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A Narrative Review of Sri Lanka's National Pre-Hospital Ambulance Service, "1990 Suwa Seriya," with a Focus on out-of-Hospital Cardiac Arrest (OHCA) Management

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Abstract

Sri Lanka has emerged as a regional leader in healthcare within South Asia, achieving some of the lowest maternal and neonatal mortality rates in the region. Despite these successes, the absence of an organized pre-hospital care system has hindered improvements in overall mortality rates. This narrative review explores the development of Sri Lanka's Emergency Medical Services (EMS) over the past decade, highlighting historical challenges and the pivotal impact of the national ambulance service, "1990 Suwa Seriya," on morbidity and mortality outcomes, including out-of-hospital cardiac arrest (OHCA). The review traces the rapid progression from a non-existent pre-hospital system in 2015 to a nationwide, publicly accessible, and free emergency ambulance service covering 22 million people within six years. Key factors contributing to this transformation include collaborations with emergency medicine specialists, innovative training and credentialing programs, and emerging research initiatives, providing a model for other countries developing pre-hospital care systems. The service's response during the COVID-19 pandemic, its effect on public trust, and strategies to mitigate OHCA-related morbidity and mortality are also discussed. Overall, 1990 Suwa Seriya exemplifies a commitment to continuous enhancement of pre-hospital care and serves as a potential blueprint for strengthening emergency healthcare in lower-middle-income countries (LMICs).

Keywords: Low resource, Resuscitation, Emergency medicine, Pre-hospital care

Background

Sri Lanka, an island nation in South Asia with an area of 65,625 km², is classified as a lower middle-income country (LMIC) and has an estimated population of 22.1 million [1, 2]. The country offers universal healthcare free of charge, covering a broad spectrum of services such as maternal and child care, immunizations, and prevention of communicable and non-communicable diseases. Within the South Asian region and among LMICs, Sri Lanka has achieved notable public health successes, including the elimination of malaria, polio, and neonatal tetanus. The country reports a high female life expectancy of 78.6 years and maintains a maternal mortality rate of 47 per 100,000 live births, which is exceptionally low compared with other nations in the same income group [1, 2].Cardiovascular disease is the leading cause of death, while trauma, particularly from road traffic collisions, is the foremost reason for hospital admissions. World Bank estimates indicate around 3,000 fatalities and 8,000 severe injuries occur annually from road accidents [3, 4]. Despite the country's healthcare progress, the per capita road traffic mortality rate remains at 17.4—twice that of high-income countries and the highest in South Asia [3]—highlighting the urgent need for increased investment in emergency services.

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The 2004 Boxing Day Tsunami revealed major deficiencies in disaster preparedness and pre-hospital care, prompting healthcare reforms such as the establishment of the National Disaster Management Centre and recognition of Emergency Medicine as a specialty in 2013. Policy frameworks for pre-hospital care and accident and emergency services were further strengthened in 2016 [1, 4].

This narrative review traces the development of Sri Lanka's EMS over the past decade, discussing future challenges and goals, drawing on both statistical evidence and the authors' first-hand experience, and examining approaches to improve out-of-hospital cardiac arrest (OHCA) survival.

The Past

State of EMS prior to 2016

Before 2016, emergency medical services in Sri Lanka were constrained by logistical and infrastructural challenges. The primary means of transporting patients was motorized three-wheeled rickshaws ('Tuk Tuks'), which, though culturally familiar, posed substantial risks of secondary injury and often delayed hospital arrival, contributing to higher pre-hospital and in-hospital mortality—a pattern observed in many LMICs [5]. Previous efforts by private and non-governmental organizations to develop a coordinated ambulance network had limited success [6].

Founding of 1990 Suwa Seriya

The creation of an organized pre-hospital system relied on a combination of stable funding and strong political commitment. The 1990 Suwa Seriya ambulance service was inaugurated on July 28, 2016, under Prime Minister Ranil Wickremesinghe, led by Dr. Harsha De Silva, then Deputy Minister of National Policies and Economic Affairs. Its first phase, funded by a $7.55 million grant from the Indian government, deployed 88 ambulances in the Southern and Western provinces, established an Emergency Command and Control Center, and covered operational costs for one year [5].

