SickKids LEARNING INSTITUTE

Super User Facilitator Guide

Zoll R Series® Defibrillator Provider Training

Contents

Welcome Super Users

Thank you for joining our team of Super Users and for your ongoing commitment to Caring Safely at SickKids. This facilitator guide has been developed for you to help you provide quality and safe staff training experiences. Every effort has been made to ensure the accuracy of the information within this guide, however the reader is cautioned to check the Zoll resources found on the SickKids website.

Super User Role

Super Users are vital to a successful implementation of the Zoll Defibrillators at SickKids. Ultimately, Super Users are responsible for providing education that supports safe and quality defibrillator related patient care.

March 2-30th, 2020

Provider Training

Super Users are responsible for facilitating Zoll Defibrillator Provider Training sessions for staff who have not yet participated in Provider Training. To facilitate a session, refer to Zoll Defibrillator Provider Training Lesson Plan (~ 50 min).

Refresher Just-in-time Training (JITT)

Super Users may also facilitate condensed Refresher Just-in-time Training sessions for staff who would like to consolidate their skills learned in the Zoll Defibrillator Provider Class. To facilitate a session, refer to Refresher Just-in-time Training (10-15 min) and or the ALS In-service Script.

March 30th, 2020 onwards

Super Users are responsible for continuing to provide Zoll Defibrillator Provider and or Refresher (Just in Time) Training sessions as needed. Super Users will also play a valuable role in clinical coaching when opportunities arise, such as during team training and code blue events.

Safety is Our Top Priority

The devices we are using for training are live energy devices, so defibrillation safety must be maintained at all times. During a training session, you will be using a Symbio rhythm simulator that is connected to Training Electrodes (Pads) and defibrillator. When connected, shocks will be discharged into the Symbio, however before all shock deliveries, you must still ensure that staff state, "I'm clear, you're clear, oxygen clear, everyone clear" and ensure no one is touching the mannequin or table/bed which the mannequin is laying on. When using paddles, ensure participants only deliver shocks while the paddles are secured in the defibrillator holders i.e. never deliver shocks while paddles are out of their holders during training.

Hosting a Successful Training Session

Before a Training Session

Review your Super User Facilitator Guide. Highlight key speaking points and practice ahead of time to ensure your session goes smoothly. Make a training plan with dates, times, and locations. Reserve a defibrillator training cart with the Interprofessional Education Specialist (IES) in your department. Training carts consist of a defibrillator, infant and adult chest mannequin, Symbio rhythm simulator, and OneStep Adult and Pediatric CPR Training Electrodes. A cart also contains OneStep Adult CPR, OneStep Pediatric CPR, Pedi-padz (Radiotranslucent), Pro-Padz Adult (Radiotranslucent), and PADPRO Mini Infant electrodes. Be sure to creatively advertise for your sessions and track participant attendance using the Participant Attendance Log.

After a Training Session

Many of you will be training in patient care areas, so please return your teaching space to its pre-session state. Do not dispose of any of the disposable supplies and return your training cart to its pre-session state so it's ready for the next user. Return your defibrillator training cart to your IES within your reserved time frame.

Provider Training Lesson Plan

The Zoll Defibrillator Provider Training session will take approximately 50 minutes in duration to complete. The lesson plan below provides you with the necessary structure, curriculum and learning activities for a successful experience. Print this lesson plan and your facilitator guide and have them handy to refer to during your session. The icons below are provided as helpful prompts.

Show & Explain  Demonstrate & "Try it Out!"  Symbio rhythm simulator setting 

Device Controls and Indicators		Defibrillation		See-Thru CPR	
 ~2 min	Front Panel Cables and Connectors External/Internal Paddles Battery pack Recorder tray	 ~15 min	VT-HI Manual with electrodes Manual with paddles Analyze (AED)	 ~ 2 min	CPR Artifact + connect ECG Filtered waveform during CPR CPR Filtered Raw waveform
Code Readiness		**Synchronized Cardioversion**		**Pacing**	
 ~5 min	Self-Test 30J Manual Test Functional Testing Visual Inspections	 ~4 min	AFIB	 ~8 min	3rd ECG Leads Pacer Rate Output & Capture 4:1 Standby/Asynchronous
Multifunction Electrodes (Pads)		**Real CPR Help (CPR Feedback)**		**Monitoring**	
 ~4 min	Connecting/Disconnecting Selecting Applying	 ~8 min	VT-HI PPI CPR Idle Timer CPR Rate and Depth Compression Release Bar (Recoil) CPR Metronome/Voice Prompts	 ~2 min	Options Param EtCO2 NIBP Key Data Transfer

Session Introduction

This session will provide an overview of the Zoll R Series® Defibrillator functions. Some functions are similar to our previous device, while others are new.
This training session will review all of these functions which include:

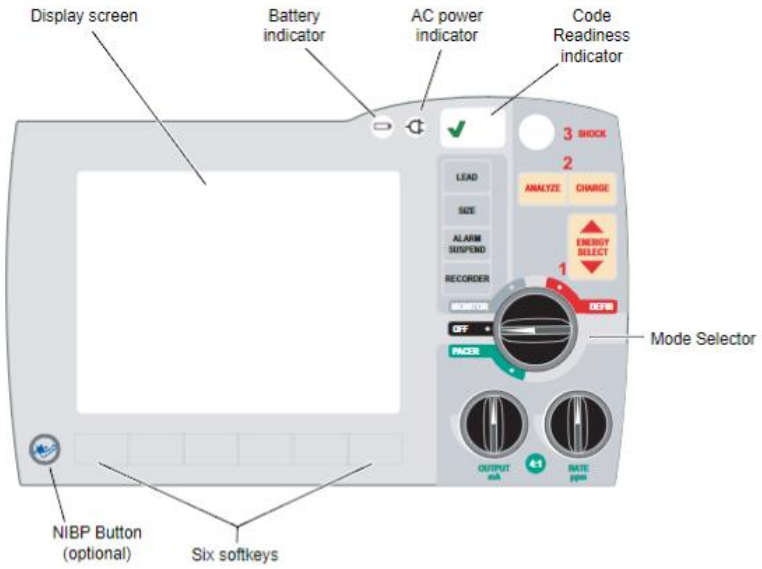
- Defibrillator Function (Manual mode and New Analyze mode)
- Synchronized Cardioversion
- ECG Monitoring
- External Pacemaker
- Real CPR Help New
- SpO2 Monitoring New
- EtCO2 Monitoring New
- Non-Invasive Blood Pressure Monitoring (NIBP) New

Device Controls and Indicators

We will start with an orientation to the device controls and indicators.

Front Panel

The front panel of the R Series® device includes the display screen, softkeys, battery indicator, AC power indicator, Code Readiness indicator, SHOCK button, and control panel.



Display screen
Shows therapeutic settings, physiological waveforms, and other information for each monitored parameter, messages, time, and softkey labels.

Battery indicator
Indicates battery status:
Steady yellow = Battery is charging
Steady green = Battery is charged
Alternating yellow and green = No battery is installed, or there is a battery charging fault (Call Medical Engineering).

Indicator for AC power
Illuminated when the unit is plugged into an alternating current (AC) power source

Code Readiness indicator
Shows the status of the unit, based on its most recent Readiness check:
A green ✓ indicates the unit is ready for therapeutic use
A red X indicates the unit's Readiness is compromised and that it may not be ready for therapeutic use. If you see a red X in the event of an emergency, attempt to use the device anyway (to avoid delaying therapy) and send a team member to obtain another device.

Mode Selector
Selects the mode of operation
OFF = Unit is powered off
MONITOR = Physiological monitoring (ECG and other options)
DEFIB = Manual or Advisory defibrillation
PACER = Noninvasive external pacing

ENERGY SELECT Buttons
There are two sets of up-down arrow buttons that control the selection of defibrillator energy. One set is located on the front panel and the other located on the sternum paddle.

CHARGE Button
Charges the defibrillator to the selected energy. In addition to the CHARGE button on the front panel, there is one located on the apex paddle handle.

SHOCK Button
The front panel SHOCK button is only active when using hands-free therapy electrodes. The SHOCK button illuminates when the device is charged and ready. When using paddles or spoons you can only discharge with the SHOCK buttons on the paddle or the spoons (so only the person holding the paddles can discharge as he is standing closest to the patient).

Analyze/AED

The Analyze/AED button initiates ECG analysis to determine whether a shockable rhythm is present. The use of the Analyze/AED function on the Zoll defibrillator is for Advanced users ONLY (not BLS). Application of energy (cardioversion, defibrillation, pacing) in a patient care area is a medically delegated act and requires a Physician's order.

As Advanced providers, the Manual mode on Zoll is the principle mode of use. Although the AED function is available, it is not preferred and is not the norm at SickKids. AED/Analyze may be utilized in an uncertain situation and ONLY as a medically delegated act. If used, consider setting Joules in weight based dosing for optimal energy delivery vs deferring to automated presets.

The Lifepak AEDs can be used in non-patient care areas and can be used by BLS providers without delegation by a medical order.

LEAD Button
Selects the ECG source for display and printing. The PADS or PADDLES lead setting is automatically selected when the defibrillator powers up in DEFIB or MONITOR mode with either hands-free therapy electrodes or paddles attached to the OneStep cable. Lead II is automatically selected when the device is powered up in PACER mode. Pads or Paddles monitoring is not available in PACER mode.

SIZE Button
Selects the relative amplitude scale factor for the displayed ECG waveform. Available scale factors are x0.5, x1, x1.5, x2 and x3

ALARM SUSPEND Button
Activates, deactivates or audibly suspends all alarm functions. A bell () appears on the display when alarms are enabled. When alarms are either audibly or permanently disabled, an "X" appears across the bell ().

