



Adrinject | Adripod

Adrinject and Adripod are designed as a kit to assist paramedics in adrenaline administration during CPR procedures in pre-hospital contexts. Together two products will free up time, hands and attention and help the paramedics do what they are best at in critical situations when seconds matters the most.

Introduction



Adrinject and Adripod was designed during a 10-week term project at the Master programme of Advanced Product Design at Umeå Institute of Design. The project focused on identifying relevant design opportunities for paramedics, seen through the lens of a human-centred design, based on the paramedics' different needs and wishes.



This project would not have been possible without the help from the dedicated paramedics working at the Umeå ambulance station. They allowed us to enter their workplace and shared their workday with us. Throughout the project they were always open and curious to listen, discuss and give feedback to ideas, thoughts and design solutions.



The project was also carried out in collaboration with Laerdal Medical. This Norwegian company is dedicated to help saving lives with products for CPR training, Airway Management and Advanced Life Support Training. Laerdal provided constructive feedback within the specified field of medical design.





Sorsele
Malå
Luleå
Lycksele
Dorotea
Åsele
Vännäs
Umeå
Nordmaling

Norsjö
Skelefteå
Robertsfors
Vindeln

How does the paramedics work day look like?

Have a look at our field research video

<https://vimeo.com/145408467>

“The best surgeon in the world wouldn't be effective on site”

“The paramedics’ and nurses’ job is to take care of people, not to judge them”

GROUP WORK SUMMARY



Field trip analysis

Gathering and analysing all the data from all the group members. The aim was to get interesting conclusions about the participatory observations at the ambulance station.

Our group had the highest number of calls during our stay there. Our analysis focused on framing all the different things the paramedics experienced during that work shift.



VSP - Visual Persona Diagram

The VSP is a visual map to explain the workday of a fictitious persona based on what we saw during the visit. The goal was to visually trigger problems the user may have during the day, which later was converted into design opportunities.



User problems and solutions workshop

The previously identified problems were used to create quick plausible-solutions that address these. The aim with this exercise was to use those ideas as a base for inspiration for the next phases.




Quick concept generation exercise

During the next phase ideas were developed into more defined concepts and used as a starting point for developing the concepts and new use scenarios.