To ensure sustainability beyond the initial grant, the government formalized the program through the 1990 Suwa Seriya Foundation Act No. 18 of 2018, enacted on July 4, 2018 [7]. Subsequent Indian funding of $15 million enabled the second phase, launched on July 21, 2018, which expanded the fleet by 209 ambulances to a total of 297, providing nationwide coverage [8].

Collaboration with emergency medicine specialists in Sri Lanka

The Postgraduate Institute of Medicine (PGIM) at the University of Colombo launched its Doctor of Medicine (MD) training program in Emergency Medicine in 2013. The Sri Lankan Society of Critical Care and Emergency Medicine (SSCCEM), originally established in 2002, had already begun strengthening national emergency and critical care training through an active partnership with Australian emergency physicians starting in 2006 [9]. By the time the 1990 Suwa Seriya service was introduced, the first group of Emergency Medicine trainees had completed the local and overseas components required by the PGIM curriculum. These trainees subsequently served as on-call clinicians and contributed to the training of EMTs.

During the early operational phase, each ambulance dispatch was closely coordinated through the Emergency Command and Control Center in Colombo, where on-call specialists provided medical oversight. As the service grew, the 1990 Suwa Seriya Foundation formalized its collaboration with SSCCEM by signing a memorandum of understanding (MOU), ensuring a sustained structure for clinical governance and quality assurance [6]. When the Sri Lanka College of Emergency Physicians (SLCEP) was established in 2022, the responsibility for continuing these educational, supervisory, and operational roles transitioned seamlessly to the new college.

Initial training of staff

Recruitment of Emergency Medical Technicians (EMTs) initially focused on individuals who had completed the G.C.E. Advanced Level examination. In the early years, selected candidates were sent to Hyderabad, India, for an intensive two-month training program delivered by the GVK Emergency Management and Research Institute (GVK EMRI). The curriculum incorporated theoretical teaching—including Basic Life Support with AED use and Intermediate Life Support following American standards—along with simulation-based learning, clinical exposure in Indian hospitals, and practical ambulance shifts. After returning home, trainees completed an additional four weeks of skills refinement, communication training, and orientation to Sri Lankan EMS protocols and regulations, followed by a one-month in-country field internship [5, 8].

Understanding the limitations and priorities of this externally delivered training program was essential in shaping the long-term development of local practice standards. Building a credible credentialing system ensured consistent expectations for EMT performance and played a major role in increasing professional and public confidence in pre-hospital emergency care.

Challenges during implementation

Introducing automated external defibrillators (AEDs) into routine ambulance operations created an unexpected barrier. Although Sri Lanka had a small number of AEDs in public spaces—such as airports, selected hotels, and foreign embassies—access to these devices was generally restricted to designated safety personnel rather than the general public. The exact distribution and number of AEDs available in the country remain undocumented [10], as does information about their use. Hesitancy toward a well-established intervention widely accepted internationally highlighted the public's limited awareness of pre-hospital emergency care and its proven benefits, particularly the impact of rapid defibrillation on OHCA survival.

To address the broader unfamiliarity with EMS, a nationwide public engagement initiative was launched. This campaign used multiple communication channels, including television, newspapers, and targeted outreach activities. A central feature involved 1990 Suwa Seriya teams visiting schools to teach children when to call 1990—such as during episodes of chest pain—and to encourage families to give way to ambulances. By empowering children as messengers within their households and communities, the program sought to improve public responsiveness to emergencies [11]. Additionally, a public conversation emerged in the media debating the evidence supporting the safety and effectiveness of pre-hospital defibrillation.