RECORDER Button
Starts or stops the stripchart recorder.

PACER OUTPUT mA
When pacing is selected, this control sets the amount of current delivered. The selected current setting is indicated on the display.

PACER RATE ppm
When pacing is selected, this control sets the rate (ppm) at which the pacemaker will operate. The selected pace rate setting is indicated on the display.

4:1 Button

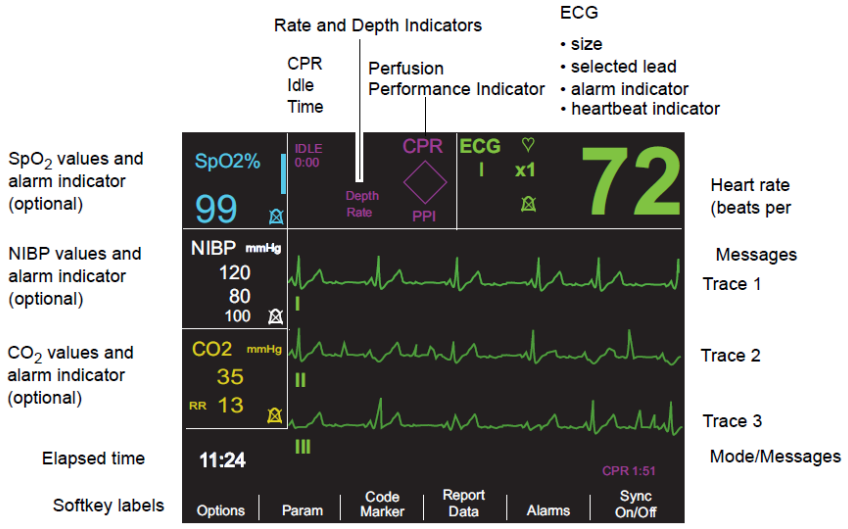
This button is used to determine a patient's underlying ECG rhythm. While depressed, this button causes pacing stimuli to be delivered at ¼ of the indicated ppm setting. When the button is released, normal pacing resumes.

NIBP Button
Allows you to start single, auto, or STAT non-invasive blood pressure measurements.

Softkeys
Six unlabeled buttons located directly below the display control different functions. Labels for the softkeys appear at the bottom of the display directly above each softkey to indicate its function.

Display Screen
The front panel includes a color display which shows:

- Elapsed time (since the unit was turned on)
- CO2 levels, respiration rate and alarm status indicator
- Non-invasive blood pressure (NIBP) readings: diastolic, systolic, and mean, plus alarm status indicator
- SpO2 levels, signal strength and alarm status indicator
- IDLE time (time elapsed after compressions interrupted)
- CPR Rate and Depth
- Release Bar (recoil bar) with OneStep Adult CPR Electrodes only
- Perfusion Performance Indicator (PPI) with OneStep Adult CPR Electrodes only
- ECG trace, selected lead, heartbeat indicator, selected size, alarm status indicator, heart rate
- Messages and prompts (e.g. selected energy, charging status, and delivered energy for defibrillation and synchronized cardioversion, output current and stimulus rate for pacing)
- ECG waveforms
- Labels above the softkeys (labels change depending on the context)

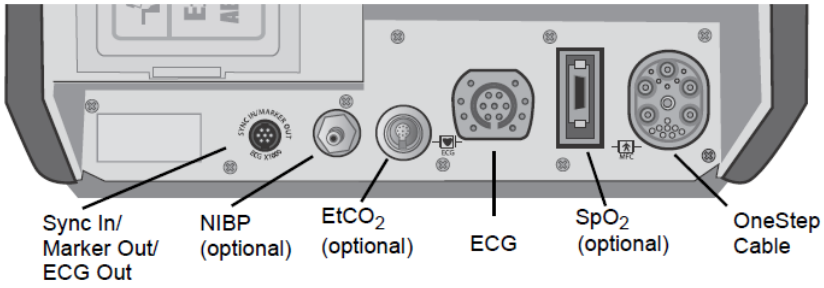


Messages

During operation, a fault or error message is displayed when a fault is detected. If this occurs, turn the unit off and then on and recheck operation. If the fault persists, contact Medical Engineering.

Cables and Connectors

The back of the unit includes a set of connectors for patient cables.



- Sync In / Marker Out / ECG Out – It has not yet been confirmed which areas will use this feature.
- NIBP - For connecting blood pressure cuff cable (black)
- EtCO2 - For connecting CO2 monitor cable (yellow)
- ECG - For connecting 3- or 5-lead ECG cable
- SpO2 - For connecting pulse oximeter cable (blue)
- OneStep Therapy Cable (red) - For connecting paddles or ZOLL hands-free therapy electrodes
- Power Cord - Used to operate the R Series® unit when battery power is not being used. It's important that when not in use the defibrillators are kept plugged in.

External Paddles

See External Paddles for overview of external paddles.

Autoclavable internal handles (Internal Paddles)

Used during open chest defibrillation procedures. See Autoclavable Internal Handle and Electrode Operator's Guide for more information.

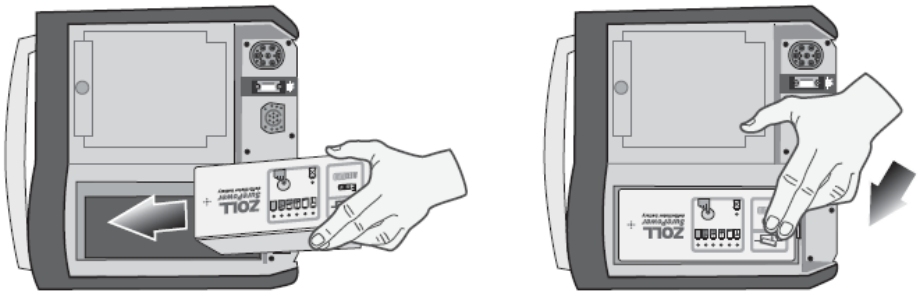
Battery Pack

To check the remaining time of the battery, push the index finger button. The indicator lights show 30 minute increments for total of 4 hours of run time. If an Amber light appears on "?" section of battery for > 5 seconds or a Red light appears on the "X" section of the battery for > 5 seconds, notify Medical Engineering.

To replace a battery pack, place the end of the battery pack opposite the tab into the end of the compartment closest to the front of the unit. Then lower the tabbed end of the battery pack into the compartment and press down on the tabbed end until it locks into place.

Recorder Tray

To load the Recorder Tray, press the button to open door, and insert the paper as per the picture inside the paper tray. There should be a folded crease to the top right, with the black arrow facing towards the back of the device. Pull a strip or two forward and let paper drop and then close the door on top of the strip. The recorder will print a pre and post shock/cardioversion strip. You can also press "Recorder" to print/stop a strip.

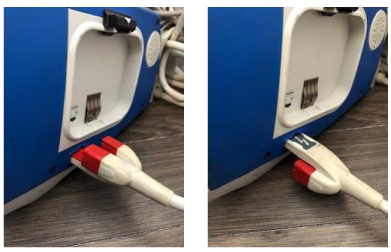


Code Readiness

Automated Self-Test

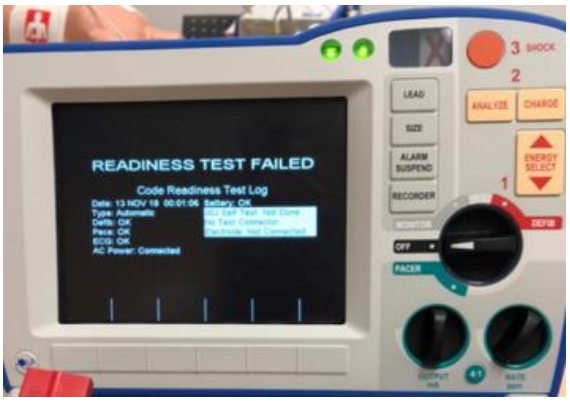
To keep the device code ready be sure that it is always plugged into a working outlet and that the OneStep Pediatric CPR Electrodes are connected to the therapy cable. These electrodes have a built-in testing wire which allows the device to perform a daily (00:01 hrs) automated self-test. If the electrodes are not connected to the electrodes, the device will fail the self-test.

Some units will need to test into the right-side BASE port directly with the OneStep Cable (e.g. Cath Lab, Cardiac OR, NICU) because they will be mainly using electrodes which do not contain a 30J testing wire. Examples of electrodes that do not contain a test wire include, Pedi-padz and Pro-padz Adult both which are radiotranslucent, and PADPRO Mini Infant (< 3 kg).



The Code Readiness Indicator tells you whether the self-test passed or failed. A green check mark means it passed the test and is Code Ready. A red X means it failed a part of the test and the device is not Code Ready.

When the device fails a self-test, it will also display Readiness Test Failed on the screen and will highlight what needs to be fixed. See image below. These are usually easily fixable problems i.e. No pads plugged in, no battery, no A/C power, pads expired). After resolving issue, the Red X can be cleared by performing a manual 30J test. If the Red X is still there after the 30J Manual Test, call Medical Engineering to troubleshoot the device. If the device reads DEFIB FAILURE, start CPR if needed, ask someone to get another device, and afterwards call Medical Engineering, and DO NOT USE device.



30J Manual Test

To test the manual defibrillation function using OneStep Pediatric hands-free therapy electrodes:

Turn the unit off for at least 10 seconds.
Turn the Mode Selector to DEFIB.

The unit emits a four-beep tone indicating successful completion of the power-on self-test.
The ECG source is PADS, and ECG size is X1. “DEFIB 10J SEL,” and DEFIB PAD SHORT appear on the display. The ECG trace appears as a solid line while the OneStep cable is connected to either the Test Port or OneStep electrodes.

