Short Communication

Can the Emergency Medical Service (EMS) System Help in Improving the Healthcare Access – Evidence from Maharashtra EMS

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Abstract

Background: For many people in the remote regions of India, medical help is inaccessible as 66% of rural Indians do not have access to critical medicine and 31% of the population travel more than 30 km seeking health care in rural India. Timely non-availability of doctors in healthcare facilities, especially in primary health centers (PHCs), leads to more dependency on the private healthcare practitioners for the out-patient department services. This needs immediate attention. **Materials and Methods:** The healthcare authority in Maharashtra has allowed doctors in 108 emergency ambulances to provide consulting services. The current study is based on the total consultations managed by the doctors on-board on the 108 ambulances in the state of Maharashtra in the years 2020, 2021, and 2022. The data are procured from the state-run Emergency Response Centre, and the analysis is done by using the basic statistical technique in MS Excel and SPSS16.0. **Results:** More than 9.35 lakh medical consultations were provided with an average 856 consultations per ambulance in the year 2022, showing a significant growth of 452% over the consultations in 2020. The base location of the 32% ambulance (298) in the PHCs has improved the round the clock accessibility in 16% of the total PHCs in the state of Maharashtra. **Conclusion:** The availability of the doctors in the state-run emergency ambulances for general healthcare services has improved the adherence of Indian Public Health Standards, and such practice must be examined for implementation in other states.

Keywords: EMS ambulances, health facility, healthcare access, medical consultation, out-patient department services, public health centers

Introduction

Healthcare access is the ability of the system to make sure the availability of quality healthcare to the citizens. Healthcare access has been a topic of great debate along with the mandate of universalization of healthcare. Oxford dictionary defines access as "The right or opportunity to use or benefit from (healthcare)". Thus, making use of an existing facility in an efficient way can also improve access. India has witnessed a number of innovative practices to offer healthcare services across width and breadth of the vast geography. Still, there is a huge unmet need for healthcare. An unmet need for an individual arises when the quality of care is not accessible when needed.[1] Unmet needs arise due to barriers related to availability, affordability, accessibility, and acceptability of services.[2]

India has a population of nearly 1.41 billion, and as per 2011 census, more than 68% live in rural areas. The overall health situation of India needs significant intervention due to the fact that 66% of rural Indians do not have access to critical medicine and 31% of the population travel more than 30 km seeking health care in rural India.[3] Timely non-availability of doctors in healthcare facilities, especially in primary health centers (PHCs), is a major challenge in rural India.[4]

Access this article online

Quick Response Code:

Website: www.ijcm.org.in

DOI: 10.4103/ijcm.ijcm_448_23

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How to cite this article: Jena BN, Shelke D, Saunik S. Can the Emergency Medical Service (EMS) system help in improving the healthcare access – Evidence from Maharashtra EMS. Indian J Community Med 2024;49:438-42.

Received: 09-07-23, **Accepted:** 06-11-23, **Published:** 07-03-24

For many people in the remote regions of India, medical help is inaccessible. Developing and maintaining sustainable healthcare delivery for people in the remote areas is indeed a challenge.[4] There is an urgent need to provide access to affordable healthcare in a sustainable manner.

Around 70% of all out-patient visits are provided by private providers due to some challenges in the public sector which are related to quality of care, accessibility and affordability of health care services, medicines, and diagnostics.[2] The rate of primary healthcare visits and the cause specific clinician requirements decline with an increase in the distance of the healthcare facility.[5] In India, nearly 30% of patients in chronic care and 17% in acute care face difficulty in accessing out-patient care as they need to travel more than 5 km. Such a challenge is also persistent for the patients seeking care from the private sector.[6]

The mean distance of any healthcare facility run by the private sector or government is 4.94 km. About 58% patients seeking care live within 5 km of the health facility, whereas around 25% patients live in the distance between 5 and 9 km, and 18% patients live beyond 10 km.[7] The demand and the resulting access to the healthcare are often influenced by the overall awareness on the disease, and only 20.3% of the geriatric population are aware about the common causes of prevalence of geriatric morbidity and its prevention, thus limiting the overall demand for the out-patient department (OPD) services.[8]

Thus, ensuring the availability of medical services after travelling such a distance becomes a critical parameter for the improvement in the access. Human resources and availability of healthcare professionals in the facility are the associated critical factors for ensuring the delivery of the healthcare services to the citizens. In India, around 20 healthcare professionals are available for 10,000 population, and these consist of 31% of allopathic doctors, 30% of nurses and mid-wives, 9% of AYUSH professionals, and 11% of pharmacists.[9]