Rising with the COVID-19 waves

By the middle of 2019, the 1990 Suwa Seriya system had grown into a nationwide service equipped with a fleet of 297 ambulances and supported by nearly 600 fully trained and credentialed EMTs. With island-wide operational capacity firmly in place, the service was able to deliver rapid emergency response across all regions. When COVID-19 emerged, the service reached a defining point in its development, becoming responsible for transporting Sri Lanka's first confirmed patient with the virus [5].

As the pandemic progressed, 1990 Suwa Seriya evolved into a critical component of the country's frontline response. In the months leading up to COVID-19, the service routinely handled approximately 5,000 incoming calls and about 1,000 patient encounters per day. Once community transmission intensified, these numbers escalated sharply. Daily call volumes surged to around 9,000, while the number of cases attended each day increased to roughly 1,500. To ensure safety, EMTs underwent detailed instruction on the appropriate procedures for donning, removing, and disposing of PPE so they could continue caring for suspected or confirmed COVID-19 patients without compromising their own safety [5].

Allowing infected individuals to rely on public transport would have significantly amplified the risk of viral spread, especially among unvaccinated and medically vulnerable populations. The unwavering involvement of 1990 Suwa Seriya played a decisive role in minimizing these dangers and demonstrated the service's essential contribution to safeguarding the public. As a result, the organization became firmly embedded in the national perception as an indispensable element of Sri Lanka's universal healthcare system. **Figure 1** illustrates the monthly call volume received by the service over the past five years.

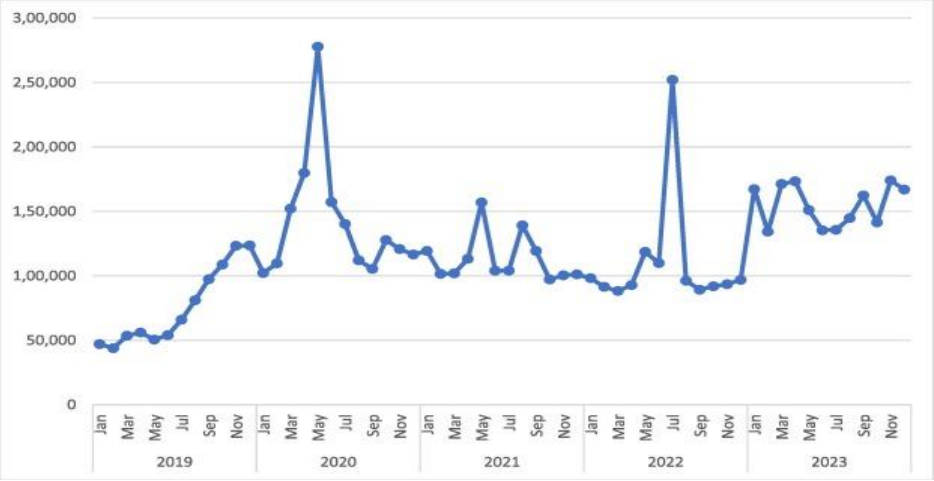

Figure 1. Number of calls received per month from 2019 to 2023

The present

Operational procedures of the 1990 Suwa Seriya

The 1990 Suwa Seriya service now functions with a total of 322 ambulances distributed across the country and is supported by close to 600 trained EMTs. Members of the public can request assistance either by dialing the toll-free number 1990 or by using the dedicated 1990 mobile application, which also enables automatic transmission of the caller's location to the Emergency Command and Control Center (ECCC) [5].

All ambulance activity is continuously monitored from the ECCC in Colombo, where performance indicators—including response time (measured from the moment a case is assigned to the point of ambulance departure), routing compliance, and several other operational metrics—are reviewed in real time. Response time varies among provinces due to factors such as ambulance availability, road quality, and geographical accessibility. Across the country, the average response time is approximately 12 minutes and 52 seconds, while within the Colombo metropolitan area this improves markedly to 8 minutes and 32 seconds. These details, along with the mean duration required to transport patients from the scene to hospital, are illustrated in **Figure 2** [5].