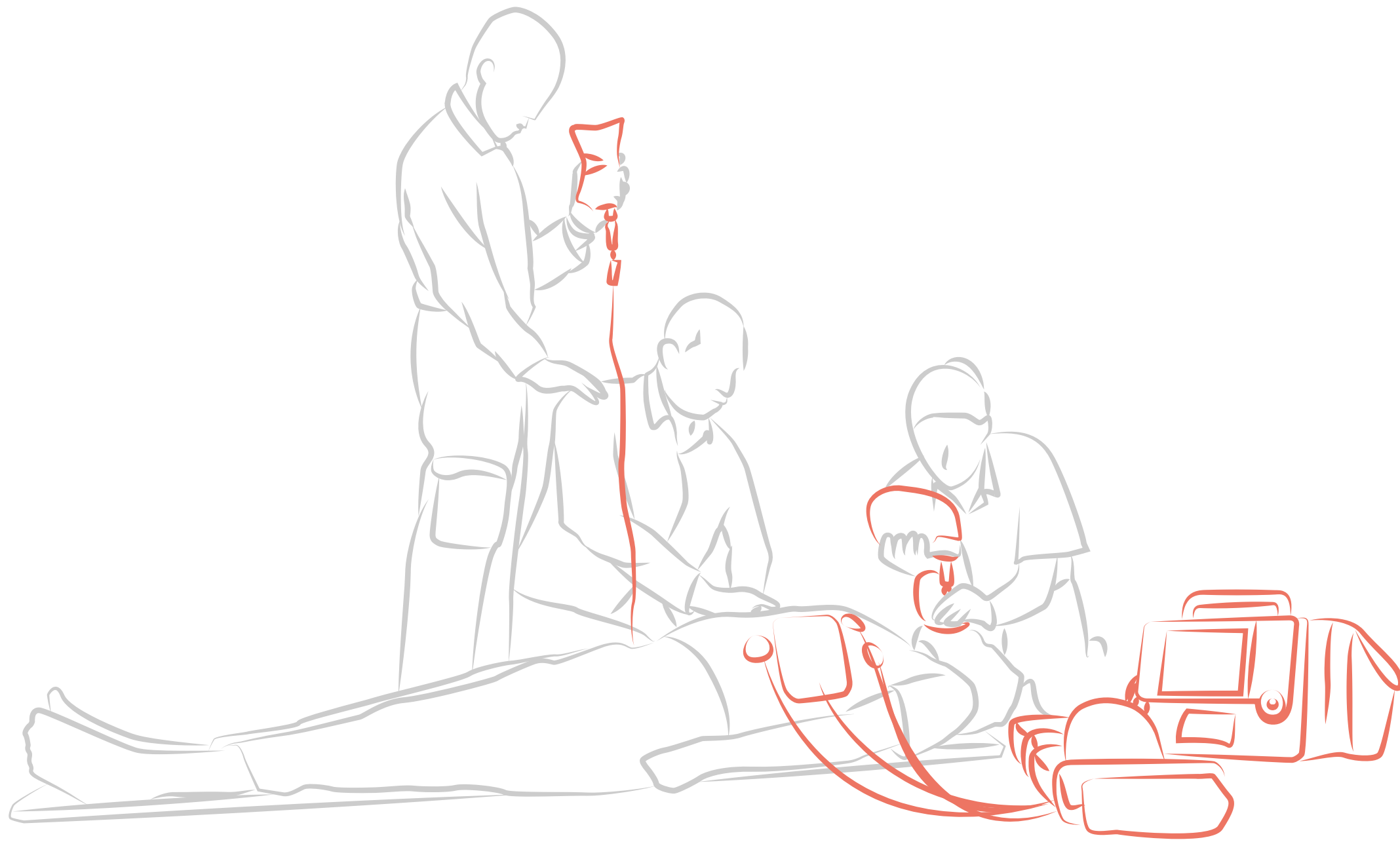
Role-play exercise

Here one or more of the generated concepts were rehearsed and performed as role-plays. This exercise highlighted the strengths of an idea in a quick and easy way. Props made from foam and cardboard, together audio recordings and visual projections was prepared and used in the performances.



How can the intravenous treatment be done more efficiently during a cardiac arrest?

WHAT IS CARDIAC ARREST?