Out of people in Maharashtra who availed the healthcare services from public health facilities, 91% availed it for OPD services and around 5% used it for in-patient department (IPD) services.[10] With a significant dependency for the OPD services, non-availability of doctors in the health facility may discourage the overall health seeking behavior of the population and the access to healthcare will get into a vicious circle again.[10] Around 27% of the sanctioned positions of doctors in public health centers (PHCs) are vacant.[11] Research in such dimensions suggests that task shifting and mainstreaming doctors and practitioners of the traditional Indian medicine system including the Ayurvedic and Homeopathic system of medicine may help in improving the healthcare access.[9]

Healthcare access, especially the emergency healthcare, has achieved an important boost with the introduction of 108 services. It has given a better access to emergency healthcare including the maternal and obstetrics emergencies. It is the most used model of Emergency Medical Service (EMS) in India through the 108 ambulance to attend patients who are in need of services related to critical care, trauma, and accidents.[12] The service is a public-funded service and operated by BVG India in the state of Maharashtra.[13] Although in all the states in India, the 108 emergency medical service is managed by the Emergency Medical Technician (EMT) in the ambulance, the Maharashtra EMS, for the first time in India, recruited medical professionals in the ambulance to take care of patients in emergency situations (MEMS office, Pune, 2023). Such arrangement of physicians in the ambulance provided much better quality care in terms of adhering to medical protocols, administration of medicines, online consultation with trauma specialists in the hospital, and much more. Although the physicians are from the alternative medicine background including BAMS (Bachler in Ayurvedic Medicine and Surgery) and BUMS (Bachler in Unani Medicine and Surgery), the care to the patients was much better as compared to the EMTs. The Maharashtra EMS system has on-boarded more than 3500 physicians to manage a fleet of 937 ambulances (MEMS office, Pune, 2023). Such medical professionals manning the 108 ambulances could create opportunities to provide access to the clinical needs of the citizens other than emergencies.

In 108 operation, the ambulances are stationed in a particular location, mostly at the public healthcare facilities including PHCs and community health centers (CHCs) along with the doctor in the ambulance. When an emergency call comes, the ambulance immediately leaves to the incident location to provide care and take the emergency victim to the hospital if needed and the ambulance comes back to the location. Thus, when the ambulance is not busy in providing emergency calls, it remains stationed at the location. So, the doctors are eventually available to provide medical consultation to the citizens. With the EMS service being a 24*7 service, doctors are available all the time in the ambulances.

In 2020, the Government of Maharashtra has allowed the doctors on-board in the 108 ambulance to do the general consultation for the citizens as and when appropriate. Such arrangement has provided enough opportunity for the patients to get the medical consultation services irrespective of the availability of the doctors in the healthcare facility.

The current research tries to understand the volume of consultation being provided by the doctors in the 108 ambulance and other aspects of the services.

Materials and Methods

The current study is based on the total consultation managed by the doctors on-board on the 108 ambulance in the state of Maharashtra in the years 2020, 2021, and 2022.

The current study analyzed all the non-emergency consultations done by the doctors in the "1 0 8" emergency ambulance managed by BVG Maharashtra Emergency Medical Services (BVG MEMS) from January 2020 to December

2023 in the state of Maharashtra. The Emergency Response Centre (ERC) is the emergency service processing unit of BVG MEMS and thus manages all the data pertaining to all the emergency calls and associated events. All the non-emergency consultations provided by the doctors known as Emergency Medical Service Officers (EMSOs) are also documented and reported to the ERC. Thus, the ERC of BVG MEMS was the major source of data for the study. When patients visit the health facility and the 1-0-8 ambulance is stationed in the health facility, the patients can opt to take the medical consultation from the EMSO in the ambulance. The EMSO in the ambulance provides the consultation to the patients irrespective of the doctors available in the facility or not. Since the ERC data entry is done by the qualified and trained personnel and data capturing is completely automated, the quality of data is assumed to be good for research studies. The current study is a retrospective and observational study done by using the data collected from the "108" operation. The permission for using the data for the study was obtained from the Government of Maharashtra.

The present study examined the OPD consultation services managed by the EMSOs. The data collected from the ERC are processed in MS EXCEL of MS Office 2010 and SPSS 16.0. Basic statistical methods are used to interpret the results.

