

# Hands-free Automated Cardiopulmonary Resuscitation (CPR) device

A Project By :



(concept development & ideation)



(production & distribution)

# Cardiac arrest

( SUDDEN UNEXPECTED LIFE-THREATENING EMERGENCY )

Definition : “electrical disturbance which causes the heart to stop beating”

Symptoms : patient collapses, becomes unresponsive  
usually shows no breathing

Consequence : deprives vital organs of blood flow and hence oxygen



can cause severe and irreversible damage  
to brain ***WITHIN NINE MINUTES***



***Death in > 90% cases in out-of-hospital settings***

**Cardiac arrest = Most important cause of  
Sudden Cardiac Death**

# What is CPR ?

Cardiopulmonary resuscitation (CPR) = “an emergency lifesaving procedure performed when the heart stops beating”

Consists of : 100 -120 chest compressions/min of 2-2.4 inch depth each  
30:2 = chest compressions: breaths ratio

*(As per NHCPS 2015 - 2020 BLS Guidelines)*

\*\*\* Chances of survival improve by 2-3 times when CPR is provided within 4-6 minutes after cardiac arrest

**CPR = a crucial step in the chain of survival  
..... American Heart Association (AHA)**

# COVID19 and Cardiac Arrest

**\*\* Massive surge (> 50%) in cases of cardiac arrest across the globe because:**

- Direct effect of COVID-19 infection on heart, especially in patients with pre-existing heart disease
- hesitancy by people to call emergency medical service providers
- reluctance on the part of bystanders to perform CPR

**\*\* Several anecdotes of Covid19 cases where cardiac arrest has been the presenting feature**

# CPR in the era of COVID19 pandemic.....

Prior to this pandemic, survival had improved due to prompt use of chest compression and defibrillation

However,

CPR is an inherently risky activity because involves many steps that can aerosolize the virus.

**NOW** the **CHALLENGE** is

Ensure that patients with or without COVID-19 who experience cardiac arrest get the best possible chance of survival without compromising the safety of rescuers

The **NEED** of the hour

**“Hands-free Fully Automated Cardiopulmonary  
Resuscitation (CPR) Device”**

# Other problems specific to Indian medical system...

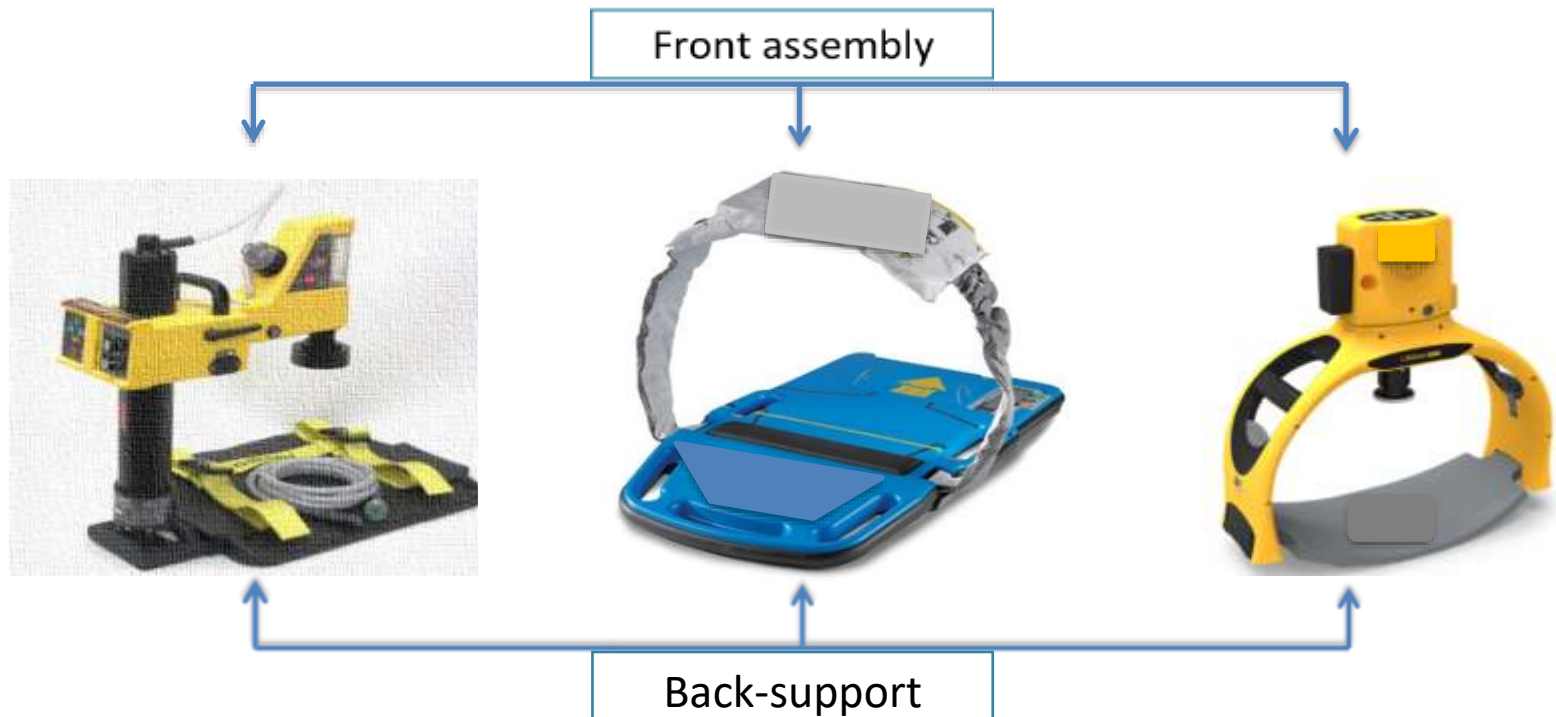
- Scarcity of trained healthcare workers (doctors, nurses & paramedical staff)
- Poor doctor-to-patient ratio → 1:1700 at present  
*Hence,*  
*> 99% patients don't receive appropriate CPR especially in rural areas*
- Underdeveloped emergency response system → medical assistance arrives extremely late. Mortality increases by 10% with each passing minute  
*Hence,*  
*poor survival rate*
- ***No mechanical CPR-providing device*** currently available in India which is designed specifically to fulfill the requirements in Indian set-up

