

Use Case: Use AED Plus (UC1)

Primary Actor: The rescuer

Precondition: Person collapses - suspected cardiac arrest

Postcondition: The device delivers at least one shock to the patient if shock was needed, and help arrived

Main Success Scenario:

1. The rescuer turns the unit on
2. AED Plus does the self-test to ensure unit OK
3. AED Plus gives an audible "STAY CALM" prompt
4. AED Plus gives an audible "CHECK FOR RESPONSIVENESS" prompt
5. AED Plus gives audible and visual "CALL FOR HELP" prompt
6. The rescuer places electrode pads to patient's bare chest and AED Plus analyzes heart rhythm (Use Case 2)
7. The rescuer uses AED to deliver shock (Use Case 3)
8. The rescuer performs CPR on adult patient (Use Case 4)

After 2 minutes repeat steps 7-9

Extensions:

2a. Self-test fails:

2a1. The rescuer initiates manual self-test by pressing the ON/OFF button for more than 5 seconds

2a2. Attempt to repair the device by replacing the batteries or electrodes (Use Case 7)

2a3. If the self-test fails again, remove the AED from the service and contact ZOLL Technical Service

6a. Pads are not attached properly:

6a1. Give audible and visual "CHECK ELECTRODE PADS" prompt

7a. Shockable rhythm is not present:

7a1. Follow step 9

8a. Shock is not delivered because of some error condition:

8a1. Give visual and audible "NO SHOCK DELIVERED" prompt

9a. Patient is not an adult:

9a1. Deliver CPR for child or infant (Use Case 5,6)

USE CASE: Place electrode pads and Analyze heart rhythm (UC2)

Primary Actor: rescuer

Precondition: AED is turned on and the device is functioning properly and attached to the patient.

Postcondition: AED determines whether a shockable rhythm is present and provides corresponding textual guidance.

Main success scenario:

1. Rescuer selects Adult Pads for adult and Child Pads for child.

2. Rescuer places electrode pads on the patient's bare chest.
3. AED receives the patient's heart rhythm through the electrodes.
4. AED display the ECG waveform of the patient.
5. AED determines whether a shockable rhythm is present.

Extensions:

- 3a. There is no detectable electrical activity, and the patient has flatlined.
 - 3a1. AED does not work.

USE CASE: Deliver shock (UC3)

Primary Actor: Rescuer

Precondition: Shockable rhythm is present, and shock is advised.

Postcondition: AED analyzes patient's heart rhythm and delivers shock on command.

Main success scenario:

1. The rescuer presses a button on the AED to deliver the shock.
2. The AED prompts "Stand clear" on the screen to ensure no one is touching the patient.
3. "Do not touch patient" alert is issued on the screen and audibly as the AED evaluates the heart rhythm.
4. A "Shock delivered in 3...2...1..." countdown is displayed and played over audio then a shock tone beeps right before a shock is delivered.

Use Case: Deliver CPR on an Adult Patient (UC4)

Primary Actor: rescuer

Precondition: Electrodes are connected to the AED Plus device. The connected electrode pads for adult use are attached to the patient correctly. The AED Plus issues the audio prompt "START CPR" and illuminates the CPR-related graphics. Indicator light flashes.

Postcondition: The 2-minute CPR period is finished. The AED Plus issues the audio prompt "STOP CPR".

Main success scenario:

1. The rescuer positions their hands in the centre of the patient's upper chest and their shoulders directly over their hands, keeping their elbows locked.
2. The rescuer presses the heels of the hands straight down on the patient's breastbone, with depth at 5-6 cm (2-2.4 inches) for each compression.
3. The rescuer releases pressure and completely removes their weight to allow the patient's chest to return to the resting position.
The rescuer repeats steps 2-3 for 30 times, at a rate of 100 to 120 per minute.
4. The rescuer opens the patient's airway by tilting the head and lifting the chin.
5. The rescuer positions a barrier device.

6. The rescuer breathes into the patient twice, each time taking about 1 second, with just enough air to make the patient's chest rise.

The rescuer repeats the cycle of steps 2-6 in a 2-minute period.

Extensions:

2a. The rescuer does not perform compressions with enough depth.

2a1. The AED Plus issues the audio prompt "PUSH HARDER".

2a2. The rescuer watches the depth of chest compression measured on the display of the AED Plus and makes sure the indicator lines are displayed in the bar graph area at 2 and 2.4 inches of compression depth.

2a3. The AED Plus issues the audio prompt "GOOD COMPRESSIONS".

Use Case: Deliver CPR on a Child Patient (UC5)

Primary Actor: rescuer

Precondition: Electrodes are connected to the AED Plus device. The connected electrode pads for child uses are attached to the patient correctly. The AED Plus issues the audio prompt "START CPR" and illuminates the CPR-related graphics. Indicator light flashes.

Postcondition: The 2-minute CPR period is finished. The AED Plus issues the audio prompt "STOP CPR".

Main success scenario:

1. The rescuer positions their hand(s) in the centre of the patient's upper chest and their shoulders directly over their hands, keeping their elbows locked.
2. The rescuer presses the heels of the hands straight down on the patient's breastbone, with depth at 5 cm (2 inches) or 1/3 of the chest depth for each compression.
3. The rescuer releases pressure and completely removes their weight to allow the patient's chest to return to the resting position.