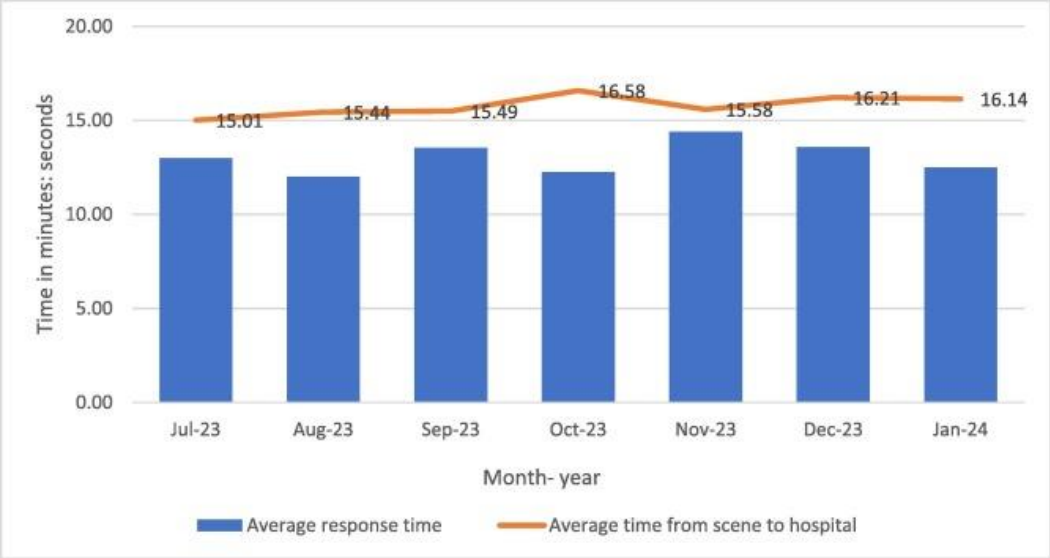

Figure 2. Average response time of the ambulance service from assigning of an ambulance to reaching the scene and average number of cases attended by the EMS 1990 Suwa Seriya from July 2023 to January 2024

Since its launch in 2016, the 1990 Suwa Seriya system has been mobilized for well over 1.8 million emergencies. Road traffic incidents represent just over a quarter of all activations, whereas cases involving acute cardiac problems, suspected stroke, or episodes of unresponsiveness collectively account for roughly four out of every ten deployments. The typical monthly workload handled by the service during the past year is shown in **Figure 3**.

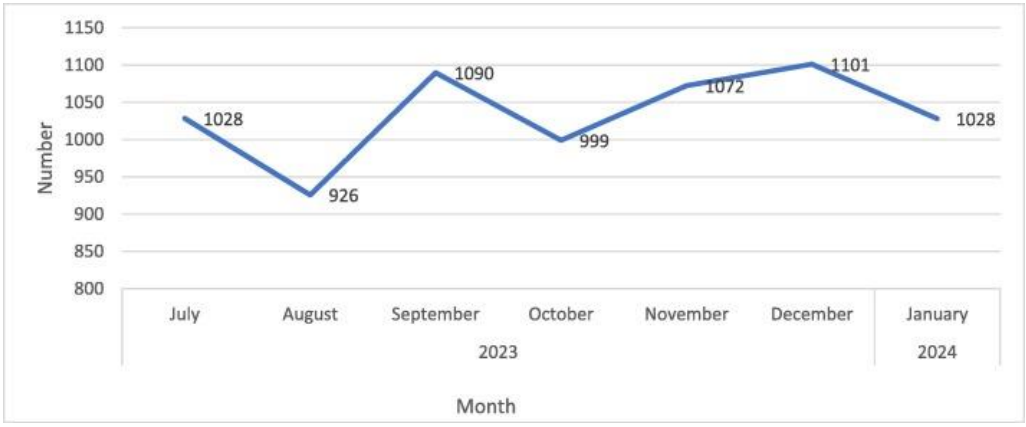

Figure 3. Average number of cases attended per month by Suwa Seriya from July 2023 to January 2024

Over the years, the 1990 Suwa Seriya service has demonstrated its capacity to function reliably during a range of major emergencies—such as structural collapses, mass-casualty bus crashes in remote regions, widespread flooding, and, most prominently, the 2019 "Easter Sunday" bombings and several large-scale road traffic disasters. During the coordinated bombings on three churches and three high-end hotels, which generated more than 500 casualties and led to 253 deaths, the rapid mobilization and clinical efficiency of 1990 Suwa Seriya formed a crucial part of the immediate response effort [5].