# Problems in available CPR devices

- Majority manually operated devices requiring prolonged contact with the patient → So healthcare workers exposed to a significant risk of contracting the COVID-19 and other contagious infections
- Many interruptions occur while giving CPR manually or with the help of manual devices. “Care-giver’s fatigue” = an important cause → poor quality CPR
- Very few automated devices available, but they have following shortcomings:
  - Require dust-free, water-free environment for functioning
  - Require regular servicing & maintenance
  - Manufactured abroad → very expensive
  - None of them provide facilities to maintain Airway and Breathing

# Another important short-coming .....

Automated CPR devices – (1) patient - lifted and placed on 'back-support'  
(2) 'front assembly' strapped to back-support

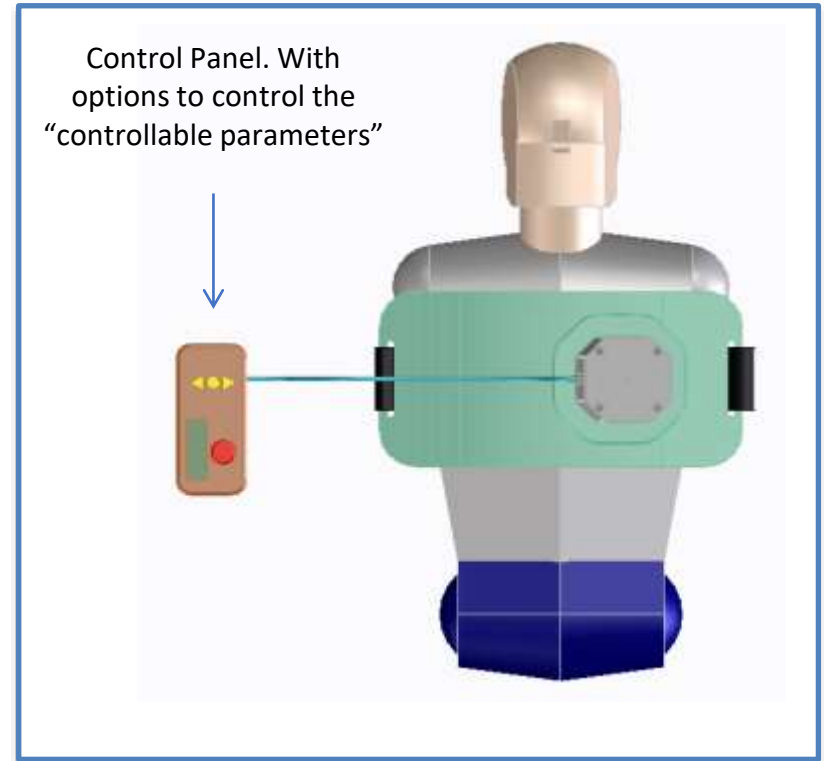
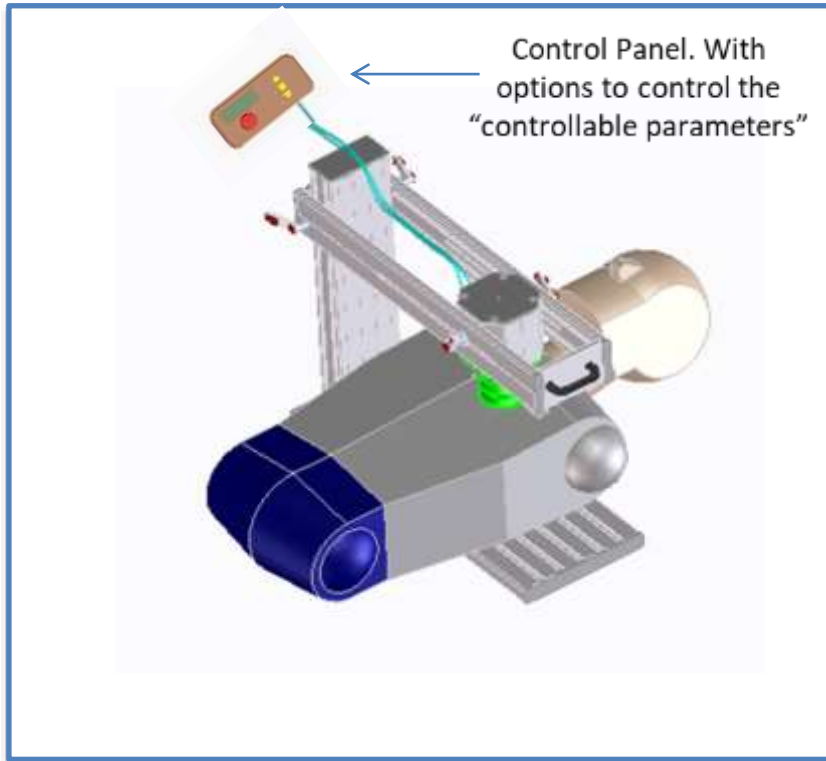


*In addition to increase in the risk of exposure to infection when rescuers lift patients while setting up the above assembly this movement,*

***Increases risk of causing and/or aggravating cervical spine injury in the patient***



# Fully automated, Hands-free CPR device



**Proposed CPR device (s)**

# Advantages of Our Solution...

✓ **Fully automated portable device** for use by **minimally trained** persons → **1-2** medical/paramedical staff sufficient for providing emergency care

✓ **“Hands-free” device** with 8 hours battery back-up

**Minimizes the risk of transmission of infection to care-givers**

→ **No interruptions** in CPR during transport. Rescuers don't need to use strength to give chest compressions → can focus on other aspects of emergency resuscitative care → **Good quality CPR**

