fatality rate is about 60 per 100 million passengers per year in South Africa while Mehmet *et al.* reported a figure of 2133 deaths per year per 100 million passengers in Turkey.^[5,6] A 10-year evaluation of train accidents from an ED in Turkey showed a mortality rate of 16%.^[7] Literature from London and New York describes morbidity and mortality among patients

traveling in the underground trains.^[8,9] Virdee *et al.* described a 11-years data of train-related injuries at a major trauma center in London.^[10] However, most of the above studies have been done in the EDs of hospitals where only the patients with significant injuries tend to report to seek treatment. Our study differs from the existing literature in that it was carried out at a railway station and included all patients with both major and minor ailments, both trauma and nontrauma.

Table 3: Medical complaints of patients presenting to the ECC (n=824)

Presenting complaint	Number	Percentage
Fever	227	27.5
Headache	148	17.9
Nausea/vomiting	148	17.9
Abdominal pain	124	15
Musculoskeletal pain	85	10.3
Diarrhea	62	7.5
Giddiness	44	5.3
Allergic reactions	46	5.3
Altered sensorium and unresponsive	44	5.3
Dyspnea	27	3.2
Cough	24	2.9
Chest pain	22	2.6
Seizure	20	2.4
Chronic ulcer	9	1
Others*	67	8.1

ECC=Emergency Care Center. **Others* includes ear pain, palpitations, tiredness and weakness, psychosis, sweating, ear discharge, skin blisters, acute urinary retention, accidental ingestion of harmful substances, and labor

Table 4: Outcome of the patients presenting to the ECC (n=1076)

Outcome	Number	Percentage
Continued travel	905	84.1
Referred to a tertiary care center hospital	119	11.0
Referred to a secondary care center hospital	32	2.9
Dead	20	1.8

ECC=Emergency Care Center

The common modes of train-related trauma include train–train collisions, train derailment, train–motor vehicles/pedestrian collisions, stepping off a train, and falling down a speeding train between the train and the platform.^[6,11] Because our study was done on the patients at the platform of a railway station, only the injuries and medical conditions occurring during travel among trains arriving at the station were captured.

In our study cohort, three-thirds of the patients sustained a minor injury like a laceration or an abrasion. Many of these injuries probably occurred as a result of poor infrastructure in trains leading to accidents, such as falling window shutters on hands of passengers. Second, casual and improper travel among passengers, such as sitting at the foot board during travel and alighting or getting onto a running train often result in more serious injuries. Two such patients sustained lethal crush injuries, while two others had an amputated lower limb as a result of falling between a running train and the platform. Such fatalities would not occur in most developed countries where the infrastructure is designed to have inadequate space for a person or a limb to fall between the train and the platform. This calls for urgent safety modifications to minimize the train–platform interface of most of the platforms in India.

Medical emergencies which were witnessed at our ECC ranged from minor ailments to life-threatening conditions. The commonly administered drugs were paracetamol, nonsteroidal anti-inflammatory drugs, antiemetics, and antacids. It is quite useful to equip emergency centers with these common medications to provide symptomatic relief to many unprepared weary travelers. These simple measures could alleviate their symptoms and may prevent serious complications during further down travel. However, in the absence of a doctor, our ECC was ill-equipped to directly handle serious medical emergencies such as seizures, dyspnea, and sudden cardiac arrest. There was also no automated external defibrillator (AED) at the ECC or at the railway station. Even though CPR was initiated by the ECC

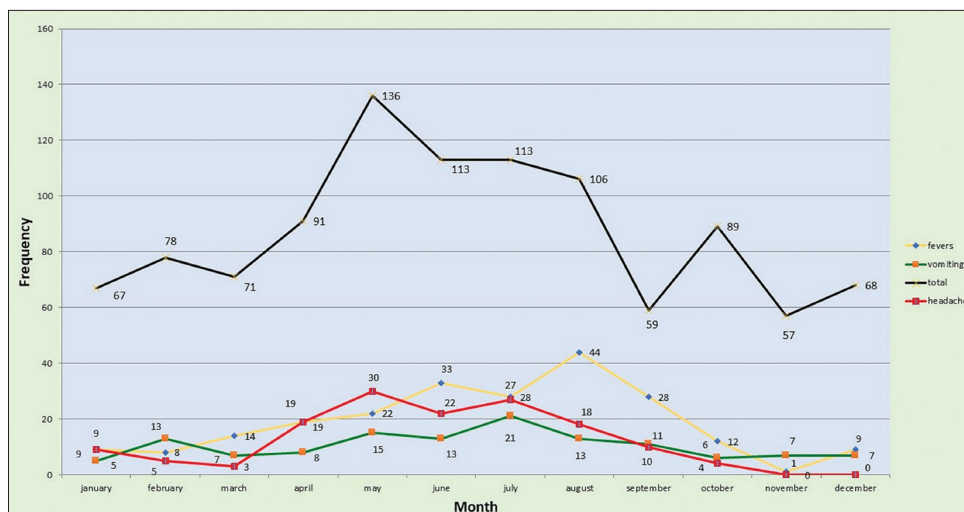


Figure 2: Seasonal variation in presenting complaints at the ECC

team on 18 patients before shifting the patients to a hospital, none could be revived. Many patients categorized as triage priority 1 had to be referred to secondary-level and tertiary-level hospitals.^[12] Though most airports in the country have AEDs, very few railway stations in our country are equipped with this life-saving device. The need of the hour is equipping public spaces in India with the essential life-saving equipment and a team of trained paramedical staff in managing basic emergencies before referring them to nearby health centers.