Press the ENERGY SELECT buttons to set the energy to 30 joules.
Press the CHARGE button on the front panel.

When the charge-ready tone sounds, press the ENERGY SELECT buttons to set the energy to 20 joules.

The defibrillator will disarm itself.

Press the ENERGY SELECT buttons to reset the energy to 30 joules
Note: For testing, the unit discharges the defibrillator only if the energy is set to 30 joules.
Press the CHARGE button on the front panel.
When the Ready tone sounds, press the SHOCK button on the front panel until the shock is delivered.

The unit displays the message 30J TEST OK and prints a stripchart indicating 30J TEST OK and the delivered energy.

If the message 30J TEST FAILED appears, contact appropriate technical personnel or the ZOLL Technical Service Department.

In addition to the automated self-test, routine Visual Inspections and Functional Testing are also required to ensure the device is code-ready. Documentation of Visual Inspections and Functional Testing should be documented on the "Code Readiness Checklist: Zoll R Series Checklist" form. Clinical areas are responsible for establishing and maintaining a process for ensuring that these are completed as outlined below.

Visual Inspections

Visual inspections are required every 12-24 hours. The frequency of these inspections are to be consistent with the area's current practice for defibrillator inspections. To perform Visual Inspections, refer to the "Code Readiness Checklist: Zoll R Series Checklist" form next to the device.

Visual Inspections (required Q12-24h as per your area's current practice)

Device Front & Top Panel
- ✓ Code Readiness Indicator shows green checkmark (passed self-test)
- ✓ AC and Battery Lights are both solid green
- ✓ Battery in place and displays fully charged when index finger button is pressed
- ✓ Battery does not display "low battery", "replace battery"; or an Amber/Red light in the "?"/"X" sections for >5 seconds
- ✓ Recorder paper present and correctly loaded in recorder tray

Device Back Panel
- ✓ Plugged into AC outlet
- ✓ Accessory cables all present and connected
- ✓ Finger sat probe present (black mesh pocket)
- ✓ Neonatal and Paediatric End Tidal CO2 (ETCO2) adaptors present (black mesh pocket)
- ✓ OneStep CPR Pediatric Multifunction Electrodes (X1) Connected to OneStep Cable

Plastic Bag Contents
- ✓ BP cuffs (4 sizes) present
- ✓ OneStep CPR Adult Multifunction Electrodes (X1) present
- ✓ Conmed PROPAD Mini Infant <3 Kg Radiotranslucent Electrodes (X1)
- ✓ Pro-padz Radiolucent Adult Multifunction Electrodes (X 1)
- ✓ Pedi-padz Radiolucent Multifunction Pediatric Electrodes (X1)

Readily Accessible
- ✓ Spare deck of recorder printer paper
- ✓ Orange Gel conduction pads (X2)
- ✓ Razor
- ✓ ECG electrodes (X1) package

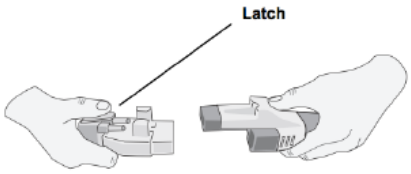
Disposables
- ✓ All disposables unexpired; replace any expired disposables

Functional Testing:

Functional testing is required every 24 hours (NOT weekly) and involves a) Defibrillator Testing with Hands-free Therapy Electrodes, Pacer Testing, and a Recorder Check. For instructions on how to perform these tests refer to the laminated cards attached to the device.

Connecting and Disconnecting Electrodes

When connecting the electrodes, position the "Lightening Bolt" Up. The Latch locking lever holds pads and cable into place. When disconnecting, press on the far ridged end of the latch, and pull apart hard in order to release.



Selecting Electrodes

Below are guidelines for selecting the appropriate size of electrodes.

> 8 years of age and > 25 Kg	OneStep Adult CPR Multifunction Electrodes
< 8 years of age and between 3-25 Kg	OneStep Pediatric CPR Multifunction Electrodes
< 3 Kg	PADPRO Mini Infant Electrodes
3-15 kg	Pedi-padz Radiolucent Electrodes
> 15 kg	Pro-Padz Adult Radiolucent Electrodes

Applying Electrodes

Before applying electrodes, it is important to dry the skin and shave chest hair if needed. For all electrode placement, follow the picture on the packaging. Press and Roll the electrodes firmly into place. When using electrodes with a CPR puck, be sure that the horizontal line on CPR puck aligns with patient's axilla and the vertical align on the center of the sternum.

OneStep Adult CPR Multifunction Electrodes

Defibrillation/Synchronized Cardioversion
The recommended electrode placement for Defibrillation and Synchronized Cardioversion is the Anterior-Anterior (A-A) position (also known as Anterior-Lateral position) for adults. The Lateral Pad (red) should be placed 1st. The Anterior Pad (blue) should be placed 2nd with the CPR puck positioned Mid Sternum (where you will perform chest compressions). The SickKids Resuscitation Oversight Committee recommends that the 3 lead ECG cable be used when performing synchronized cardioversion to ensure a clear signal.

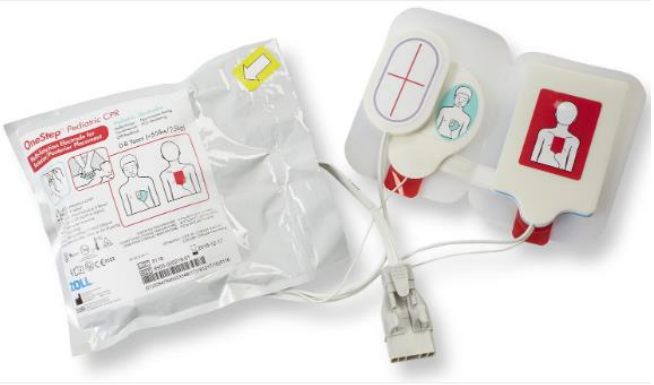
Pacing: Electrode Placement
The recommended placement for Pacing is Anterior-Posterior position. This will require tearing the CPR puck off the Anterior Pad (blue) and placing it on the centre of the sternum, putting the Anterior Pad (blue) in the posterior position, and putting the Lateral Pad (red) in Anterior position (APEX). You will need to use the 3 lead ECG when pacing.

Refractory Arrhythmias: Electrode Placement
Anterior-Posterior (A-P) position may also be considered or indicated for refractory arrhythmias. A-P position path is shorter thus reducing impedance. Tear the puck off the Anterior Pad and position it on the sternum, position the Anterior Pad (blue) in the posterior position, and then position the Lateral Pad (red) in Anterior position (APEX).

If needed e.g. a lot of breast tissue, the CPR puck can be removed from the anterior pad and repositioned so that it sits appropriately mid sternum. The puck cannot be torn from the OneStep Pediatric CPR Electrodes as this will damage them.

Onestep Pediatric CPR Multifunction Electrodes

Use ONLY A-P positioning with CPR puck mid-sternum. The electrodes have pictures to remind you of placement. The device recognizes Pediatric electrodes and uses a Pediatric Algorithm. You will need to use the 3 lead ECG cable when pacing.



PROPAD Mini Infant < 3 Kg Radiotranslucent Electrodes

These electrodes should be used for patients weighing less than 3 Kg. These electrodes do not have a CPR puck, therefore do not provide any CPR feedback.

Radiolucent Electrodes

Pro-padz Radiolucent Adult Multi-function Electrodes for patients weighing > 15 Kg
These electrodes do not have a CPR puck, therefore do not provide any CPR feedback.

Pedi-padz Radiolucent Multi-Function Pediatric Electrodes
These electrodes should be used for patients weighing 3-15 Kg. These electrodes do not have a CPR puck, therefore do not provide any CPR feedback.

Defibrillation

Set Symbio rhythm simulator to VT-HI

Manual Defibrillation with Hands-Free Electrodes

Remove all clothing covering the patient's chest. Dry chest if necessary. If the patient has excessive chest hair, clip or shave it to ensure proper adhesion of the electrodes. Attach hands-free therapy electrodes according to instructions on the electrode packaging. Ensure that the therapy electrodes are making good contact with the patient's skin and are not covering any part of the ECG electrodes. Connect the hands-free therapy electrodes to the OneStep cable if not pre-connected. When connecting the electrode to the cable, push the two connectors together until the latch clicks.

If defibrillation electrodes are not making good contact with the patient's skin, the unit issues the messages CHECK PADS and POOR PAD CONTACT and does not allow delivery of energy. If a short circuit exists between the electrodes (for example, if they are still sealed), the unit issues the message DEFIB PAD SHORT.

Poor adherence and/or air under the therapy electrodes can lead to the possibility of arcing and skin burns.

Apply one edge of the pad securely to the patient. Roll the pad smoothly from the applied edge to the other, being careful not to trap any air pockets between the gel and skin.

1 Select DEFIB
Turn the Mode Selector to DEFIB. The unit automatically defaults to the preconfigured first shock energy selection (displayed below).

When using OneStep Adult electrodes, the default energy selections are:
Shock 1 - 75 joules
Shock 2 - 150 joules
Shock 3 - 200 joules

When using OneStep Pediatric electrodes, the default energy selections are:
Shock 1 - 10 joules
Shock 2 - 20 joules
Shock 3 - 30 joules

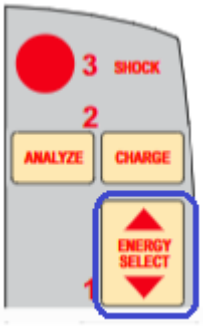
Energy Select:

Always look at the display, and verify that the selected energy is appropriate, and as ordered by MD

Although there are default energy settings within Zoll below, at SickKids we are selecting the Joules according to weight-based dosing.