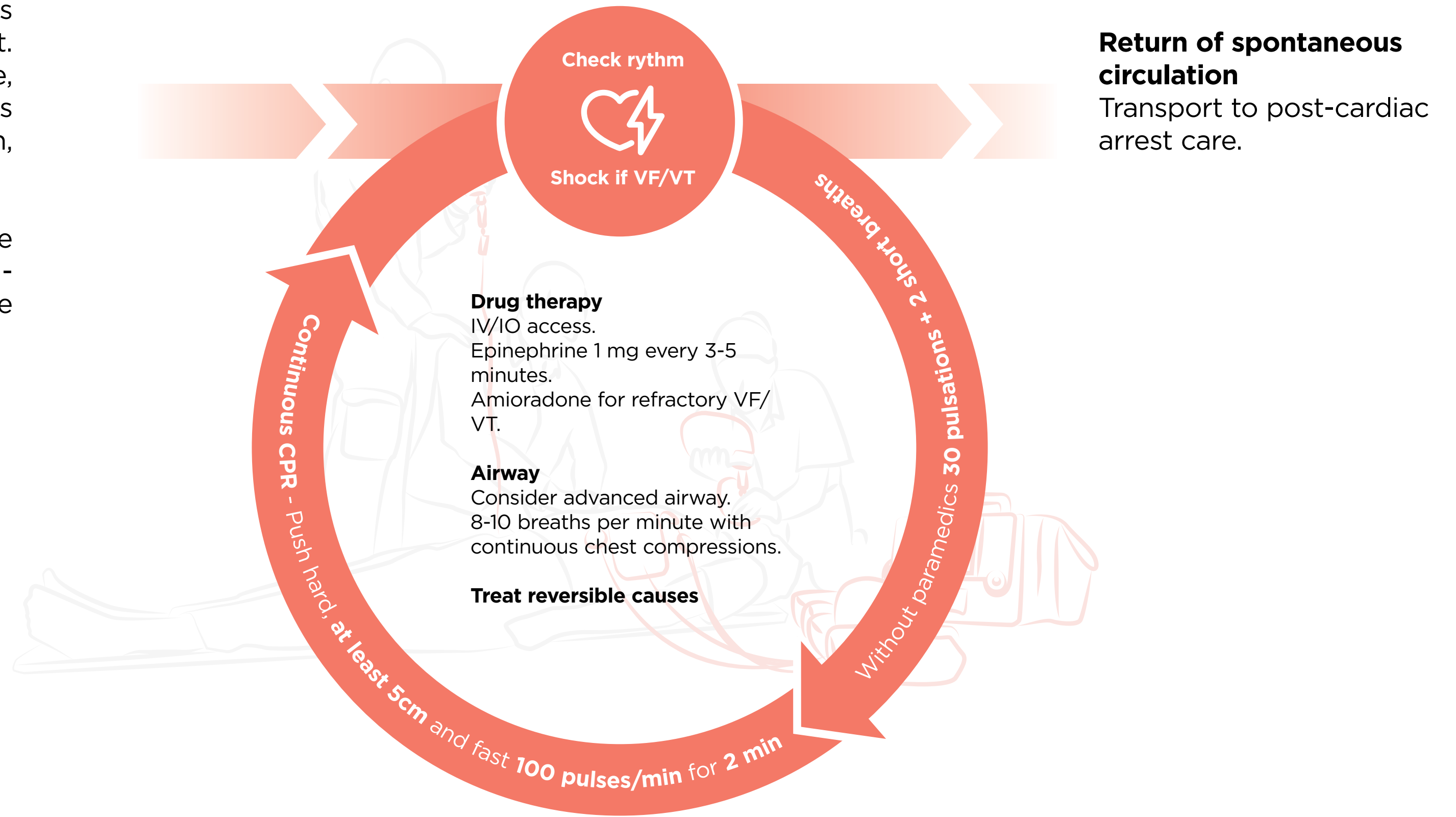
Cardiac arrest is a sudden stop in the blood circulation due to the failure of the heart to contract completely. Cardiac arrest can be reversed if treated early, thus it requires medical attention to perform **Cardiopulmonary Resuscitation (CPR)** as soon as possible.

HOW DOES CPR WORK?

Scenario: A person collapses with possible cardiac arrest. When the paramedics arrive, they assess responsiveness and breathing (look listen, feel). They start CPR.

Paramedics will attach the ECG monitor and defibrillator and give oxygen to the patient when available.

IV Intravenous
IO Intraosseous
VF Ventricular fibrillation
VT Ventricular tachycardia



THE BIG PROBLEMS (AND BIG OPPORTUNITIES)

Paramedic team inefficiency

There is a need call a second ambulance as a back up to help.

What if the system was designed so two people or maybe even only the first responder could aid the patient?

Long set-up

The paramedic team has to have the equipment ready as fast as possible.

What if the devices could be prepared in advance or had minimum set-up time on-site?

It takes time to prepare the syringe and inject

The paramedic has to break the bottle, transfer the right dose to the syringe, remove air bubbles and inject the dose every 4 minutes.

What if the procedure could be done once?

Choose the right amount of fluid

The paramedic has to decide which is the right amount of fluid and when to inject it. During a Cardiac arrest, it is important that the paramedics inject adrenaline in the right moment with the right amount to help the patient's heart beat.

What if the paramedic had help to decide the right dose of and was told when it was time to inject it?

Communicate to other parties that the procedure is done.

Once the patient is stable, the paramedic has to transfer the procedure done to the next team for further procedures and reporting.

What the system would consider the paramedics responsibility of documenting the usage of medicine?



THE DESIGN PROCESS

What goes on in Umeå Institute of Design?