Operational procedures for out-of-hospital cardiac arrest

Bystander CPR rates within Sri Lanka remain extremely low, reflecting trends seen across many LMICs where formal first-responder systems and dispatcher-assisted CPR programs are not yet in place [12]. Ambulances, however, are stocked with essential equipment for resuscitation, including AEDs, adrenaline, IV access supplies, bag-valve masks, and basic airway tools.

Upon arrival, EMTs take over any ongoing resuscitation efforts, apply the AED, and proceed according to the prompts it delivers. Patients are then transported to the nearest hospital while continuous manual CPR and ventilation are maintained. The activation of an AED automatically triggers mandatory transfer to a healthcare facility. Although documentation is currently paper-based, work is underway to transition to a digital reporting system to strengthen governance, research capacity, and clinical documentation.

In general, EMTs refrain from initiating CPR when the patient has had no resuscitative efforts for more than 15 minutes, as this typically indicates a very poor chance of survival. In these circumstances, an on-call emergency physician decides whether CPR should begin or be withheld, taking into account the patient's prior medical background and estimated downtime. At present, there is no centralized registry that reliably captures bystander CPR activity or survival outcomes. A national initiative to integrate data from 1990 Suwa Seriya with hospital records is in progress, aiming to generate more accurate insights into survival after OHCA and the effectiveness of pre-hospital interventions. This forms part of a broader research strategy discussed later. **Figure 4** provides an overview of the process.