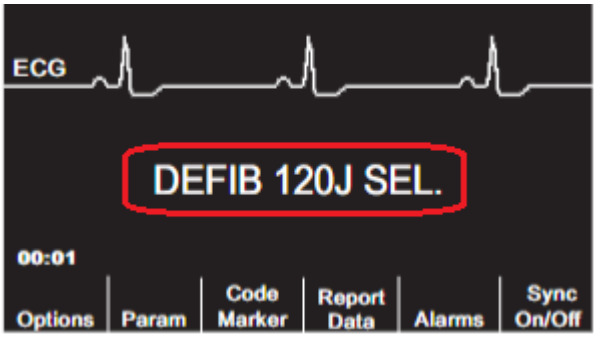
Defibrillation weight-based dosing recommendations:

- 2J/Kg; then 4J/Kg; then anywhere from 6J/Kg up to maximum of 10 J/Kg
- Internal Shock: 0.5J/Kg (open sternum patients)



Select the ordered energy level using the ENERGY SELECT buttons on the front panel.

The selected energy level is shown as DEFIB XXXJ SEL. on the display.



2 Charge Defibrillator
Press the CHARGE button on the front panel.

To increase or decrease the selected energy after you have pressed the CHARGE button, use the defibrillator ENERGY SELECT buttons.

Caution! Changing the selected energy while the unit is charging or charged causes the defibrillator to disarm itself. Press the CHARGE button again to charge the unit.

After charging to the selected energy, the SHOCK button on the front panel lights up. A distinctive charge ready tone sounds and the DEFIB XXXJ READY is displayed. The defibrillator is now ready to discharge.

3 Deliver Shock

Warn all persons in attendance of the patient to STAND CLEAR prior to defibrillator discharge. Remove oxygen source at least 30 cm away from patient. Do not touch the bed, patient, or any equipment connected to the patient during defibrillation. A severe shock can result. Do not allow exposed portions of the patient's body to come into contact with metal objects, such as a bed frame, as unwanted pathways for defibrillation current may result.

Press and hold the SHOCK button until energy is delivered to the patient.

Once the energy is delivered, the display simultaneously shows XXXJ DELIVERED and DEFIB XXXJ SEL. After approximately 5 seconds, the XXXJ DELIVERED message disappears and the DEFIB XXXJ SEL. message remains to indicate the selected energy level.

Manual Defibrillation with Paddles

Keep Symbio rhythm simulator set to VT-HI

1 Select DEFIB
Turn the Mode Selector to DEFIB. The unit automatically defaults to the preconfigured first shock energy selection. Using the energy select button change the energy setting to that ordered by the MD

Note: Defibrillator PADDLES are selected as the ECG source when the instrument is turned to MONITOR or DEFIB with paddles connected to the OneStep cable.

Energy Select
Turn the Mode Selector to DEFIB. The unit automatically defaults to the preconfigured first shock energy selection (displayed below).

Unless internal handles are connected to the OneStep cable, the default energy selections for adult patients are:
Shock 1 - 75 joules
Shock 2 - 150 joules
Shock 3 - 200 joules

The device automatically sets the energy to the preconfigured Energy Level: Shock 1, 2, 3 setting at power-up and after each of the first two shocks. The ENERGY INCREMENTED message will be displayed after Shocks 1 and 2 are delivered. Manually changing the energy level outside the preprogrammed sequence and delivering a shock disables the automatic escalation function.

Energy Select:

Always look at the display, and verify that the selected energy is appropriate, and as ordered by MD

Although there are default energy settings within Zoll below, at SickKids we are selecting the Joules according to weight-based dosing.

Defibrillation weight-based dosing recommendations:

- 2J/Kg; then 4J/Kg; then anywhere from 6J/Kg up to maximum of 10 J/Kg
- Internal Shock: 0.5J/Kg (open sternum patients)

You can select a different energy level using the up and down arrow buttons. One pair is located on the front panel of the unit; the other pair is located on the sternum paddle.

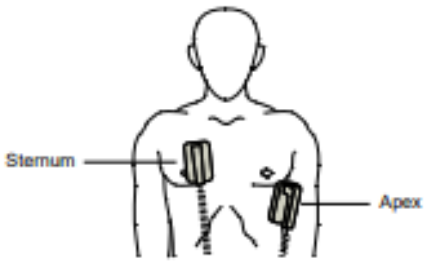
Prepare Paddles

Release the paddles, apply defibrillator gel pads. Make sure that the size of the pad is large enough to cover the entire paddle electrode area.

Apply Paddles to Chest

Apply the paddles firmly to the anterior wall of the chest.

Place the sternum paddle to the right of the patient's sternum (patient's right), just below the clavicle. Place the apex paddle on the chest wall, just below and to the left of the patient's left nipple, along the anterior-axillary line.



2 Charge Defibrillator

Press the CHARGE button on the apex handle or on the front panel.

If both SHOCK buttons on the paddles are depressed when the CHARGE button is activated, the unit does not charge and a RELEASE SHOCK BUTTON message appears on the display.

To increase or decrease the selected energy after you have pressed the CHARGE button, use the defibrillator ENERGY SELECT buttons on either the sternum paddle or the defibrillator front panel.

Caution! Changing the selected energy while the unit is charging or charged causes the defibrillator to disarm itself. Press the CHARGE button again to charge the unit to the newly selected energy level.

After charging to the selected energy, the charge indicator on the apex paddle lights. A

charge ready tone sounds, and the message DEFIB XXXJ READY is displayed. The defibrillator is now ready to discharge.

3 Deliver Shock

Warn all persons in attendance of the patient to STAND CLEAR prior to defibrillator discharge. Do not touch the bed, patient, or any equipment connected to the patient during defibrillation. A severe shock can result. Do not allow exposed portions of the patient's body to come into contact with metal objects, such as a bed frame, as unwanted pathways for defibrillation current may result.

Apply a force of 10 - 12 kilograms (22 - 26.4 pounds) to each paddle in order to minimize patient impedance and achieve optimal results.

Using your thumbs, simultaneously press and hold both SHOCK buttons (one on each paddle) until energy is delivered to the patient.

Caution! Use only thumbs to depress the SHOCK buttons. Failure to do so could result in the inadvertent depression of the ENERGY SELECT buttons, causing the defibrillator to disarm itself.

Once the energy is delivered, the display simultaneously shows XXXJ DELIVERED and DEFIB XXXJ SEL. After approximately 5 seconds, the XXXJ DELIVERED message disappears, and the DEFIB XXXJ SEL. message remains to indicate the selected energy level.

Note: If the defibrillator is not discharged within 60 seconds after reaching the selected energy level, the unit automatically disarms itself.

During the 10 seconds prior to disarming, the charge ready tone beeps intermittently. The charge ready tone then stops, the charge indicator light goes off, and the monitor message changes to DEFIB XXXJ SEL. Press the CHARGE button to recharge the unit.

Manual Defibrillation with Autoclavable Electrodes (internal paddles)

If applicable to clinical area, refer to Autoclavable Internal Handle and Electrode Operator's Guide

Advisory Defibrillation (Analyze/AED function)

Keep Symbio rhythm simulator set to VT-HI

When this mode is used, the device can identify shockable rhythms using it's built in ECG analysis capability. This is not the preferred mode at SickKids. As Advanced providers, the Manual mode on

Zoll is the principle mode of use. Although the AED function is available, it is not preferred and is not the norm at SickKids. AED/Analyze may be utilized in an uncertain situation and ONLY as a medically delegated act. If used, consider setting Joules in weight-based dosing for optimal energy delivery vs deferring to automated presets.

Use only pediatric electrodes to defibrillate patients under 8 years of age in Advisory mode. Use of adult electrodes with pediatric patients can result in the delivery of excessive energy doses.

Prepare patient's skin and apply electrodes in the same fashion as shown earlier.

1 Select DEFIB
Turn the Mode Selector to DEFIB. The unit automatically defaults to 75 joules or the preconfigured first shock energy selection.

Energy Select
Look at the display, and verify the selected energy is appropriate.

When used with OneStep Adult electrodes, the default energy selections are:
Shock 1 - 75 joules
Shock 2 - 150 joules
Shock 3 - 200 joules

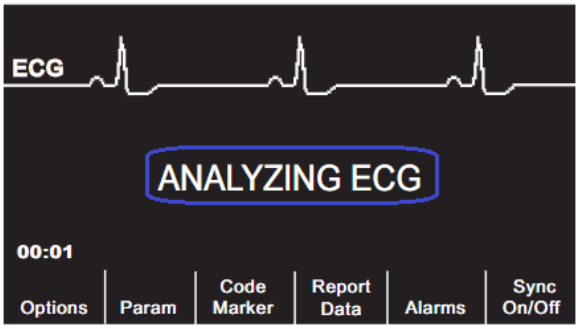
When used with OneStep Pediatric electrodes, the default energy selections are:
Shock 1 - 10 joules
Shock 2 - 20 joules
Shock 3 - 30 joules

After the third shock, all subsequent shocks are delivered at the same energy as the third shock in both Adult and Pediatric modes. If medical protocols allow, you may select a different energy level using the energy select up and down arrow buttons on the front panel. If you manually change the energy level outside preconfigured SHOCK 1, 2, 3 sequence and deliver a shock, it disables the automatic energy escalation.

2 Press ANALYZE Button

Keep patient motionless during ECG analysis. Do not touch the patient during analysis. Cease all movement on bed before analyzing the ECG.

