

# Global Comparison of Ambulance Services in Select Countries and Feasibility to Have Standardized Ambulance Services for India

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## ABSTRACT

**Introduction:** Emergency Medical Service (EMS) is provided by a variety of individuals, using a variety of methods. The levels of service available will fall into one of three categories: Basic Life Support (BLS), Advanced Life Support (ALS) and Intermediate Life Support (ILS)

**Objective:** The objective of the study was to compare the ambulance services in various parts of the world and to study the feasibility of having standardized ambulance services for India.

**Methodology:** The present study focuses on Ambulance services in select countries of the world based on questionnaire circulated and responses obtained. This study is based on the responses obtained from EMS stakeholders working in EMS field in India and various parts of the World. Their responses were corroborated for authenticity through additional sources e.g. website, official publications of their Institutions and in some cases through personal interaction with the authorities.

**Results:** There is no standardization of ambulance design across various procurements in the country and the industry is forced to re-integrate their vehicles every now and then. Most of the ambulance specifications are written by medical specialists who are unable to translate the user requirements in automobile terminology there by resulting in a huge gap between the user expectations and industry deliverability. Developed and developing countries have both Basic Life Support (BLS) & Advanced Life Support (ALS) type of Ambulances.

**Conclusion:** The real concept of an ambulance is missing in India. EMS is responsible for delivery of Emergency care in pre-hospital or out of hospital environment and to develop relatively good EMS model. India should have both BLS as well as ALS type of ambulance services which should include Ambulance Vehicles, Ambulance drivers and Emergency Medical Technicians (EMT's). There is also need to issue necessary instructions to the buyer of the incompletely built vehicle about the constructional and functional aspects of the ambulance.

**Keywords:** *Advanced Life Support (ALS), Ambulance, Basic Life Support (BLS), Emergency Medical Service, Intermediate Life Support (ILS).*

## INTRODUCTION

In India, every 4 minutes, one person dies on the road<sup>1</sup>. While 7 to 10 percent are critically injured, 20 to 30 per cent are seriously hurt, of these about 30 per cent are disabled for life, either partially or totally<sup>2</sup>. Considering the rate of road accidents and following critical injuries, there is a need for Emergency services

to provide immediate aid to the victims in order to save their lives. The World Health Organization (WHO) in its landmark 2005 treatise on EMS and pre hospital trauma care systems also, has established the importance of EMS and pre hospital trauma care systems in reducing morbidity and mortality from injury and violence and therefore the need and priority for development of EMS

system worldwide<sup>3</sup>.

As per a WHO draft outlining the key concepts for developing pre hospital trauma care systems minimally, an effective pre hospital care system should contain the following elements: “Prompt communication and activation of the system, the prompt response of the system and the assessment, treatment and transport of injured patients, regardless of country or terrain in which their injuries occur and regardless of the economic status of the country or municipality rendering care and treatment”<sup>4</sup>.

The first one hour after the road accident is critical for saving lives. In this “golden hour”, as coined by Dr. R Adams Cowley<sup>5</sup>, prompt medical aid can be critical to the patient’s survival<sup>6,7</sup>. Death rate can be reduced by 30% if better medical aid is provided in the first hour after accident. Proper wound care, immobilization of fractures, availability of Oxygen, intravenous fluids, prompt recognition of life - threatening conditions and transport to definitive care can all reduce morbidity and mortality. This should be the chief function of a well-equipped ambulance. Unfortunately, in much of the developing world such services are unavailable and care and transport of the sick and injured patient are carried out by lay people. EMS essentially aims at either providing treatment to those in need of urgent medical care, with the goal of satisfactory treatment, or arranging for timely removal of the patient to the next point of definitive care. This role must be played by an efficient ambulance service and subsequently the Casualty department at a hospital or another place where physicians are available.”<sup>8</sup>

EMS is provided by a variety of individuals, using a variety of methods<sup>9</sup>. To some extent, these are determined by country and locale, with each individual country having its own ‘approach’ to how EMS should be provided, and by whom. Generally speaking, the levels of service available will fall into one of three categories: **Basic Life Support (BLS)** Ambulance is used to transport relatively stable patients; **Advanced Life Support (ALS)** Ambulance that contains all emergency equipment and drugs necessary to manage any kind of patient emergency; and, **Intermediate Life Support (ILS)**, which is essentially a BLS provider with a moderately expanded skill set, may be present, but this level rarely functions independently, and where it is present, may replace BLS in the emergency part of

the service. The objective of this paper were to study ambulance services in the selected developed and developing countries and study the feasibility of having standardized ambulance services for India.