Results

The total number of medical consultations provided through EMSO in the year 2020 was to the tune of 169,385, which was increased to 664,007 in 2021 and further to 935,544 in 2022. This indicates a growth of 292% in the year 2021 over 2020 and 41% in the 2022 over 2021. The ambulances were located mostly in PHCs and rural hospitals (RHs) [Table 1].

The distribution of ambulance by its location is an important factor for the non-emergency medical consultation as dependency on the outside facility arises when the doctors in the facility are not available or too busy in taking care of other activities. In the Indian health system, the PHC is the first referral unit and is available for an approximate 30,000 population. Thus, the availability of services in PHC is the critical parameter for improving the access of healthcare. RHs are the next level referral centers. The current distribution of ambulances shows that more than 62% of the EMS ambulances are stationed in either PHCs or RHs. If the distribution of the medical consultations by the location of the ambulances is analyzed, it is revealed that 63% of the total consultation is occurring at the ambulances located in the PHC and another 24% of the consultations are happening in the RH-stationed ambulances. Therefore, around 62% of the ambulances provide 87% of the total consultation.

Sixty-two percentage of the total consultation was for the male patients, and around three quarters of the patients taking consultation from the ambulance are in the age group of 16 years to 49 years [Table 2].

Table 1: Distribution of ambulances by location in Maharashtra

Ambulance Location	Number of Ambulances	% of Ambulances
Medical College	2	0.2%
District Hospital	40	4.3%
Sub-Divisional Hospital	81	8.6%
Municipal Hospital/Health Centre	106	11.3%
Rural Hospital	289	30.8%
PHC	298	31.8%
Sub-Center	20	2.1%
Railway Station	49	5.2%
Non-Health Centre	52	5.5%
Total	937	100.0%

Table 2: Distribution of medical consultation by demographic parameter in 2022

Parameter	No. of medical consultations	% of the total medical consultations
Gender		
Female	358974	38%
Male	576571	62%
Transgender	9	0%
Age		
Up to 5 years	16365	2%
6 years to 15 years	58786	6%
16 years to 49 years	692250	74%
50 years and above	168153	18%
Grand Total	935554	100%

Most of the medical conditions were found to be cough and cold, fever, general weakness, minor injury due to animal attack, allergic reactions, and blood pressure, for which the consultations were sought.

Although the total volume of consultation through 108 ambulance doctors has increased by 452% to 935,544 in 2022 over 2020, there was a significant variation among the districts. In 2022, Jalna district of Maharashtra registered the lowest volume of medical consultation through 108 ambulance doctors at 295 consultation per ambulance, whereas Nagpur district had the maximum consultation at 1307 per ambulance. The average number of consultations per ambulance for the year 2022 was found to be 856 with a standard deviation of 236. Thus, the coefficient of variation (CV) was calculated to be 27%.

An attempt was made to answer such variation by analyzing the non-availability of doctors in the health facilities, especially in PHCs. The data on the availability of doctors in the health facility were extracted from the published data of the Ministry of Health and Family Welfare, Government of Maharashtra, and are presented below [Table 3].

When the volume of consultation through 108 ambulance doctors was analyzed and correlated with the shortfall of

Table 3: Status of doctors by districts of Maharashtra

District	Sanctioned posts	Regular	Bonded	Ad hoc	Total	Shortfall	Shortfall %
Ahmednagar	325	169	30	93	292	-33	-10%
Akola	125	86	8	22	116	-9	-7%
Amravati	274	151	35	56	242	-32	-12%
Aurangabad	209	149	21	29	199	-10	-5%
Beed	235	175	33	18	226	-9	-4%
Bhandara	218	124	19	31	174	-44	-20%
Buldhana	242	117	29	57	203	-39	-16%
Chandrapur	148	111	10	17	138	-10	-7%
Dhule	117	59	6	38	103	-14	-12%
Gadchiroli	216	167	8	17	192	-24	-11%
Gondia	162	99	9	28	136	-26	-16%
Hingoli	118	67	11	20	98	-20	-17%
Jalgaon	290	117	14	126	257	-33	-11%
Jalna	172	101	26	37	164	-8	-5%
Kolhapur	248	169	29	44	242	-6	-2%
Latur	191	145	22	11	178	-13	-7%
Nagpur	142	83	11	19	113	-29	-20%
Nanded	270	190	36	11	237	-33	-12%
Nandurbar	152	96	10	29	135	-17	-11%
Nashik	387	234	31	89	354	-33	-9%
Osmanabad	190	113	24	23	160	-30	-16%
Parbhani	161	107	18	27	152	-9	-6%
Pune	399	276	36	66	378	-21	-5%
Raigad	217	101	18	60	179	-38	-18%
Ratnagiri	244	185	8	15	208	-36	-15%
Sangli	185	127	12	28	167	-18	-10%
Satara	252	164	23	44	231	-21	-8%
Sindhudurga	170	118	1	22	141	-29	-17%
Solapur	243	112	19	77	208	-35	-14%
Thane	344	208	29	51	288	-56	-16%
Wardha	152	96	9	25	130	-22	-14%
Washim	201	137	18	36	191	-10	-5%
Yavatmal	110	52	12	20	84	-26	-24%

