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How to turn the tide in time-critical emergencies

An ordinary day can turn into a crisis in a moment. Medical emergencies can happen to anyone. A bike accident, a catastrophic injury to a fellow sports team member, or a sudden heart attack are examples of emergencies. Imagine you are witness to one of these events. Your first reaction is to dial your local emergency number. Now that first responders are on the way, the next thought is how long will it take for them to get there? “Hurry, hurry,” keeps going over in your head. Every second counts. The longer it takes for first responders to arrive, the more fear sets in. So, what will you do in the meantime? How can you, as a bystander, positively influence the wellbeing of the individual in need of medical assistance?

We are talking about time-critical emergencies. A time-critical emergency is a medical situation where early intervention, timely response, and fast treatment can make a big difference in the eventual outcome for a person. Conditions such as heart attacks, strokes, and severe trauma are considered time-critical or -sensitive medical emergencies. How critical is response time in an emergency? Do minutes really make a difference? For instance, CPR, or cardiopulmonary resuscitation, which is a lifesaving technique, can help save a life during cardiac arrest when the heart stops beating. The

American Heart Association (AHA) estimates that the survival rate for cardiac arrest is estimated to be around 50% in cases where CPR is administered within 3–5 min. However, this survival decreases by 7–10% with each minute that defibrillation is delayed.

Emergency response may also vary depending on your location. It can be slower in rural areas, not only due to a lack of immediate resources, but also because responders need to travel further to reach the scene of the accident. Heavy traffic has an effect on response time. Even adverse weather can slow things down. All of these factors contribute to a higher risk of critical injury or death.

“Helping Save 1 Million More Lives. Every Year. By 2030.” This is the audacious goal Laerdal has established. Nothing less. And you can help them achieve it. We are asking you to help improve the survival rate in your community by designing a service that can positively influence the situation and outcome of time-critical emergencies by engaging bystanders, improving community awareness and/or helping with early recognition (e.g. in the case of stroke, where symptoms are not so easily spotted). And with bystanders, we mean everyone. We all can be a bystander in a time-critical emergency. Have a

look at [Laerdal's One Million Lives website](#) for more background,

For Laerdal, the key word is "helping"; developing solutions and services that help train and equip those capable of providing assistance, from laypeople, ambulance dispatchers, and community first responders to paramedics and medical staff in hospitals. The guiding stars are the Sustainable Development Goals (SDGs), established by the UN in 2016, especially SDG3 focusing on good health and wellbeing. SDG3 also addresses accidents and non-communicable diseases, including sudden cardiac arrest.

