Use cases for Final Project

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Use Case 0: Operating the AED

Primary actor: User
Secondary actor: AED
Scope: Usage of the AED
Level: User
Precondition: There is a victim undergoing cardiac arrest and an AED is available
Minimal guarantee: The AED will monitor the victim and attempt to resuscitate them until help arrives.
Success guarantee: The AED will successfully resuscitate the victim.
Main success scenario:

1 User powers on the AED (includes UC1).

2 User checks if the victim is ok and gets help (includes UC1.1).

3 User applies electrode pads to the victim (includes use case 2).

4 AED analyzes the victim's heart signal (includes use case 3).

5 If the signal is shockable, then the user will shock the victim using the indicated button and perform CPR. (includes use case 4 and 5).

6 If the signal is not shockable, then the user will perform CPR (includes use case 5).

7 AED goes back to step 4 and the process repeats.

Extensions:
If the checks in step 1 fail in any step in operation, AED regresses to use case 1.

Use Case 1: Power On

Primary actor: User
Secondary actor: AED
Scope: Usage of the AED
Level: User
Precondition: The AED is in its initial state and not on yet.
Minimal guarantee: The AED will not operate in an unsafe mode.
Success guarantee: The AED will correctly check if it can operate safely and display a green light.
Main success scenario:

1 User presses the power on button.

2 AED begins self tests.

3 AED performs battery check: verifies that the battery is attached and has sufficient capacity.

4 AED performs electrode connection check: verifies that the defibrillation electrodes are properly pre-connected to the device.

5 AED displays green status indicator light and voice prompts "AUTOMATIC DEFIBRILLATOR. UNIT OK."

6 AED flashes indicator light and prompts "PLEASE CHECK IF THE PATIENT IS OK.".

7 User shouts to the patient "ARE YOU OK???" and shakes the patient.

8 AED flashes indicator light and prompts "PLEASE CALL FOR HELP OR CALL 911.".

9 User gets help.

Extensions:
If any check fails, it will abort the rest and notify the user with the corresponding fix to the problem.
3a. On failure, the voice prompt will say "CHANGE BATTERIES." The user should replace the batteries until full (use case 8).
4a. On failure, the voice prompt will say "PLUG IN CABLE." The user should plug in the connector (use case 9).

Use Case 2: Electrode Placement (Includes Use Case 1)

Primary actor: User
Secondary actor: AED, Patient
Scope: Usage of the AED
Level: User
Precondition: The AED is operating within safe parameters.
Minimal guarantee: The AED will not proceed in resuscitation until pads are on in the correct configuration.
Success guarantee: The AED has its pads attached correctly to the patient's bare chest, and is the correct size of the patient.
Main success scenario:

1 AED will flash indicator light and say "PLACE PADS ON THE PATIENT.

2 User exposes patient's bare chest.

3 User attaches the pads according to the instructions on the pads.

4 AED says ”PADS SUCCESSFULLY ATTACHED.”.

Extensions:
2a. If the patient’s age range does not match with the pads installed, then the user should attach the correct ones before proceeding.
4b. If the pads are not attached correctly, the AED will prompt ”CHECK ELECTRODE PADS.” and does not proceed.

Use Case 3: Analysis (Includes Use Case 2)

Primary actor: User
Secondary actor: AED, Patient
Scope: Usage of the AED
Level: User
Precondition: The AED is operating within safe parameters and electrodes are correctly placed.
Minimal guarantee: The AED will classify the signal as some kind of rhythm.
Success guarantee: The AED will correctly classify the signal’s rhythm/arrhythmia.
Main success scenario:

1 AED will flash indicator light and say ”DON’T TOUCH PATIENT. ANALYZING.”

2 AED will analyse the ECG signal from the pads, classifying it as a shockable rhythm, proceeding to Use Case 4: Shocks.

3 If rhythm is non-shockable, AED will say ”UNSHOCKABLE RHYTHM DETECTED.”, and the system proceeds to Use Case 5: Compressions.