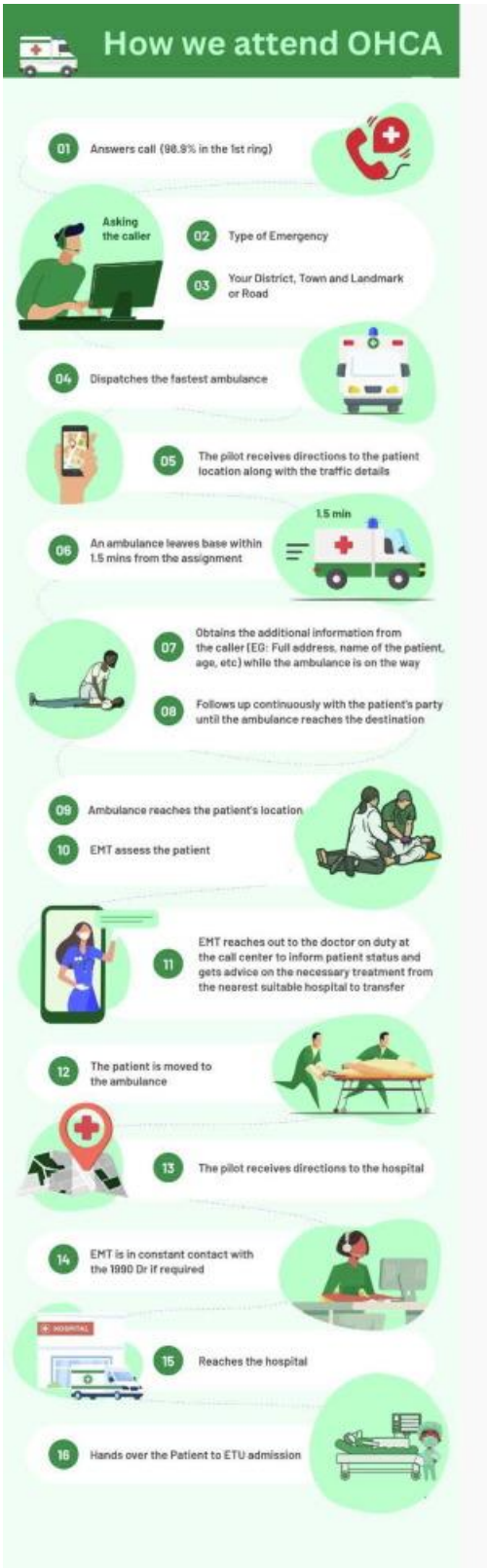

Figure 4. Process of handling out-of-hospital cardiac arrest by the Suwa Seriya Ambulance Service. ETU: Emergency Treatment Unit of the Hospital

Current training and credentialing process

To ensure alignment with national healthcare expectations, it became essential to formalize local credentialing across core competencies such as Basic Life Support (BLS), Advanced Life Support (ALS), airway skills, and

other foundational procedures. Routine review of case documentation soon evolved into a key component of quality assurance, helping the service recognize gaps in practice and plan targeted training initiatives.

Educational content was developed in collaboration with the Australia and New Zealand College of Paramedics and the SSCCEM, ultimately forming four structured refresher modules. These were later redesigned to incorporate an online learning pathway—offered in Sinhala, Tamil, and English—paired with a one-day in-person training session [6]. The digital modules cover topics like mass-casualty response and clinical scenarios drawn from pediatrics, obstetrics, toxicology, and sepsis, while the in-person component reinforces BLS, trauma management, emergency delivery, and neonatal resuscitation. This hybrid design not only sustained high standards of service delivery but also allowed the organization to identify EMTs ready to progress into a more advanced extended-care role.

The creation of the Diploma in Paramedical Sciences for EMTs was carefully mapped to both Sri Lankan and international EMS benchmarks. The curriculum emerged through a partnership between the University of Kelaniya's Faculty of Medicine, the Sri Lanka College of Emergency Physicians, and the 1990 Suwa Seriya Foundation. The first intake of trainees is now undergoing this specialized instruction at Kelaniya, leading to the Advanced Certificate in Paramedical Sciences—developed specifically for Sri Lanka's pre-hospital system. The program integrates academic study with supervised clinical placements in A&E, obstetrics, psychiatric care, and the ambulance service itself. Completion of clinical evaluations results in recognition as certified EMTs.

Research in pre-hospital care and OHCA

1990 Suwa Seriya remains the only nationwide, no-cost ambulance service operating in a lower-middle-income country (LMIC) [13]. Its existence provides an exceptional platform for generating evidence to advance EMS practice in similar global settings. With an estimated 80% of worldwide emergencies occurring in developing countries—many lacking adequate EMS—the World Health Organization has emphasized the importance of building structured pre-hospital systems in LMICs [14]. The Sri Lankan experience therefore offers a valuable model for evaluating the economic and health impacts of EMS implementation in resource-limited environments.

To strengthen research on out-of-hospital cardiac arrest (OHCA), the Sri Lanka Out-of-Hospital Cardiac Arrest Study (SLOCAS) was established. Modeled on the EuReCa 2 initiative, SLOCAS focuses on gathering selected Utstein variables from OHCA events attended by 1990 Suwa Seriya over a defined study period. Its broader aim is to create the foundation for a comprehensive, LMIC-appropriate OHCA registry.

The introduction of a robust Electronic Patient Care Record (ePCR) system marks a major step forward for the service. Once fully implemented, it is expected to substantially enhance Sri Lanka's capacity to conduct high-quality pre-hospital research and contribute meaningful data to the global EMS community. This commitment underscores 1990 Suwa Seriya's ongoing role in driving healthcare innovation both nationally and across other LMICs.