doctors, the relationship was not well established with a correlation coefficient of 35%. Again, the proportion of rural population is not significantly correlated to the volume of consultations (r = 16%).

Discussion

Care through OPD service is crucial for developing and strengthening primary healthcare and reducing the out-of-pocket (OOP) expenditure.[14] The role of PHCs is important as it can address 80% of the health needs of people and thus reduce the OPD care cost.[15] Therefore, the availability of doctors in PHCs will add a huge value in the health care system and also improve the accessibility to a greater extent. As per the Indian Public Health Standards (IPHS) 2012, PHCs should have 6 hours of OPD services, with 4 hours in the morning and 2 hours in the afternoon.[16] The arrangement from the Maharashtra Emergency Management Services (MEMS) to make the doctors in ambulances to be available for the general medical consultation improves the confidence in the system. In 298 locations (32%), the ambulances are stationed in the PHCs, and thus, the doctors in these ambulances are available for consultation. Of the total of 1816 in-position PHCs in the state of Maharashtra, 298 PHCs are having additional benefits of doctors being available for consultation for the general public coming to the PHC for OPD service. This translates to more than 16% PHCs having additional support systems in terms of manpower and so also better access to patients. Similarly, in 289 locations, the ambulances are stationed in RHs or CHCs. Out of the 407 CHCs functioning in the state of Maharashtra, 71% facilities are supported by this facility. Such systems may be considered as a back-up for the in-service doctors and such back-up will improve the access to a greater extent. Since the ambulances can be moved to their locations, a guideline may be formed to redefine the ambulance station where the access is low and availability of the doctor is a challenge.

Again, the IPHS defines emergency healthcare protocols for the PHCs. IPHS suggests 24-hour services for PHCs for management of injury and accident, dog bite, snake bite, and

scorpion bite, and the medical officer may be available in the facility on a call basis.[16] The doctors in the 108 ambulance have gone through a focused and dedicated training on management of emergency situations (BVG MEMS Office, Pune). The availability of such manpower through 108 ambulance ensures the fulfilment of the 24-hour emergency service requirement for all health facilities where the ambulances are stationed. From the perspective of service delivery, all the PHCs which are not categorized as 24*7 hours service PHCs can be categorized as "Equivalent to 24*7 hours service PHC" due to the availability of emergency ambulance, trained medical professional, doctors, and the support system to handle all the emergency cases mentioned in IPHS. This will also help in strategically converting any PHC into a 24*7 hours service PHC.

Studies in Maharashtra indicate that the demand for OPD services in PHC varies from 40 to 182 per day.[17] The current research found that on an average, each ambulance is supporting 2.3 consultations per day. A few districts like Nagpur, Solapur, and Washim are contributing to the general consultation with more than 3 consultations per day. Although the contribution to the overall general medical consultation is low against the total demand for OPD services or general medical consultation, the current arrangement is a well-structured support system to improve the healthcare access.

Conclusion

Healthcare access has been a matter of great concern in India. The access not only is limited to the physical distance to reach the healthcare facility but also deals with availability of manpower to take care of the immediate need of the patients, quality of manpower, and availability of medicines and other consumables. Available of doctors in the ambulance itself is a great achievement from the policy perspective of the Government of Maharashtra. Such a directive not only improves the quality of the emergency services but also creates avenue for improving the healthcare access through general healthcare consultation and counseling. The demand for the general consultation through the 108 ambulance doctors has grown more than 6 times in just 2 years, and this will also help in improving the system as a whole. Indian Public Health Standards envisages 24*7 services in PHCs by including one more medical officer (may be from AYUSH). This will be supported to the maximum extent through the medical doctors in the EMS system. This will help in adherence of Indian Public Health Standards in health care facilities, especially PHCs and CHCs.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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