The rescuer repeats steps 2-3 for 30 times, at a rate of 100 to 120 per minute.

4. The rescuer opens the patient's airway by tilting the head and lifting the chin.
5. The rescuer positions a barrier device.
6. The rescuer breathes into the patient twice, with just enough air to make the patient's chest rise.

The rescuer repeats the cycle of steps 2-6 in a 2-minute period.

Extensions:

2a. The rescuer does not perform compressions with enough depth.

2a1. The AED Plus issues the audio prompt "PUSH HARDER".

2a2. The rescuer watches the depth of chest compression measured on the display of the AED Plus and makes sure the indicator lines are displayed in the bar graph area at 2 inches of compression depth.

2a3. The AED Plus issues the audio prompt "GOOD COMPRESSIONS".

Use Case: Deliver CPR on an Infant Patient (UC6)

Primary Actor: rescuer

Precondition: Electrodes are connected to the AED Plus device. The connected electrode pads for child use are attached to the patient correctly. The AED Plus issues the audio prompt “START CPR” and illuminates the CPR-related graphics. Indicator light flashes.

Postcondition: The 2-minute CPR period is finished. The AED Plus issues the audio prompt “STOP CPR”.

Main success scenario:

1. The rescuer places two fingers on the patient’s breastbone just below the nipple line.
2. The rescuer pushes down on the breastbone 1/3 the depth of the patient’s chest or about 4 cm (1 ½ inches).
3. The rescuer releases pressure completely but keeps their fingers in light contact with the patient’s chest.

The rescuer repeats steps 2-3 for 30 times, at a rate of 100 to 120 per minute.

4. The rescuer opens the patient’s airway by tilting the head and lifting the chin.
5. The rescuer positions a barrier device.
6. The rescuer breathes into the patient twice, with just enough air to make the patient’s chest rise.

The rescuer repeats the cycle of steps 2-6 in a 2-minute period.

Extensions:

- 2a. The rescuer does not perform compressions with enough depth.
 - 2a1. The AED Plus issues the audio prompt “PUSH HARDER”.
 - 2a2. The rescuer watches the depth of chest compression measured on the display of the AED Plus and makes sure the indicator lines are displayed in the bar graph area at 1 1/2 inches of compression depth.
 - 2a3. The AED Plus issues the audio prompt “GOOD COMPRESSIONS”.

Use Case: Install or Replace Batteries (UC7)

Primary Actor: The AED Plus equipment maintenance staff

Precondition: There are 10 consumer type 123A Photo Flash lithium manganese dioxide batteries of Duracell, Sanyo or Varta. The batteries are well before their labeled expiration date.

Postcondition: The device successfully recognizes 10 fully charged batteries.

Main success scenario:

1. The staff ensures that the AED Plus is turned off.
2. The staff opens the battery compartment by removing the battery cover from the back of the unit.
3. The staff removes all batteries at once and disposes of batteries properly.
4. The staff places new batteries into the battery bank, observing battery polarity markings and making sure that all batteries are securely seated and properly oriented.

5. After placing the first 5 to 9 batteries in the battery well, the audio prompt “INSTALL BATTERIES” raises.
6. The staff installs the remaining batteries in the battery compartment.
7. The staff presses the Battery Reset Button inside the battery compartment when prompted.

Use Case: Maintain AED Plus (UC8)

Primary Actor: The AED Plus equipment maintenance staff.

Precondition: It is the time for periodically maintenance check.

Postcondition: All the items in the checklist passes. The device is ready to use.

Main success scenario:

1. The staff verifies that the AED Plus unit is clean, undamaged, free of excessive wear.
2. The staff verifies that there are no cracks or loose parts in the housing.
3. The staff verifies that electrodes are within their expiration date.
4. The staff verifies that electrodes are pre-connected to the input connector and sealed in their package.
5. The staff verifies that all cables are free of cracks, cuts and exposed or broken wires.
6. The staff turns the AED Plus on and off, and verifies the green check indicates ready for use.
7. The staff verifies that batteries are within their expiration date.
8. The staff verifies that supplies are available for use.

Extensions:

- 1a. The device is not clean, undamaged, or free of excessive wear.
 - 1a1. The staff replaces the device and supplies.
- 2a. There are cracks or loose parts in the housing.
 - 2a1. The staff replaces the device and supplies.
- 3a. The electrodes are expired.
 - 3a1. The staff replaces the electrodes.
- 4a. The electrodes are not sealed in the package.
 - 4a1. The staff replaces the electrodes.
- 4b. The electrodes are not pre-connected to the input connector.
 - 4b1. The staff connects the electrodes to the input connector.
- 5a. The cables are not all free of cracks, cuts and exposed or broken wires.
 - 5a1. The staff replaces the cables.
- 6a. The AED Plus device does not show green check.
 - 6a1. The staff does further troubleshoot or replace the device.
- 7a. The batteries are expired.
 - 7a1. The staff replaces the batteries (Use case 7).
- 8a. Some supplies are missing or not working.
 - 8a1. The staff replaces the supplies.