Current perception of the public

Across the country, the 1990 Suwa Seriya ambulance network has become deeply valued, to the point where many now view it as an essential component of public services. Despite being freely available to anyone—residents and visitors alike—there remains a noticeable gap in public understanding of what a coordinated pre-hospital emergency system actually offers. This limited awareness sometimes results in hesitation to request an ambulance or delays in allowing emergency vehicles to pass, even when sirens and warning lights are clearly visible. Also, widespread knowledge of basic first aid and the ability to perform bystander CPR continues to be a critical yet insufficiently met requirement for strengthening emergency response.

To help address these shortcomings, Suwa Seriya took part in the 2019 global "World Restart a Heart Day", reinforcing the worldwide call for increased CPR literacy and timely transfer of critically ill or injured individuals to definitive care. Encouraging motorists to clear a path for ambulances has become another central focus. Changing public habits in this regard represents meaningful progress toward faster emergency access and ultimately improved patient outcomes. Ongoing public education campaigns delivered through media channels, schools, and community engagement activities are being used to reinforce this life-saving practice.

The Future

The guiding principle behind 1990 Suwa Seriya's work is captured in the simple motto printed on each vehicle: "Save a Life". This commitment is pursued through relentless advancement, careful integration of evidence-driven improvements, and responsible management of public and donor contributions. The organization is simultaneously expanding several longstanding initiatives with proven value while progressing toward a series of new and ambitious developments.

Overall operations

A significant transition underway is the replacement of traditional paper Patient Care Reports with fully digital documentation. Beyond reducing paper waste, this shift enhances the accuracy and consistency of clinical records and provides the foundation for powerful analytical insights through an advanced business intelligence platform.
In parallel, 1990 Suwa Seriya is working with both domestic and international funding partners to grow its ambulance fleet to 450 units. Achieving this target will allow the service to maintain a nationwide response time below eight minutes, ensuring swifter access to emergency care.
Another major advancement is the rollout of interconnected ambulances equipped to communicate directly with Emergency Physicians at the ECCC. This digital link will enable real-time clinical support and telemedical consultation during patient transport, strengthening the overall standard of pre-hospital care.

Improvements in Out-of-Hospital Cardiac Arrest (OHCA) Care by 1990 Suwa Seriya
In collaboration with the Sri Lanka College of Cardiologists, 1990 Suwa Seriya is introducing 12-lead ECG capability in its ambulances, with real-time transmission of ECG data to percutaneous coronary intervention (PCI)-capable hospitals. This will enable direct transport of post-resuscitation STEMI patients to facilities with cardiac catheterization laboratories when clinically appropriate.
The service is training a cadre of Advanced Care EMTs who will possess expanded competencies, including advanced airway management and an extended drug formulary, thereby raising the overall standard of pre-hospital critical care and improving patient outcomes.
Although the acquisition of mechanical chest compression devices is recognized as a valuable enhancement for high-quality CPR during transport, this initiative has been temporarily deferred because of budget constraints.
1990 Suwa Seriya is strengthening its dispatcher-assisted CPR program by providing enhanced telephone guidance and remote support to bystanders. In parallel, the "1990 Education in Schools" initiative and broader community training programs are being rolled out to increase public awareness of the chain of survival, teach hands-only CPR, and promote willingness to use automated external defibrillators (AEDs) before professional help arrives.
These ongoing developments reflect 1990 Suwa Seriya's sustained dedication to systematic service enhancement, strategic partnerships, and community engagement in order to optimize survival from out-of-hospital cardiac arrest. The key elements that have shaped the evolution of Sri Lanka's EMS system are summarized in **Figure 5** [15].

Figure 5. Key factors underpinning the sustainability of EMS services in Sri Lanka

In a remarkably short span of just seven years, the 1990 Suwa Seriya ambulance service has revolutionized prehospital emergency care in Sri Lanka. By implementing cutting-edge protocols and a comprehensive digital overhaul of operations, it has significantly reduced overall morbidity and mortality while laying a strong foundation for the future of acute care delivery.

Although multiple elements have contributed to its success, unwavering government commitment and Sri Lanka's longstanding national policy of providing universal free healthcare and education have served as the primary catalysts behind these extraordinary outcomes.