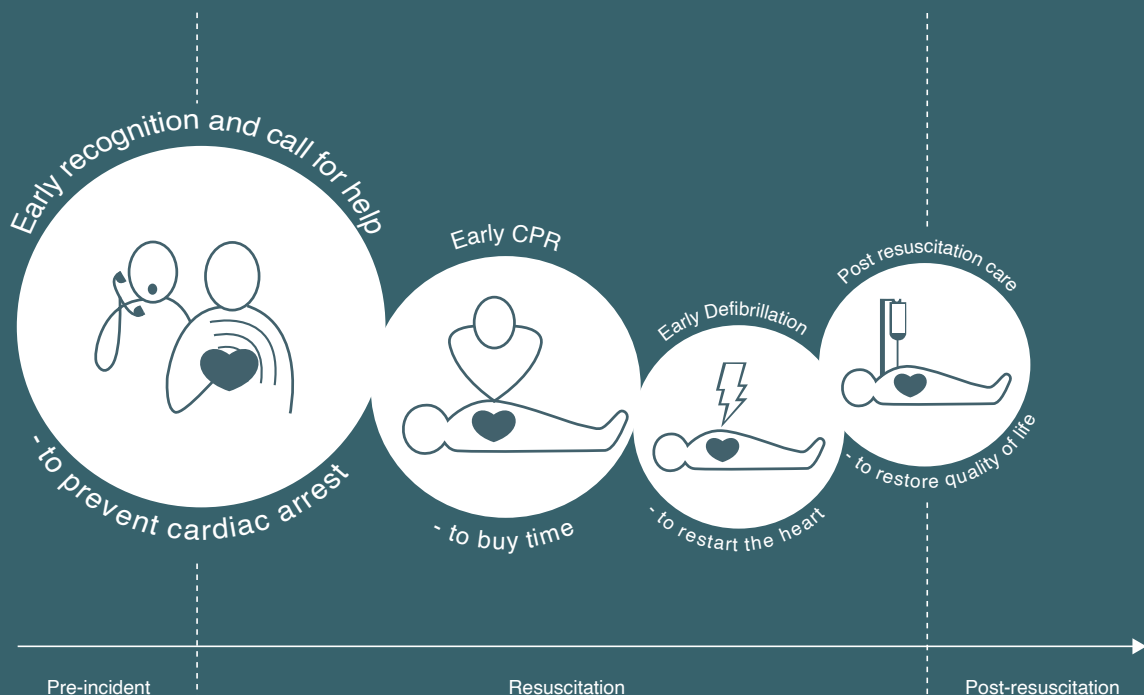
prevention and therapy over the last 60 years. Every year, 5 million die from sudden cardiac arrest, 5 million from stroke, 5 million from sudden illness and trauma and 10 million from sepsis. 90% of these (23 million people) happen in local communities. Survival rates vary significantly across the world. This can be explained by the difference in quality implementation of the Chain of Survival and the ten steps to increase survival, as recommended by the Global Resuscitation Alliance (GRA). For all time-critical emergencies, time is the crucial factor. Early recognition by a bystander, guided by an emergency telecommunicator, along with prompt dispatch and quality care is critical for both survival and ensuring a good quality of life.

Background

Time-critical emergencies

Time-critical emergencies are still a major cause of death despite significant advances in

The below chain of survival for individuals experiencing cardiac arrest aims to illustrate the interrelationship between key stages of resuscitation and emphasises the need for all links to function effectively in order to maximise



the chances of survival. The contribution of each of the four links diminishes rapidly as victims succumb at each stage, leading to a decline in the attrition rate for those advancing along the chain. The size of the circle represents the importance and positive contribution to patient survival.

Prepared-to-act bystanders

Data from Sweden and Denmark indicate that we will need 50 million more prepared-to-act bystanders, with a peak of about 100 million, every year by 2030 to achieve best-practice Bystander response coverage and reach our goal of saving lives. Best practice CPR coverage is achieved when 60% of the target population aged 18-80 years are prepared and supported with Telephone-CPR. Globally, this equates to 3 billion people who need to be prepared for maximum effect.

In addition to early CPR, early defibrillation has also shown a significant effect on survival from community cardiac arrest. Over the last couple of decades, more than 5 million Automated External Defibrillators (AEDs) have been placed in public places. Unfortunately, these devices are used rarely, by some estimates, in less than 1% of cardiac arrests. A [literature review conducted by Warwick University and the London Ambulance Service](#) ⁹ from 2017 identified many barriers to their use, including few people knowing what an AED is, where to find one, how to use one, and lack of confidence and fear of harm when using it.

Rapid developments in digital technologies and the increased availability of smartphones have fostered a new breed of companies. Several EMS Services have compiled registries of public access defibrillators in their community and are using mobile applications to enrol those willing and able to respond to an emergency. An [impact evaluation of GoodSAM](#) ⁹ (community-based emergency and responder platform) in Australia

showed that when GoodSAM responders arrived first, they were, on average, nearly 2 minutes faster than dispatched paramedics – a significant time saving when early intervention is crucial. Survival in this group was 41% compared with 11% for those cases that GoodSAM responders did not attend.

The emphasis on improving survival rates of cardiac arrest has, until the last decade, been in High-Income Countries, but cardiac arrest is a global phenomenon. 86% of all global cardiac arrests are estimated to occur in low- and middle-income countries where survival rates are the lowest and the most significant opportunity for impact.