Have a look at my design process

<https://vimeo.com/156157520>

Adrinject

QUICK SET-UP

The combination of one single use 4-in-1 dose adrenaline and the semi-automatic injector allow instant preparation of the IV treatment after getting IV access. Since the administration of the following doses has been pre-prepared, the paramedics can focus fully on the patient and the CPR treatment.

One 4-in-1 dose last up to 20-minutes of CPR treatment. Just unpack it and plug it into the injector and it will switch on automatically.

EASY REPORTING

The 4-in-1 dose can be used as a reminder for reporting the event, by keeping the empty bottles and/or reading the scale in the dose.



FORGET ABOUT MISTAKES IN DOSAGE

Adrinject allows the paramedic to adjust the dose with precision when they need to do so. There have been cases where children as young as 2 year have had cardiac arrests, it is therefore necessary to assess the patient's weight and adjust the doses accordingly.

An overdose of adrenaline could kill a child, that is why this device is equipped with a lock-system until the dose is confirmed, firstly by locking the slider, and secondly by pressing the button on the top to push the fluid in. Furthermore, the dose for adults is highlighted in orange, so the paramedic gets an additional visual confirmation that the correct dose is being used.



ALWAYS BE IN CONTROL OF THE FLUID

Based on feedback from the paramedics interviewed, Adrinject provides mechanical control on how the fluid (adrenaline and saline) is injected into the patient's body, just as if it was a normal syringe.