Press the ANALYZE button to begin the analysis of the patient's ECG rhythm and to determine if a shockable rhythm is present.



An ANALYZING ECG message is displayed for 6 to 12 seconds while the patient's ECG is analyzed. Once the analysis is completed, the unit indicates whether a shock is advised. The analysis normally consists of three consecutive 3-second ECG rhythm analyses. If at least two of the three analyses determine that the patient has a shockable rhythm, the unit automatically charges to the preconfigured energy level and prompts the operator to shock the patient. If two or more of the three 3-second ECG analyses do not detect a shockable rhythm, the unit alerts the operator that no shock is advised.

When a nonshockable rhythm is detected, the unit displays a NO SHOCK ADV. message.

When a shockable rhythm is detected, the unit displays SHOCK ADVISED and PRESS CHARGE messages. Press the CHARGE button.

3 Press SHOCK

Warn all persons in attendance of the patient to STAND CLEAR prior to defibrillator discharge. Remove oxygen source 30 cm away from patient. Do not touch the bed, patient, or any equipment connected to the patient during defibrillation. A severe shock can result. Do not allow exposed portions of the patient's body to come in contact with metal objects, such as a bed frame, as unwanted pathways for defibrillation current may result.

Once the unit is charged to the selected energy, the SHOCK button illuminates, and the PRESS SHOCK message is displayed. Simultaneously, the monitor displays the energy level to which the defibrillator is charged, DEFIB XXXJ READY.

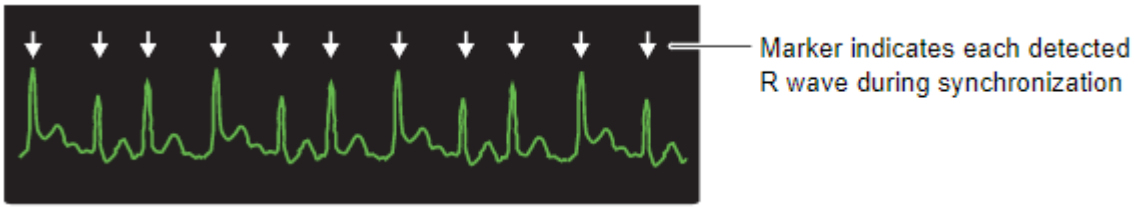
Press and hold the illuminated SHOCK button on the front panel until energy is delivered to the patient. An XXXJ DELIVERED message appears on the display for approximately 5 seconds. Watch the patient or ECG response to verify that the shock has been delivered. After the energy has been delivered to the patient, the display returns to DEFIBXXX J SEL.

After a shock delivered or a no shock advised message the device will prompt to perform CPR for 2 minutes. At the end of those 2 minutes the device will prompt to press analyze again.

Synchronized Cardioversion

Set Symbio rhythm simulator AFIB

Certain arrhythmias, such as ventricular tachycardia with a pulse, atrial fibrillation, and atrial flutter, require synchronizing the defibrillator discharge with the ECG R-wave to avoid the induction of ventricular fibrillation. In this case, the defibrillator detects the patient's R-waves. When the SHOCK button is pressed and held, the unit discharges with the next detected R-wave, thus avoiding the vulnerable T-wave segment of the cardiac cycle. When in the Sync mode, the unit displays markers (↓) above the ECG trace to indicate the points in the cardiac cycle (R waves) where discharge can occur.



Verify that markers are clearly visible on the monitor and their location is appropriate and consistent from beat to beat. If necessary, use the LEAD and SIZE buttons to establish settings that yield the most consistent Sync marker pattern.

The synchronized cardioversion procedure for ZOLL hands-free therapy electrodes is identical to that for paddles with the exception of the SHOCK button location. The R Series® defibrillator supports two types of synchronized cardioversion:

Prepare patient's skin and apply hands-free electrodes in the same fashion as shown earlier.

Attach ECG electrodes. A standard ECG cable and ECG electrodes are recommended for use during cardioversion. Hands-free therapy electrodes may be used as an ECG source. Signal quality will be equal to that of standard leads except immediately following a discharge when there may be more noise due to muscle tremors, especially if an electrode is not in complete contact with the skin. The ECG cable and electrodes will be placed on all patients on 4D, CCCU, PICU, NICU and ED.

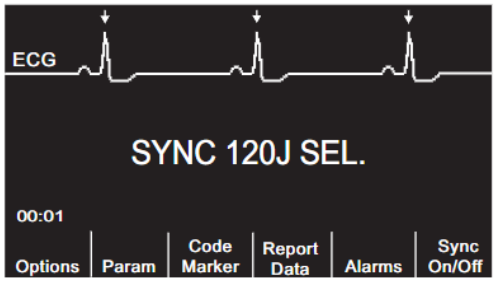
1 Select DEFIB

Turn the Mode Selector to DEFIB. Select the desired energy using the up and down arrow keys on the front panel (or sternum paddle if using paddles).

Press the Sync On/Off softkey

Your system will be in Sync mode once you press the Sync On/Off soft key. Press the Sync softkey to enter Sync mode. The selected energy level is displayed on the monitor. A Sync marker (↓) appears on the monitor above each detected R-wave to indicate where discharge will occur.

Verify that the markers are clearly visible on the monitor and their location is appropriate (e.g. not on the T wave) and consistent from beat to beat. If necessary, use the LEAD and SIZE buttons to establish settings that yield the best display. A SYNC XXXJ SEL. message appears on the display. If DEFIB XXXJ SEL. appears, press the Sync On/Off softkey. Two quick beeps sound.



2 Charge Defibrillator

Press the CHARGE button on the front panel

To abort charging and increase/decrease the selected energy after the CHARGE button has been pressed, use the ENERGY SELECT button. Press the CHARGE button again to charge the unit to the newly selected energy level. After charging the unit to the selected energy, the front panel SHOCK button illuminates. A distinctive audible tone sounds and the SYNC XXXJ READY message is displayed. The defibrillator is now ready to deliver therapy.

Warn all persons in attendance of the patient to STAND CLEAR prior to defibrillator discharge. Remove oxygen source 30 cm away from patient. Do not touch the bed, patient, or any equipment connected to the patient during defibrillation. A severe shock can result. Do not allow exposed portions of the patient's body to come into contact with metal objects, such as a bed frame, as unwanted pathways for defibrillation current may result.

Press and hold the illuminated SHOCK button on the front panel, until energy is delivered to the patient. The defibrillator will discharge with the next detected R wave. Shock is delivered with the

next R –wave. Caution: Failure to press and hold until the shock is delivered may result no shock being delivered. This is critically important in synchronized cardioversion

Once the energy is delivered, the display simultaneously shows XXXJ DELIVERED and DEFIB XXXJ SEL. After approximately 5 seconds, the XXXJ DELIVERED message disappears and the DEFIB XXXJ SEL. message remains to indicate the selected energy level.

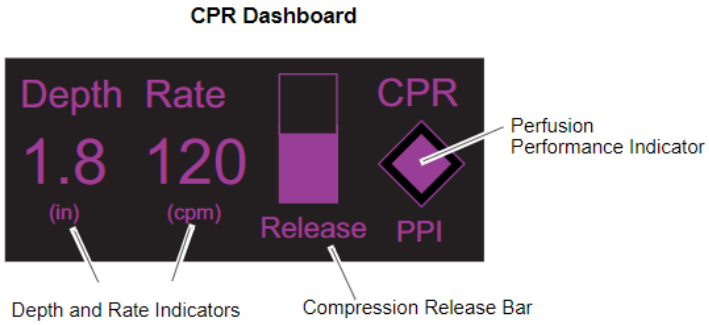
The device will stay in sync mode once SYNC is selected, so you need to remember to de-sync in the event of a non-synchronizable rhythm.

Real CPR Help (CPR feedback)

When used with OneStep CPR electrodes, the R Series® unit can provide rescuers with feedback about the quality of CPR they are delivering to their patients. The way in which feedback is provided is derived from compression rate and depth measurements. When applied according to package instructions, ZOLL OneStep CPR electrodes provide a chest compression puck that is located between the rescuer's hands and the patient's lower sternum. This puck monitors the rate and depth of chest compressions and sends this information to the R Series® unit. The R Series® defibrillator uses this information to provide feedback to the rescuer in the following forms:

- Perfusion Performance Indicator (PPI)
- CPR Idle Time Display
- CPR Rate Metronome
- Voice prompts
- Chest Compressions Waveform display
- FULLY RELEASE display prompt

Whenever OneStep CPR electrodes are connected to the R Series® defibrillator, the unit illuminates the Real CPR Help field in the upper center portion of the display.



Perfusion Performance Indicator (Adult Only)

This diamond shaped figure provides a quick, overall indicator of how well the rescuer's combined rate and depth of chest compressions match the AHA recommendations for adult CPR. Before chest compressions begin (and after each shock), the Perfusion Performance Indicator is displayed as a hollow outline. This index starts to fill from the center out as compressions begin, and becomes fully filled when consistent chest compression depth exceeding 1.5 or 2 inches, depending on the configuration, and rate exceeding 100 compressions per minute are simultaneously achieved. Should the chest compression rate or depth begin to fall below the AHA recommended levels, the PPI will only partially fill to indicate the need for more vigorous efforts. Following the cessation of compressions, the PPI's fill level gradually decreases until a hollow outline is displayed after a short period of time.

CPR Idle Time Display

This display indicates the elapsed time in minutes and seconds since the last detected chest compression. When compressions are being delivered, this time display will be blanked. Three seconds following the cessation of compressions, the display will illuminate and show the elapsed time since the last detected compression. If no compressions have been delivered for more than 20 minutes, dashes (---) will be displayed in this time field.