The accomplishments of 1990 Suwa Seriya affirm its potential for long-term sustainability and continued life-saving impact. Moreover, it serves as an inspiring blueprint and replicable model for emergency medical systems in other developing nations, proving that transformative, high-quality prehospital care is achievable worldwide.

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Conflict of interest: Sri Lal De Silva is the Chief Medical Officer and Sohan de Silva is the Chief Executive Officer of 1990 Suwa Seriya Foundation.

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Ethics statement: None.

References

1. Ministry of Health, Sri Lanka. Accident and Emergency Policy of Sri Lanka. 2016. Available from: http://www.health.gov.lk/moh_final/english/public/elfinder/files/publications/publishpolicy/15_Accident%20n%20Emergency.pdf
2. Ministry of Health, Sri Lanka. Annual Health Statistics. 2021. Available from: http://www.health.gov.lk/moh_final/english/public/elfinder/files/publications/AHB/AHS%202019.pdf.
3. World Bank. Delivering road safety in India: leadership priorities and initiatives to 2030
4. Rajapaksa L, Silva PD, Abeykoon P, Somatunga L, Sathasivam S, Perera S, et al. Sri Lanka health system review. World Health Organization Regional Office for South-East Asia; New Delhi: 2021.
5. Thilakasiri K, De Silva S, De Silva S, Migelhewa A. From Tuk Tuk to ambulances: setting up a universal access pre hospital system in a developing country. SAEM Pulse. 2021 Sep-Oct:21–2. https://issuu.com/saemonline/docs/saem_pulse_sep-oct_2021
6. Fernando S. Sri Lanka. Your ED. 2020 Aug 29–31. Available from: https://acem.org.au/getmedia/6d87eaf3-02f3-4d8f-bfc6-8a5be2522cc6/ACE_Your-Ed-Autumn_online
7. Parliament of the Democratic Socialist Republic of Sri Lanka. Suwaseriya Foundation Act, no. 18 of 2018. The Department of Government Printing, Sri Lanka; 2018 Jul 04.
8. Wanninayake I, Ranasinghe H. The organization and operation of Pre-Hospital care emergency ambulance Service (Suwaseriya1990) in Sri Lanka. 2022 Jun 28 [cited 2024 Jan 29]; Available from: https://zenodo.org/record/6773038
9. Goonasekera DC, Phil FM, Dissanayake DR, Karalliedde DL. Critical care medicine in Sri Lanka. 2016 May 30.
10. 10.08.2016 Indian Ambulance Service dr Samantha Ananda [Internet]. YouTube. 2016 [cited 2023 Sep 24]. Available from: https://youtu.be/3lKPO_cR56s?si=WDShky2c5VGXz-i9.
11. The call to life: Here's what makes the 1990 Ambulance Service so effective [Internet]. YouTube. 2021 [cited 2023 Sep 24]. Available from: https://youtu.be/oeJKd7alJ4A?si=AAEaN1jG6k2N3ux7
12. Schnaubelt S, Garg R, Atiq H, Baig N, Bernardino M, Bigham B, et al. Cardiopulmonary resuscitation in low-resource settings: a statement by the International Liaison Committee on Resuscitation, supported by the AFEM, EUSEM, IFEM, and IFRC. Lancet Glob Health. 2023;11(9):e1444–53. Available from: http://dx.doi.org/10.1016/S2214-109X(23)00302-9.
13. Plummer V, Boyle M. EMS systems in lower-middle income countries: a literature review. Prehospital and disaster medicine. 2017;32(1):64-70.
14. World Health Organization. WHO emergency care system framework. Available from: https://www.who.int/publications/i/item/who-emergency-care-system-framework
15. World Bank. Innovating for better health, saving lives: Sri Lanka's ambulance story. Available from: https://blogs.worldbank.org/en/endpovertyinsouthasia/innovating-better-health-saving-lives-sri-lankas-ambulance-story