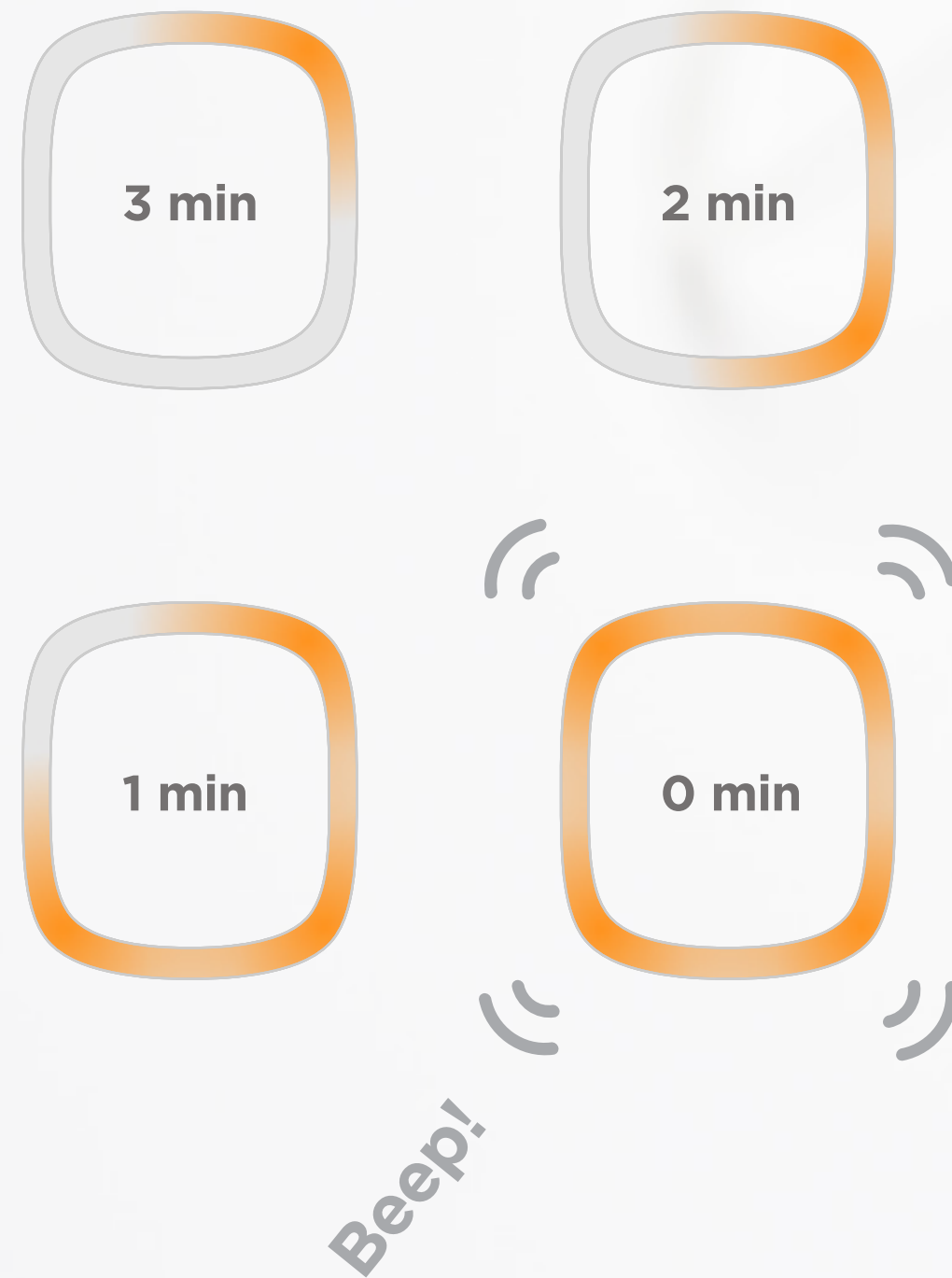
AUTOMATIC RELOADING

Adrinject increases or decreases the travel of the button to adjust the dose. So, for example, if the patient is a child, the travel of the button will be very short.



KEEP TRACK OF THE TIME

After 4 minutes, the button unlocks and pops-up and an alarm informs the paramedic to inject the next dose. After pressing the button the timer is reset to 0. After additional 4 minutes the procedure is repeated.



inject!

Adripod

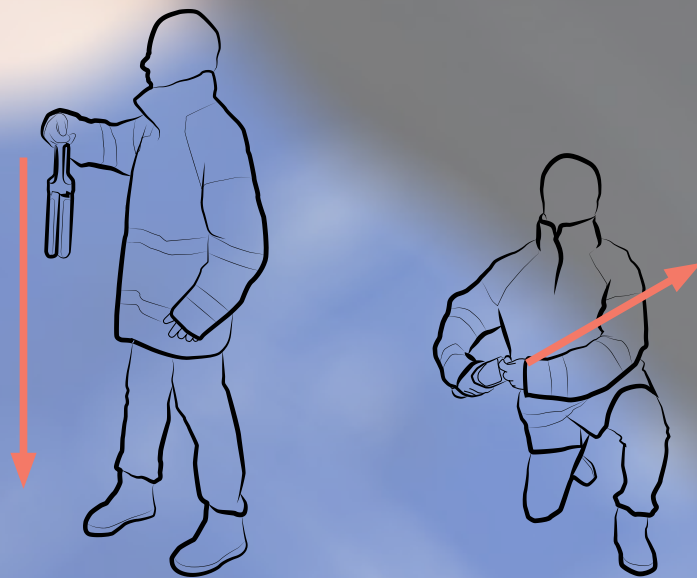
Adripod is a foldable stand from which the IV bag can be hung. This enables the paramedics to focus entirely on the patient's needs on-site when it matters the most, instead of one having to hold the saline bag or constantly checking if there is enough flow in the IV tube.

CLOSE AT HAND

Adripod can fit in most of the paramedics' bags, so it can be ready to use whenever the paramedic needs it.

READY IN A BLINK OF AN EYE

The device can be unfolded in less than 5 seconds from different postures, just by pushing one button on the handle.



A STURDY MATE

Adripod provides sturdy support of the standard 1-liter saline bags at the required height of 1,2 meters. Thereby freeing up one paramedic that otherwise might end up holding the bag.

EXTEND AND HANG

The handle is at the same time the hook for IV bags.





NEVER WITHOUT POWER

Adripod, has a built-in back-up battery pack that insures that the Adrinject will have all to power it needs for as long as the paramedics will need it. The built-in battery is placed low to provide additional stability to the Adripod.

Quick docking

Adrinject can easily be attached to Adripod by a magnetic connection. The magnetic connection makes it possible for the paramedic to connect the two devices while at the same time focusing on the patient. It also helps to keep the Adrinject hygienic and clearly visible while charging and keeping it 'out of the way' when it is not needed.

THANKS!