AI-enabled assistance

We must also consider the great potential that emerging technologies can have in providing rapid response and assistance. Artificial intelligence (AI) and machine learning (ML) are important areas of computer science that have recently attracted attention for their application to time-critical emergencies. AI refers to technology in which computer systems have the ability to think and learn like humans and to automatically perform tasks that humans would normally perform, such as cognition-driven decision-making. Specifically, ML is used to develop algorithms and models that can learn from and make predictions or recommend decisions based on large datasets.

AI and ML hold the potential to revolutionise patient care by providing decision support and optimising treatment strategies, such as resuscitation medicine, immediate response and assistance by non-medical bystanders. Think about using prediction models, natural language processing (including large language models, LLM), consideration of treatment heterogeneity, and optimisation of medical practice and resource management by reinforcement learning. What if bystanders could have access

to such intelligence and use a service that would help them quickly detect the signs and act accordingly? This enhanced ability would be vital in determining the patient's outcome.

Did you know that AI is already being employed to improve the accurate identification of cardiac arrest patients during emergency calls? And that ambulances are using AI to analyse incoming emergency calls, aiding call-takers in promptly identifying cardiac arrest cases so patients receive swift and appropriate care?

We hope [these examples](#) ♪ inspire you to reimagine the existing emergency response offering within communities, intimate spaces, in rural or urban environments and across physical and digital realms.

Additional references:

- Improving survival in the community ♪
- Christian Eriksen: How first aid training saves lives ♪
- Death and dying in prehospital care. A scoping review ♪
- Emergency ambulance call-takers' experiences in managing out-of-hospital cardiac arrest calls ♪

The assignment: Design a service that turns the tide for good

To enhance immediate action during time-critical emergencies and have an impact on the quality of life after such events, a comprehensive approach that involves people in Prevention, Immediate response, and Aftercare (PIA) is crucial. We invite you to research, find strategies and design a service tailored to your local context by focusing on Prevention and/or Immediate response to impact on the quality of life after such emergencies.

With such service, you can contribute to the vision of ensuring that no one dies or becomes disabled by time-critical emergencies. Certainly, service design can play a crucial role in addressing both the prevention of emergencies and the immediate action of bystanders. For that, it's important to design a service (or a service ecosystem that involves several services) that is inclusive and considerate of individuals with varying needs. This includes accessible information on how to act in the moment, but perhaps also facilitates a smooth recovery process, available resources, and ongoing community support. It's necessary to integrate sustainable design principles into community planning. Design infrastructure and housing that can withstand emergencies and facilitate a quick recovery. Sustainable features can contribute to a more resilient community in the long term.

By infusing service design into preventive measures, empowering and/or enabling tools and pre-emergency processes, you can contribute to creating more actionable, resilient, and supportive communities that enhance the overall quality of life after time-critical emergencies. We invite you to join this challenge and design a service that supports people's involvement in prevention of and response to time-critical health emergencies, and -if you like to- also facilitates aftercare and recovery.

Clearly, we need to contribute and design to improve and safeguard wellbeing. And although we cannot change growing social and economic inequalities, world conflicts and humanitarian emergencies, our climate crisis and other planetary issues, we can make a difference and support individuals and local communities and contribute to their improved wellbeing.

So, we ask you to turn the tide in time-critical emergencies and design a service that strengthens community resilience in the face of

such challenges. How? That's up to you! You can enhance (the experiences of) good relationships and social connections, solidarity and sharing, inclusion and belonging, better (access to) equipment and technology, bystanders habits and adequate behaviour, or other positive emotions and actions through an engaging, enabling and empowering service, addressing urgent needs, and introducing surprising and unexpected interventions that contribute to positive outcomes.

About Laerdal

This is a challenge offered to you by [Laerdal](#). Laerdal Medical is one of the world leaders in healthcare simulation, education, and resuscitation training for healthcare providers, voluntary organisations, educational institutions, hospitals, and the military worldwide. We believe that no one should die or be disabled unnecessarily during birth, from sudden illness, trauma, or medical errors. For more than 60 years and currently in 26 countries, we have focused on our ambitions and goals to deliver innovative and sustainable products while reducing our carbon footprint on the world. As an organisation, our sustainability targets are central to everything we do. Our immersive technologies and data-centric insights increase survival and improve healthcare quality. Helping save lives. That's what we do.