# Other Advantages....

- ✓ Provision for maintaining airway and breathing
- ✓ In proposed CPR device, 'front assembly' - not strapped to any 'back-support' → No need to move the patient for effective chest compressions
- ✓ **Cervical cushion** - to stabilize the cervical spine

**Minimizes the risk of causing and/or aggravating Cervical Spine Injury**

- ✓ **Made in India - Sturdy design, Appropriate for use in Indian set-up.**
  - Does not require dust-free, water-free environment.
  - Washable parts, regular servicing & maintenance not required
  - Material to be used easily available in Indian market and having medical approval.

## **Suitable for use at :**

1. Rural and urban medical services – for use at sub-center level, primary health care level as well as emergency services department in secondary and tertiary health-care level
2. Ambulances, paramedical services providing organizations
3. Military and para-military forces, police stations, Fire stations & brigades
4. Hospitality industry – hotels, restaurants
5. Universities with large campuses, Large housing societies
6. Transport companies – Airlines, Volvos bus services, Ola cabs & Uber ambulance model, Train, Dockyards
7. Shopping malls, commercial complexes, industries

# Scalability

- Manufacturing and production of automated CPR devices
- **Developing advanced versions integrated with Automated External Defibrillator (AED)\*\***
- Introduction of Artificial Intelligence (AI)
- Developing a “Holistic Basic life Support” system with an aim to make existing emergency medical services more efficient

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# Thank You !