In our study, we noticed a seasonal variation in the spectrum of cases through the year. There was an overall increase in the number of patients presenting with emergencies in the months of April and May, which is perhaps related to the sweltering and unrelenting heat encountered in the iron compartments of the trains and on the platforms during the summer of South India.^[13] Another seasonal trend we noted was a rise in the number of patients with fever during the monsoon season. This corresponds to the season of many vector-borne diseases such as scrub typhus, dengue, and malaria, endemic in this part of the country which usually lasts between August and December.^[14-16]

Our study has certain limitations. As the study was an out-of-hospital-based study, we did not have the examination findings of all patients. In addition, an etiological diagnosis was not possible as we did not have a laboratory support. Nonetheless, this study provides relatively rare information about a relatively unexplored domain of emergency medical care.

Conclusions

Trauma, fever, headache, and vomiting are the most common emergencies among patients traveling by rail and at the railway stations. Setting up well-equipped ECCs across the country to handle trauma and other medical emergencies of the traveling public would boost primary care in our society and is indeed the need of the hour. We hope that this information would help health authorities understand the spectrum of emergencies encountered during rail travel and in establishing well-equipped ECCs.

Research quality and ethics statement

The authors of this article declare that this scientific work complies with reporting quality, formatting, and reproducibility guidelines set forth by the EQUATOR Network. The authors also attest that this clinical investigation was determined to require Institutional Review Board/Ethics Committee review, and the corresponding protocol/approval number is IRB Min. No. 11026 dated 06.12.2017. We also certify that we have not plagiarized the contents in this submission and have done a Plagiarism Check.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Indian railways statistics. Available from: <http://www.indianrailways.gov.in/railwayboard/2018>. [Last accessed on 2019 Aug 03].
2. Southern railway. Chennai division on the path of progress. Available from: <http://www.indianrailways.gov.in/railwayboard/>. [Last accessed on 2019 Aug 03].
3. Number of Persons Killed and Injured In Railway Related Accidents from 2002-03 to 2014-15. Available from: <https://data.gov.in/resources/>. [Last accessed on 2019 Aug 05].
4. Goldberg BA, Mootha RK, Lindsey RW. Train accidents involving pedestrians, motor vehicles, and motorcycles. *Am J Orthop (Belle Mead NJ)* 1998;27:315-20.
5. Lerer LB, Matzopoulos R. Meeting the challenge of railway injury in a South African city. *Lancet* 1996;348:664-6.
6. Mehmet Ö, Sami Ç, Fatih A, Mehmet E, Bülent A, Kuzey A. The epidemiology of the railway related casualties. *Ulus Travma Acil Cerrahi Derg* 2006;12:235-24.
7. Akkas M, Ay D, Aksu NM, Günalp M. 10-year evaluation of train accidents. *Ulus Travma Acil Cerrahi Derg* 2011;17:440-4.
8. Cocks RA. Study of 100 patients injured by London underground trains 1981-6. *Br Med J (Clin Res Ed)* 1987;295:1527-9.
9. Amber AG, Andrea O, Pachter L, Diflo T. Public health lessons learned from analysis of New York city subway injuries. *Am J Public Health* 2006;96:631-3.
10. Virdee J, Pafitanis G, Alamouti R, Brohi K, Patel H. Mind the gap: 11 years of train-related injuries at the Royal London Hospital Major Trauma Centre. *Ann R Coll Surg Engl* 2018;100:520-8.
11. Evans AW, Hughes P. Traverses, delays and fatalities at railway level crossings in Great Britain. *Accid Anal Prev* 2019;129:66-75.
12. Rufus YB, Abhilash KP, Swadeepa RJ, Koshy SA, Chandy GM. Clinical profile and outcome of the patients presenting to the resuscitation room of the emergency department in a Tertiary Care Hospital of South India. *Curr Med Issues* 2019;17:25-9.
13. Jain Y, Srivatsan R, Kollannur A, Zachariah A. Heatstroke: Causes, consequences and clinical guidelines. *Natl Med J India* 2018;31:224-7.
14. Abhilash KP, Jeevan JA, Mitra S, Paul N, Murugan TP, Rangaraj A, *et al.* Acute undifferentiated febrile illness in patients presenting to a Tertiary Care Hospital in South India: Clinical spectrum and outcome. *J Global Infect Dis* 2016;8:147-54.
15. Wangdi K, Kasturiaratchi K, Nery SV, Gray DJ, Clements AC. Diversity of infectious aetiologies of acute undifferentiated febrile illnesses in south and Southeast Asia: A systematic review. *BMC Infect Dis* 2019;19:577.
16. Gupta N, Mittal A, Kutty SV, Kumar A, Wig N. Technical and Alarm signs for referral in adult patients with acute febrile illness: A study from a tertiary care hospital in North India. *J Family Med Prim Care* 2018;7:832-5.