CPR Rate and Depth Display

The Rate and Depth values are displayed and are highlighted and change color if they are not within the AHA-recommended range of below 100 or over 120 compressions per minute. When using the OneStep Pediatric CPR Electrodes, the numeric value for depth will be displayed, however you will not receive the corrective prompts.

Compression Release Bar (Chest Recoil)

The Compression Release Bar shows the release of the chest compression by the rescuer. When the release of the chest is properly administered (quickly and completely released), the bar will fill all the way to the top.

CPR Metronome

The CPR metronome feature that can be used to encourage rescuers to perform chest compressions at the AHA recommended rate of 100 - 120 compressions per minute. The metronome beeps at the correct rate to provide a compression rhythm for rescuers to follow. The metronome is silent when no chest compressions are being detected. The metronome only beeps when chest compressions are detected and their rate falls below or above the AHA recommended levels.

CPR Voice Prompts (Adult only)
The device provides two voice prompts related to the depth of chest compressions as feedback to rescuers performing CPR. There are:

- Push Harder
- Good Compressions

When chest compressions are detected but their depth is consistently less than 1.5 or 2 inches (3.8 or 5 cm), depending on the configuration, the defibrillator will issue the prompt Push Harder every 15 seconds. If the rescuer responds by increasing compression depth to more than 1.5 or 2 inches (3.8 or 5 cm), depending on the configuration, on a consistent basis, the unit will issue a Good Compressions prompt.

Demonstration of Real CPR Feedback features when using OneStep **ADULT** CPR Electrodes

Set Symbio rhythm simulator to VT-HI

Demo Feedback on Compression Depth
For adults, the compression depth range is 5-6cm and therefore this is what the provider should aim for. Give chest compressions that are not deep enough so that the depth number highlights Yellow and the device voice prompt says Push Harder. Then increase your depth to at least 5 cm until the device voice prompt says Good Compressions. Point out that if your depth goes over 6 cm that the device will not provide a voice prompt, such as Push Softer, but the depth number will be highlighted Yellow to indicate that the learner needs to correct themselves until there is no yellow highlight for depth.

Feedback on Compression Rate
The recommended compression rate for adults, children and infants is 100-120 compressions per minute. Give compressions too slow so that the compression rate highlights yellow. Follow the metronome to get you back to the proper rate of 100-120 bpm. Give compressions too fast so that the compression rate highlights yellow and again follow the metronome to get you back to the proper rate of 100-120 bpm.

Feedback on Compression Release (Chest Recoil)
The aim is for the release bar (or chest recoil bar) is fully purple to indicate ideal release or recoil. Give compressions without fully/quickly releasing (poor recoil) and point out that the Release Bar will not be full. The best way to demonstrate this is to lean on the mannequin. Point out this is because you are not providing adequate chest recoil.

Then show how Release Bar fills when you allow full/quick release (proper recoil). Stop leaning on the mannequin for this demonstration.

Demonstration of Real CPR Feedback features when using OneStep **PEDIATRIC** CPR Electrodes

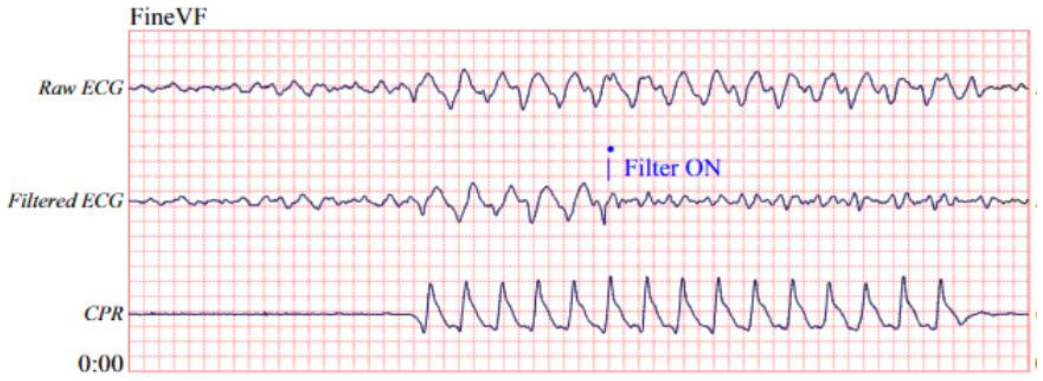
When using the OneStep Pediatric CPR Electrodes actual compression depth will display in cm, however no audible prompts such as push harder or good compressions will be heard. No release (recoil) bar, no PPI.

Recommended Compression Depth by Age
Infants = 4 cm
Child = 5 cm
Adults = 5-6 cm

See-Thru CPR

When chest compressions begin, the unit automatically starts filtering the CPR artifact after detecting the first 3 to 6 compressions. The filtered ECG, with the label "FIL," may will be displayed on the second trace. When no compressions are detected See-Thru CPR filtering stops, and unfiltered ECG signals are displayed. When compressions resume, filtering automatically restarts after 3 to 6 chest compressions.

The following figure shows a patient in Fine VF. It is difficult for a rescuer to discern this rhythm during CPR compressions. When the CPR filter turns on, the Fine VF rhythm becomes more obvious.



Demonstrate See-Thru CPR

Set Symbio rhythm simulator CPR Artifact (when starting compressions to show filtered waveform)

The FIL waveform shows how the device filters out CPR artifact allowing you to see if an organized underlying rhythm is developing. FIL is not meant to diagnose. Allows you to charge defib WHILE doing compressions. The charge will hold for 60 seconds

Set Symbio simulator to CPR Filtered (when stopping compressions to show raw waveform)

When stopping CPR to analyze the rhythm, wait for the ECG tracing to resolve CPR artifact and make your "official analysis" of the rhythm. SHOCK if needed, or disarm (energy select down) if not needed.

Noninvasive Temporary Pacing

Set Symbio rhythm simulator to 3rd

To avoid risk of electrical shock, do not touch the gelled area of the hands-free therapy electrodes while pacing.

Therapy electrodes should be replaced periodically. Prolonged pacing (in excess of 30 minutes), particularly in neonates or adults with severely restricted blood flow, may cause burns. Periodic inspection of the underlying skin is recommended.

If the unit was NOT turned off > 10 sec and less than 10 minutes have elapsed since the pacing mode was last used, reactivating the pacer mode causes pacing to resume immediately at the previously selected mA and ppm settings.

R Series® defibrillators contain a VVI demand pacemaker. Proper demand pacing requires a reliable, high quality surface ECG signal. For best results apply both standard ECG monitoring electrodes and hands-free pacing therapy electrodes.

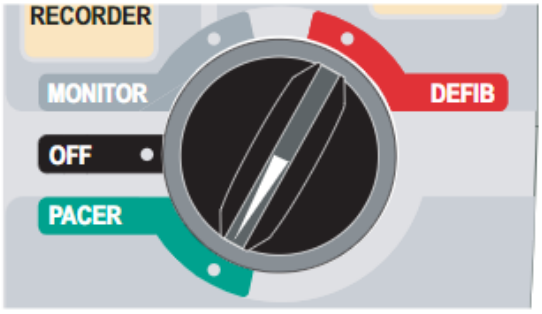
Prepare patient's skin in the same fashion as shown earlier. Apply ECG electrodes, attach lead wires, and connect the ECG cable to the R Series® rear panel. Electrodes should be in Anterior-Posterior position for both adults and pediatrics.

OneStep Adult CPR Electrode	OneStep Pediatric CPR Electrode
	
Tear the puck off the Anterior Pad and put on the sternum Put Anterior Pad (blue) in the posterior position Put Lateral Pad (red) in Anterior position (APEX)	A/P position, same as defibrillation and cardioversion

Connect these therapy electrodes to the OneStep cable and apply ECG leads.

Verify proper R-wave detection. The heart-shaped symbol flashes with each R-wave when proper detection is taking place.

Turn Selector Switch to PACER

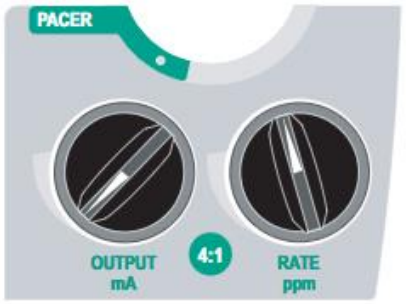


If the unit has just been turned on, the PACER OUTPUT is automatically set to 0 mA.

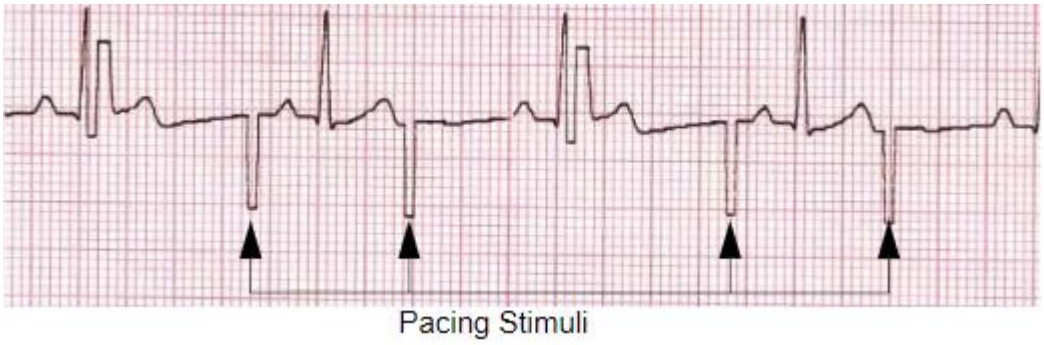
Set Pacer Rate

Set the PACER RATE to a value 10-20 ppm higher than the patient's intrinsic heart rate. If no intrinsic rate exists, use 100 ppm.