## METHODOLOGY

The present study focuses on Ambulance services in select developed & developing countries of the world based on questionnaire circulated and responses obtained. This study is based on the responses obtained from EMS stakeholders working in EMS field in these countries (developed & developing countries). The primary data was obtained from an interview and an analysis of the responses obtained from various EMS stakeholders to the questionnaire administered personally. Their responses were corroborated for authenticity through additional sources e.g. website, official publications of their Institutions and in some cases through personal interaction with the authorities. Similar questionnaire was also administered to EMS authorities in various parts of India via e mail. In order to obtain a global perspective and understanding of EMS system prevalent in various parts of the World, similar questionnaire was administered to EMS authorities in various parts of the world via e mail. Unfortunately, despite repeated reminders researchers managed to obtain limited responses, both nationally & internationally. To supplement the interview responses, information of countries included in the study from secondary data were collected.

As regards secondary data, published literature relevant to Ambulance services in various parts of the world to include select countries and India was identified. This was to identify various Ambulance services existing in various parts of the World and study various Ambulance services existing. Literature was identified through electronic literature searches & data bases. Websites of various EMS organizations were also accessed. This was to identify various Ambulance services existing in India and various parts of the World. The Basis of selection of Countries and the Inclusion criteria and Exclusion criteria are detailed further.

## RESULTS AND DISCUSSION

For purpose of this study, three strata with countries having Emergency Medical Services were considered for study.

Countries that do not have existing EMS were omitted from the study. Countries were grouped in three categories, High, Medium and Low Human Development Index. The Human Development Index (HDI) is a comparative measure of life expectancy, literacy, education, standards of living and quality of life for countries worldwide<sup>4</sup>.

It was noticed that the group / population is not homogenous, hence stratified sampling techniques were applied. Each strata was formed on basis of common characteristics thus,

Strata I included.

79 Countries with High Human Development Index.

Countries having existing Emergency Medical Services.

Strata II included

23 Countries with Medium Human Development Index.

Countries having existing Emergency Medical Services

Strata III included.

45 Countries with Low Human Development Index.

Countries having existing Emergency Medical Services.

It was ensured that all elements are most homogenous within each stratum and heterogeneous between different strata. For selection of countries to constitute sample from each stratum, simple random sampling technique was used. Name of each element was written on a slip of paper and all slips were put in a box, mixed thoroughly and blindly drawn the required number of slips and put back for all participants to have equal chance of being in the sample. Repeat slip was not included on second time. (i.e. once an item is drawn selected for sample, it cannot appear again in the sample.) It was ensured that in successive drawing each of remaining elements of population has same chance of being selected. That is if  $P_i$  represents proportion of population (High Human Development Index) included in stratum  $i$  and  $n$  represents total sample size, the number of elements selected from stratum  $i$  is  $n.P_i$ . For e.g., when we want a sample size of  $n=15$  to be drawn from a population (all

countries having existing EMS) of size  $n=147$  which is divided into three strata as under.

For strata  $n_1=79$  we have  $P_1=79/147$  and hence,

$$n_1 = n.P_1 = 15 \times 79/147 = 8.0612 \text{ rounded off to } 8$$

$$n_2 = n.P_2 = 15 \times 23/147 = 2.234 \text{ rounded off to } 2$$

$$n_3 = n.P_3 = 15 \times 45/147 = 5.591 \text{ rounded off to } 6$$

Thus using proportional allocation the sample sizes for different strata are eight, two and six respectively which is in proportion to the size of the strata seventy nine: twenty three:” forty five (79:23:45) (i.e. stratified sample was obtained). Thus after performing stratified Random Sampling following countries were selected from each strata for the study.

#### **Eight Countries with High human Development Index with existing EMS:**

United States of America, New Zealand, Canada, Germany, Hong Kong, Singapore, United Kingdom, France