Extensions:

2b. If the patient is recovering and nominal, then continue to monitor (includes use case 6).
2c. If the patient does not stabilize after some time, it is up to the user’s discretion to stop resuscitation (includes use case 7).

Use Case 4: Shocks

Primary actor: User
Secondary actor: AED, Patient
Scope: Usage of the AED
Level: User
Precondition: The AED has classified the patient’s arrhythmia as shockable.
Minimal guarantee: The AED will not shock without input, and gives the necessary precautions.

Success guarantee: The AED, with the user's authorization, will deliver the necessary shock to the patient.
Main success scenario:

1 AED will flash the shock button's indicator light.

2 User will press the shock button.

3 AED will analyse the ECG signal from the pads.

4 User will warn others to stand clear, and to not touch the patient.

5 AED will say "SHOCK WILL BE DELIVERED IN THREE, TWO, ONE...".

6 AED will beep its shock tone and say "SHOCK DELIVERED. START COMPRESSIONS.".

Use Case 5: Compressions

Primary actor: User
Secondary actor: AED, Patient
Scope: Usage of the AED
Level: User
Precondition: The AED has either advised no shock or delivered a shock.
Minimal guarantee: The AED gives the necessary instructions to the user.
Success guarantee: The User will carry out the AED's instructions and perform sufficient CPR.
Main success scenario:

1 The user will perform 2 breaths for every 30 compressions.

2 After a set amount of time (120 seconds as standard) AED will proceed to Use Case 3: Analysis

Extensions:
1a. If the pace of compressions is just right, then AED will display "Steady Compression Rhythm.".
1b. If the pace of compressions is too slow, then AED will display "Compressions too slow. Please speed up." 1c. If the pace of compressions is too fast, then AED will display "Compressions too fast. Please slow down." 2a. If the patient becomes stable before the allotted time, stop CPR and go to use case 3: analysis

Use Case 6: Successful Resuscitation

Primary actor: User
Secondary actor: AED, Patient

Scope: Usage of the AED
Level: User
Precondition: The AED has reported that the patient is nominal.
Minimal guarantee: The patient will not receive further treatment unless they are unstable.
Success guarantee: The patient remains stable until emergency services arrive.
Main success scenario:

1 AED will display ”Patient is nominal. Continuing to monitor.”.

2 User ceases treatment actions and monitors the patient.

Extensions:
2a. If the patient destabilizes, then go back to use case 3, analysis.

Use Case 7: Cessation of Resuscitation Efforts

Primary actor: User
Secondary actor: AED, Patient
Scope: Usage of the AED
Level: User
Precondition: The AED has reported that the patient is asystolic.
Minimal guarantee: No further actions are required.
Success guarantee: The patient is dead.
Main success scenario:

1 AED will display ”Patient is asystolic”.

2 If user has performed many compressions without improvement, cease treatment actions and stay until emergency services arrives.

Extensions:

Use Case 8: Replacing the Batteries

Primary actor: User
Secondary actor: AED
Scope: Maintenance of the AED
Level: User
Precondition: The AED is displaying ”CHANGE BATTERIES.”.
Minimal guarantee: The AED does not operate in an unsafe state.
Success guarantee: The AED continues operation.
Main success scenario:

1 AED will tell the user to replace the batteries.

2 User will replace batteries until indicator says 100%.

3 AED will continue operation.

Use Case 9: Connecting Pads to the AED

Primary actor: User
Secondary actor: AED
Scope: Maintenance of the AED
Level: User
Precondition: The AED is displaying ”PLUG IN ELECTRODE CABLE.”.
Minimal guarantee: The AED does not operate in an unsafe state.
Success guarantee: The AED continues operation.
Main success scenario:

1 AED will tell the user to plug in the cable.

2 User will plug in the cable.

3 AED will continue operation.