The pacer rate increments or decrements by a value of 2 ppm on the display when the knob is turned.



Observe the pacing stimulus marker on the display or stripchart and verify that it is well-positioned in diastole.


Pacing Stimuli

Set Pacer Output
Symbio rhythm simulator will capture when Output is set at ~50 mA

Increase PACER OUTPUT until stimulation is effective (capture); the output mA value is displayed. The pacer output increments and decrements by a value of 2 mA on the display when the knob is turned.

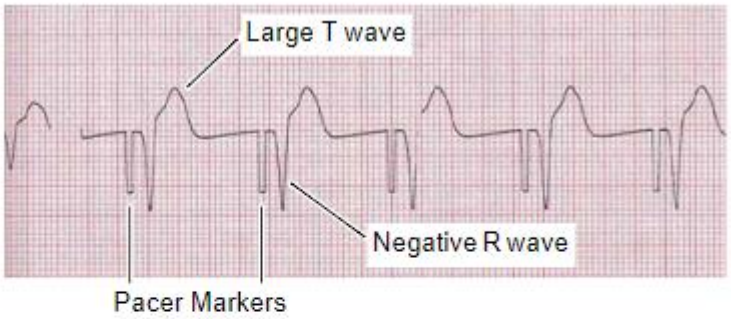
Note: When the unit is switched out of PACER mode into DEFIB or MONITOR mode and then switched back to PACER mode, within 10 seconds the pacer settings remain unchanged. If the unit is turned off for more than 10 seconds, the pacer's power up default settings are restored.

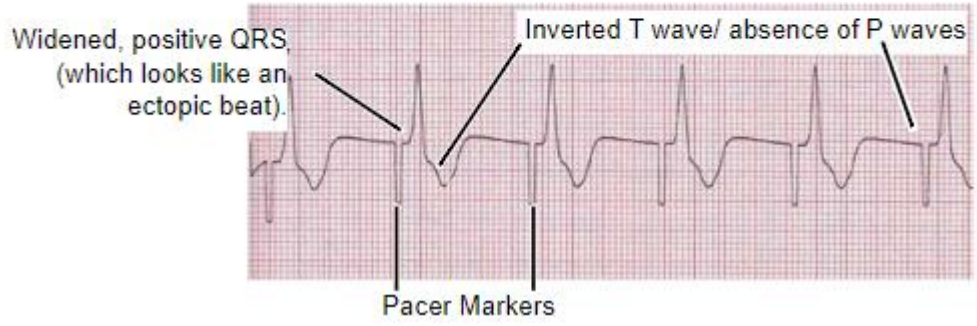
It is important to recognize when pacing stimulation has produced a ventricular response (capture). Determination of capture must be assessed both electrically and mechanically in order to ensure appropriate circulatory support of the patient. Electrical capture is determined by the presence of a widened QRS complex, the loss of any underlying intrinsic rhythm, and the appearance of an extended, and sometimes enlarged, T-wave. Ventricular response is normally characterized by suppression of the intrinsic QRS complex.

Mechanical capture is assessed by palpation of the peripheral pulse.

Effective pacing

The following ECG traces illustrate typical examples of effective pacing.

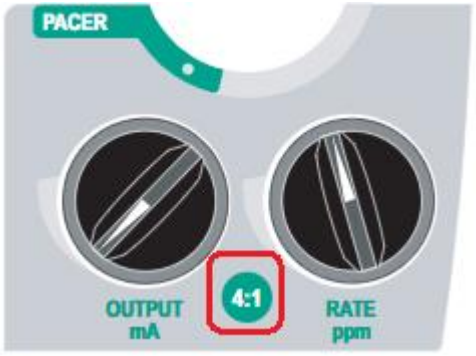




Determine Optimum Threshold

The ideal pacer current is the lowest value that maintains capture — usually about 10% above threshold. Typical threshold currents range from 40 to 80 mA. Location of the hands-free therapy affects the current required to obtain ventricular capture. Typically the lowest threshold is obtained when the position of the electrodes provides the most direct current pathway through the heart while avoiding large chest muscles. Lower stimulation currents produce less skeletal muscle contraction and are better tolerated.

4:1 Mode



Pressing and holding the 4:1 button temporarily withholds pacing stimuli, thereby allowing you to observe the patient's underlying ECG rhythm and morphology. When depressed, this button causes pacing stimuli to be delivered at ¼ of the indicated ppm setting.

Standby Pacing

For certain patients it may be advisable to use the unit in standby mode. When used in standby mode, the unit automatically provides pacing stimuli whenever the patient's heart rate drops below the pacer rate setting. To use the device in standby mode:

- Establish effective pacing
- Set the mA output 10% higher than the minimum mA output necessary to effect consistent ventricular capture
- Turn the pacing rate (ppm) below the patient's heart rate. This suppresses pacing unless the patient's own rate drops below the pacer rate setting.

Asynchronous Pacing

If ECG electrodes are not available or there is some circumstance that prevents or interferes with the surface ECG, the R Series® delivers pacemaker pulses asynchronously. Asynchronous pacing should be performed only in an emergency when no alternative is available. To pace asynchronously:

- Turn the Mode Selector to PACER
- Press the Async Pacing On/Off softkey
- The display shows "ASYNC PACE" to indicate that asynchronous pacing has been activated.
- To return to demand pacing, press the Async Pacing On/Off softkey again. The display returns to "PACE."

Patient Monitoring

To monitor your patient turn the mode selection to Monitor. The keys in the grey area affect what you see in the display. Press Lead to cycle through different leads. Press Size to change the size of the ECG waveform.

There are options for advanced monitoring of pulse oximetry, NIBP and End Tidal CO2. You can select a patient type for NIBP that will determine the default cuff inflation pressure and alarm limits/ To change the patient type setting, press the PARAM soft key, NIBP PT Type, then select the patient type you want i.e. NIBP Adult, Ped, Neonate.

Options - Includes:

- QRS Vol On/QRS Vol Off: Turns QRS tone on or off.
- Low Bright/High Bright: Adjust Screen Brightness Low and High
- Traces: Waveforms you can bring up. Options——Traces——Trace 2,3.

Param - includes various parameters for each component (SPO2, 3 Lead, ETCO2, NIBP)

EtCO2

- To deploy, place Single Patient Airway Adapter in to place
- No Need to ZERO between each use
- CO2 Warms up when defib is turned on (takes 60-90 seconds)
- Everything happens automatically, "Plug and Play"
- If Zero is needed, attach disposable adaptor to the cable, leave on roam Air (not in line), press zero
- Zero only need to be performed first time the device will be used, when switching from peds to adult sensor, when the device asks for it (or displaying questionable values)
- To Bring up the waveform: Options——Traces——Trace 3——EtCO2

NIBP Key

- Press Once = stat NIBP reading. Press again to abort reading.
- Press and hold for 2 Seconds for Auto Interval reading
- NIBP: press Param—Setting—Auto Interval (set time for Auto Interval)

Data Transfer

Code Summary data will be pushed automatically via Wi-Fi, when device is turned off for internal review.

Frequently Asked Questions

Q1: What types of pads will be used at SickKids and what are the indications?

A1: All multifunction electrodes (Pads) should be placed as indicated on the packaging.

Electrode/Pad Type	CPR Feedback	Indications	Pad Placement
OneStep Pediatric CPR Electrodes	Yes	0-8 years, 3-25 kg	Anterior/Posterior 
OneStep Adult CPR Electrodes	Yes	> 25 kg (Anterior/Anterior placement for Defibrillation and Cardioversion) (Anterior/Posterior placement for Pacing or refractory arrhythmias)	Anterior/Anterior 
PADPRO Mini Infant: (Alternate company)	No	< 3 kg	Anterior/posterior 
Pedi-padz Radiolucent	No	Paeds 3 kg - 15 kg • Cardiac Catheterization Lab • Operating Room • Open sternum • Sternal dressing < 48 hr • Dehisced/infected wounds • Sternal ECMO cannulation	Anterior/Posterior or Anterior/Anterior 

Pro-Padz Adult Radiolucent (Cath Lab only, Conmed Padpro Adult/Child > 10 kg	No	Adult > 15 kg • Cardiac Catheterization Lab • Operating Room • Open sternum • Sternal dressing < 48 hr • Dehisced/infected wounds • Sternal ECMO cannulation	Anterior/Anterior 

Q2 – Which energy mode are we to use – manual mode or analyze/advisory mode?

A2 - The Analyze/AED button initiates ECG analysis to determine whether a shockable rhythm is present. The use of the Analyze/AED function on the Zoll defibrillator is for Advanced users ONLY (not BLS). Application of energy (cardioversion, defibrillation, pacing) in a patient care area is a medically delegated act and requires a Physician's order.

As Advanced providers, the Manual mode on Zoll is the principle mode of use. Although the AED function is available, it is not preferred and is not the norm at SickKids. AED/Analyze may be utilized in an uncertain situation and ONLY as a delegated medical act. If used, consider setting Joules in weight based dosing for optimal energy delivery vs deferring to automated presets.

Note: The Lifepak AEDs can be used in non-patient care areas and can be used by BLS providers without medical delegation i.e. without a medical order.

Q3: Will we used weight-based dosing for the energy delivery or automatic presets?

A3: Weight-based dosing at SickKids will be primarily used.

Q4: Will we continue to pre-connect ECG leads when performing cardioversion?

A4: A standard ECG cable and ECG electrodes are recommended for use during synchronized cardioversion. All areas will continue to pre-connect the ECG leads to ensure a reliable clear ECG signal while attempting cardioversion.