#### **Two Countries with Medium human Development Index with existing EMS**

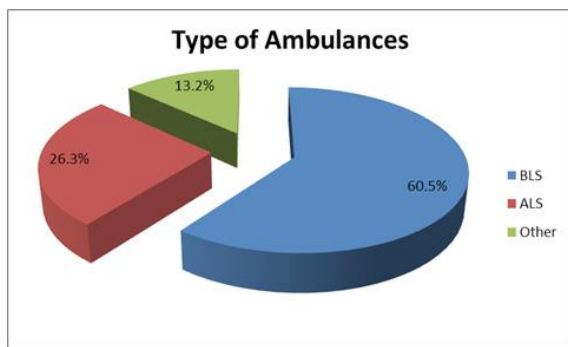
Sri Lanka & South Africa

Six Countries with Low human Development Index with existing EMS

Kenya, Pakistan, Bangladesh, Sudan, Afghanistan, Nepal

#### **India is in Medium human development index category with existing Emergency Medical Services.**

The sample size consisted of all EMS stakeholders working with various EMS setups across the world. A total of Seven hundred and fifty filled forms were collected. Incompletely filled ambiguous responses, ineligible forms etc. were discarded. Finally, six hundred and seventy two forms were analyzed. The forms filled were collected, collated and analyzed by using statistical package for social sciences (SPSS) Software version 16.0 for the purpose of the study. It can be seen (fig. 1) that 60.5% of respondents say that India has only Basic Life Support (BLS) type of Ambulances and 26.3% replied India has Advanced Life Support (ALS) type of Ambulances, whereas 13.2% of respondents replied that India has both or other type of Ambulance Services.



**Fig. 1: Type of Ambulances available in respondents' part of India**

This analysis shows that developed and developing countries have both Basic Life Support (BLS) & Advanced Life Support (ALS) type of Ambulances.

The Ministry of Road Transport and Highways, Govt. of India has set up five Working Groups on 4Es of Road Safety i.e. Education, Engineering (Vehicles), Enforcement and Emergency Care on the recommendation of the National Road Safety Council (NRSC).<sup>9</sup> The Working Group on Emergency Care in its report observed that the real concept of an ambulance is missing in India. Existing ambulances are more like transport vehicles and any vehicle suitable to lay a patient is called an ambulance without consideration to the overall ambulance design. Unrestrained occupants, particularly those riding in the patient-care compartment, are particularly vulnerable. It is, therefore, all the more necessary in an ambulance to take care of occupant safety, patient care ergonomics, medical equipment selection and placement, vehicle engineering and integration, etc.

The working group recommended that there is a need to formulate the

“**National Ambulance Code**”<sup>10</sup> with necessary amendments in Central Motor Vehicle Rules (CMVR) that defines the Constructional and Functional Requirements for Road Ambulances. In view of this, an Expert Committee was constituted with approval of the Hon’ble Union Minister for Road Transport and Highways to formulate the “**National Ambulance Code**”. The Committee took stock of the existing trends vis-a-vis ambulance construction, design and integration to understand the current scenario, limitations of the existing framework, available technology, manufacturer maturity, local conditions, past trends, etc. The committee members shared their experiences as regards the Indian reality and deliberated on the reasons behind the condition of ambulances. The following important

points were highlighted during these discussion<sup>10</sup>:

There is no standardization of ambulance design across various procurements in the country and the industry is forced to re-integrate their vehicles every now and then.

Most of the ambulance specifications are written by medical specialists who are unable to translate the user requirements in automobile terminology there by resulting in a huge gap between the user expectations and industry deliverability.

There are certain inherent limitations in the existing laws which allow goods vehicles to be converted as ambulances for passenger application without incorporating essential safety features in patient compartment like side door, forward backward seating, occupant restraints, certified electrical systems, etc.

#### **Thus Ambulance was broadly categorized as:**

**Basic Life Support Ambulance** – A vehicle ergonomically designed, suitably equipped and appropriately staffed for the transport and treatment of patients requiring non - invasive airway management/basic monitoring.

**Advanced Life Support Ambulance** - A vehicle ergonomically designed, suitably equipped and appropriately staffed for the transport and treatment of patients requiring invasive airway management/intensive monitoring

Information analyzed from Secondary Data of various countries from study shows that in selected countries ambulance vehicles attempt to meet either European standard for ambulances CEN 1789, published by European Committee for standards or United States federal KKK-1822 standards. They are either Basic Life Support (BLS), or Advanced Life Support (ALS) or both.

They are used for transportation depending upon severity of illness.

Emergency Calls.

Doctor’s urgent admission request.

High dependency and urgent inter – hospital transfer.

Major incidents.

## CONCLUSION

The real concept of an ambulance is missing in India. Existing ambulances are more like transport vehicles and any vehicle suitable to lay a patient is called an ambulance without considering the overall ambulance design. As EMS is responsible for delivery of Emergency care in pre-hospital or out of hospital environment and to develop relatively good EMS model, India should have both BLS as well as ALS type of ambulance services which should include Ambulance Vehicles, Ambulance drivers and Emergency Medical Technicians (EMT's). There is also need to issue necessary instructions to the buyer of the incompletely built vehicle about the constructional and functional aspects of the ambulance. Any body builder who is engaged in the activity of building ambulances needs to follow the prescriptions of National Ambulance code for necessary compliance, verification & certification.

**Ethical Clearance-** IEC, SIU

**Source of Funding-** Nil

**Conflict of Interest -** Nil

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