

## **USE CASE 1: Power on**

Primary Actor: Care provider

Scope: Emergency medical response

Level: User goal

Stakeholders and Interests:

- Patient: requires immediate attention – possible recipient of emergency care

Precondition: Available AED on standby Potential cardiac emergency identified

Minimal guarantees: If the battery power level is insufficient, or the electrode pads are deemed unusable, the AED will fail the self-test and the device will not power on

Success guarantees: AED is successfully powered on, passed self-test, and is ready for use with sufficient battery power

Trigger: The responder recognizes the patient experiencing a situation that potentially requires defibrillation and powers on the device so they can use the AED to help the Patient

Main Success Scenario:

1. Emergency responder identifies potential cardiac emergency, locates and retrieves AED
2. Responder opens AED, which powers on automatically If it does not power on automatically, the responder manually presses On button
3. On power on, AED performs a self-test to ensure all systems are functional and confirms operational readiness via visual and auditory indicators
4. AED provides audio instructions and visual cues for initial patient preparation and attaching electrode pads (Use Case #2 – Place Electrodes)

Extensions:

2a. AED fails to power on automatically; responder presses ON button If it does not power on after manual prompt, call 911 and monitor the Patient

3a. AED fails self-test:

3a1. If low battery is low, change the battery and restart

3a2. Electrode-pad error; inspect pad for expiry, damage, improper connection and replace if necessary, then restart

3a3. Fails indicator tests; inspect device for any external damage, restart

4a4. Fails to pass test after resolution attempts; call 911 & monitor Patient

Post-conditions:

1. AED powered on; proceed to Use Case 2 Place Electrodes for Patient assessment and preparation

## **USE CASE 2: Place Electrodes**

Primary Actor: Care Provider

Scope: Emergency medical response

Level: User goal

Stakeholders and Interests:

- Patient: requires immediate attention – possible recipient of emergency care

Precondition: AED is powered on

Success guarantees: Successful application of electrodes to patients

Trigger: AED prompts Care Provider to apply electrodes to patient

Main success scenario:

1. Care providers ( Emergency team or local citizens ) process information about patients experiencing cardiac arrest
2. Care providers remove patients' clothing to expose the chest
3. Electrodes are applied to the patient's bare chest and instructions are followed by AED Plus Device

Extensions:

- 2a. The patient is a child with a perceived age of less than 8 or weighs less than 55 lbs; Proceed with electrodes labeled "Infant/Child" and corresponding instructions
- 2b. The patient is wearing a pacemaker; do not place electrodes on the patient
- 2c. The patient is near an electrically conductive surface or the patient has a wet chest; Dry patient sufficiently before proceeding and move them away from electrically conductive surfaces
- 2d. The patient has non-defibrillation protected electronic devices on their person; Remove those devices before proceeding

Post-conditions:

1. Electrodes successfully applied, proceed to Analyze Heart Rhythm

### **USE CASE 3: Analyze Heart Rhythm**

Primary Actor :Care Provider

Scope: Emergency medical response

Level: User goal

Stakeholders and Interests:

- Patient: heart will be analyzed

Precondition: The electrodes are properly connected to the patient

Success guarantees: Accurate analysis of the patient's heart rhythm

Trigger: AED signals successful placement of electrodes

Main success scenario:

1. Making sure the electrodes are attached to the patient, the AED will start to analyze the heart rhythms
2. The AED device monitors the patient's heart rhythm and provides real-time feedback indicator light flashes
3. AED determines if a patient is SHOCKABLE or NOT-SHOCKABLE

Extensions:

- 2a. Depending on feedback, proceed with administering shock delivery
- 2b. Do not touch patients while the AED Plus device is analyzing heart rhythm
- 3a. If the patient is shockable, proceed to Deliver Shock
- 3b. If the patient is NOT-SHOCKABLE proceed to Give CPR Instructions

## **USE CASE 4: Deliver Shock**

Primary Actor: Care Provider

Scope: Emergency medical response

Level: User goal

Stakeholders and Interests:

- Patient: receives shock care

Precondition: Heart rhythm analysis detects a shockable rhythm

Trigger: Care Provider is advised by AED to deliver shock

Main Success Scenario:

1. AED displays STAND CLEAR warning for five seconds
  - a. AED plays DO NOT TOUCH PATIENT audio
2. AED calculates shock energy given heart rhythm analysis
3. Shock indicator light flashes
4. AED begins three-second countdown to shock
  - a. AED plays countdown audio
5. Care Provider presses SHOCK button
6. AED delivers shock
7. AED displays SHOCK DELIVERED message
  - a. AED plays shock tone beep audio

Extensions:

- 4a. Care Provider does not want to deliver shock
  - 4a1. Care Provider presses the OFF button to discharge the unit

Postconditions:

1. Shock delivered successfully, proceed to Give CPR Instructions
2. Shock not delivered, proceed to Give CPR Instructions

## **USE CASE 5: Give CPR Instructions**

Primary Actor: Care Provider

Scope: Emergency medical response

Level: User goal

Stakeholders and Interests:

- Patient: requires immediate and effective CPR for the best chance at recovery

Precondition:

- Patient heart rhythm feedback (Use Case #3 - Analyze Heart Rhythm) indicates Patient requires CPR (post shock - Use Case #4: Deliver Shock, or if no shock advised)

Minimal guarantees: AED guides care providers through administering CPR by providing instructions

Success guarantees: Care provider follows CPR instructions provided by AED, aiding in the administration of effective CPR to improve Patient condition

Trigger: AED device advises CPR administration post shock delivery or if no shock advised

Main Success Scenario:

1. Following shock delivery or if no shock advised, AED automatically initiates CPR instructions mode
2. AED prompts care provider to start CPR via audio and visual instructions
3. Care provider is instructed on the correct Patient positioning and the rate and depth of chest compressions, along with rescue breaths if required
4. Audio and visual feedback is provided continuously, with periodic stops for the AED to re-evaluate Patient heart rhythm

Extensions:

- 4a. Patient shows abrupt signs of recovery
  - 4a1. Care provider ceases CPR, proceeds to Continued Evaluation

Post-conditions:

1. CPR instructions provided, proceed to Analyze Heart Rhythm again

## **USE CASE 6: Continued Evaluation**

Primary Actor: Care Provider

Scope: Emergency medical response

Level: User goal

Stakeholders and Interests:

- Patient: undergoes continued evaluation

Precondition: Heart rhythm restored

Trigger: Heart rhythm analysis detects healthy rhythm

Main Success Scenario:

1. AED conducts heart rhythm analysis continuously

Extensions:

1a. AED detects declining heart rate

1a1. AED proceeds with Analyze Heart Rhythm

## USE CASE DIAGRAM