Q5: Which pads will remain connected to the Zoll defibrillators?

A5: OneStep Pediatric CPR electrodes will be the standard pre-connected electrodes. Some specialty units (e.g. NICU, Cath lab, Cardiac OR) may decide to pre-connect alternate pads such as PADPRO Mini Infant, Pedi-Padz (radiotranslucent) or Pro-Padz Adult (radiotranslucent). If it is a non-Zoll pad or Zoll pad that does not indicate "OneStep" then the therapy cable should be plugged into the base port to allow for self-testing.

Q6: What quality checks will be done and when?

A6: To ensure Code Readiness of the device, routine Visual Inspections and Functional Testing are required. Visual inspections are required every 12-24 hours. The frequency of these inspections are to be consistent with the area's current practice for defibrillator inspections. To perform Visual Inspections, refer to the "Code Readiness Checklist: Zoll R Series Checklist" form next to the device.

Functional testing is required every 24 hours (NOT weekly) and involves a) Defibrillator Testing with Hands-free Therapy Electrodes, Pacer Testing, and a Recorder Check. For instructions on how to perform these tests refer to the laminated cards attached to the device.

Documentation of Visual Inspections and Functional Testing should be documented on the "Code Readiness Checklist: Zoll R Series Checklist" form. Clinical areas are responsible for establishing and maintaining a process for ensuring that these are completed as outlined below.

Q7: Will an input cable be provided linking the bedside monitor with the defibrillator?

A7: This is being looked into by our medical engineering department.

External Paddles

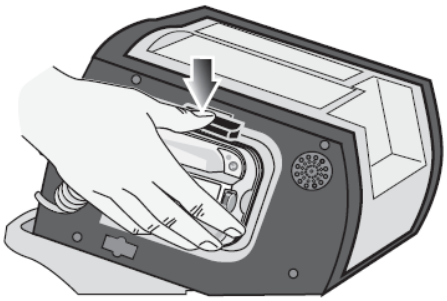
The external paddles on the R Series® device are used for defibrillation and synchronized cardioversion.

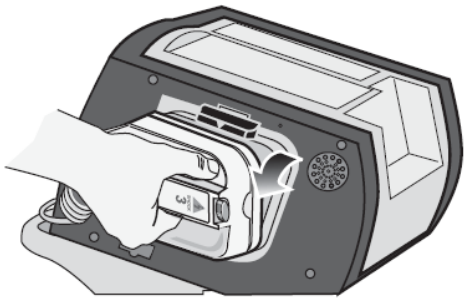
Caution: You cannot use paddles for ECG analysis or pacing.

Defibrillation paddles can be used for ECG monitoring when it is not practical to apply ECG electrodes. Press the LEAD button to select PADDLES as the ECG source. The paddles are stowed in wells on either side of the unit.

Releasing the Paddles

To release the paddles, grasp the handles and then press down on the latch button above each paddle.

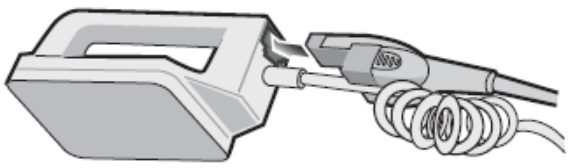




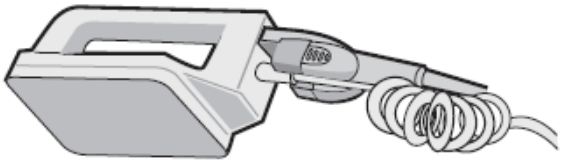
Attaching the OneStep Cable to the APEX Paddle

Attach the OneStep cable from the R Series® unit to the connector at the base of the apex paddle.

1. Align OneStep cable as shown.

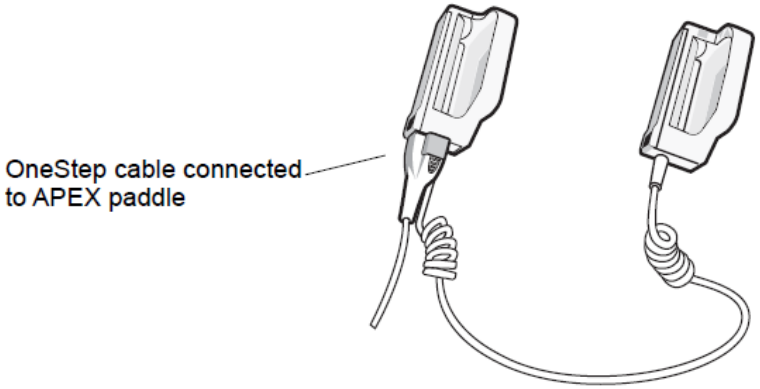


2. Insert OneStep cable into APEX paddle.



OneStep Cable Connected to APEX Paddle

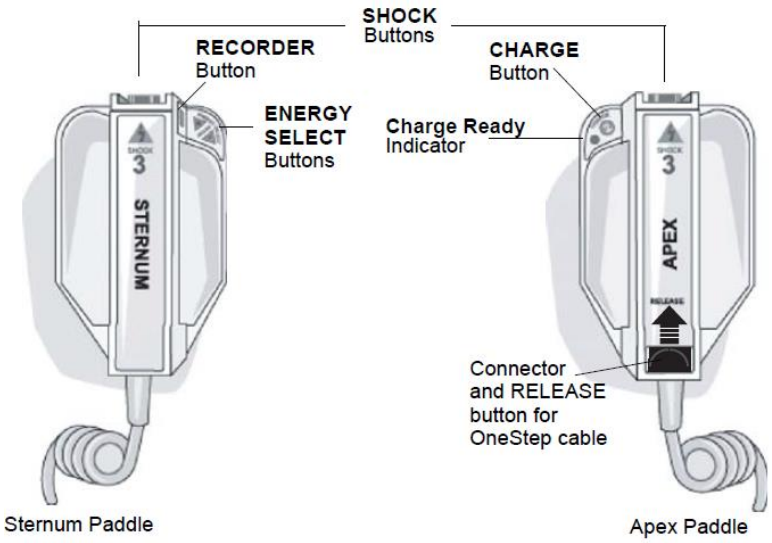
Below shows the OneStep cable connected to the Apex paddle.



If you need to detach the OneStep cable from the APEX paddles, push the RELEASE button in the direction of the arrow and unplug the OneStep cable.

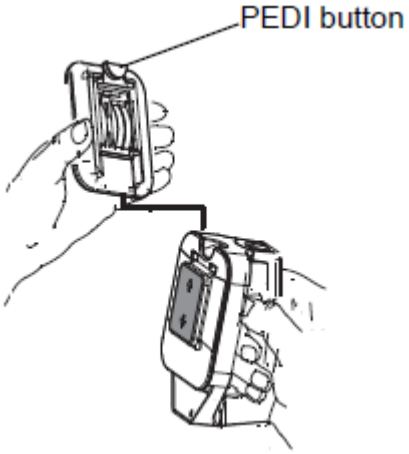
External Paddles

The paddles include controls for selecting defibrillation energy, charging, delivering a shock, and turning the stripchart recorder on and off.



Pediatric-size electrodes are built into the paddle assembly beneath the standard electrode plates. The user must manually adjust energy settings to pediatric levels.

Pediatric Plate



To expose the pediatric plate, press the PEDI button at the top of the paddle, then slide the Adult plate upward.

Before replacing the Adult plate, be sure to clean the pediatric plate and surrounding area thoroughly. Slide the Adult plate onto the paddle until it locks into place.

Participant Attendance Log: Zoll R Series® Defibrillator Provider Training

Date	Full Name (PRINT)	Badge Number	Initials	Unit/Department	RN/RRT/ MD/NP	Super User's Name (PRINT)

Zoll R Series Defibrillator

Refresher Just-in-time Training (JITT)

Refresher Just-in-time Training

Super Users can also support education and practice on the Zoll defibrillator using Just-in-Time Training (JITT) sessions to refresh key learnings from the Zoll Provider class. JITTs are intended to be short 10-15 minute sessions where principles of safety are reinforced and skills are practiced.

The following 3 JITTs can be done in isolation of each other, or all together if time allows. The JITTs focus on three key aspects of cardiopulmonary resuscitation.

1. Basic Life Support (BLS) – Cardiopulmonary resuscitation (CPR)

2. Advanced Life Support (ALS) - Application of energy using the Zoll defibrillator

3. System Safety: Functional and visual checks of the Zoll defibrillator

Learner Objectives

At the end of the JITTs, IPT members trained on the Zoll defibrillator will:

JITT #1: Basic Life Support (BLS)
Select the correct Multifunction Electrode and provide high quality CPR using real time feedback, minimizing interruptions in compressions, according to Heart and Stroke standards

JITT #2: Advanced Life Support (ALS)
Apply energy (defibrillation, cardioversion, pacing) safely as per American Heart Association (AHA) standards

JITT # 3: Functional Testing and Visual Inspections
Perform regular defibrillator and system checks to ensure the defibrillator (and accessories) is code ready at all times.

Target Audience

IPT members who will use the Zoll defibrillator during Code Blue events and/or when there is a need for elective or emergent application of energy.

Duration

10-15 minute sessions per JITT. Super Users can perform a single JITT or multiple JITTs, as time allows. Code blue nurses, and CSN's can complete all 3 JITTs for refresher training and practice.

Zoll R Series: Refresher Just-in-time Training (JITT) Outline	
	Modules
3 JITTS	1. Basic Life Support (BLS) 2. Advanced Life Support (ALS) 3. Functional and Visual Checks
Pre-reading	Super User Guide for Provider Training (Zoll Defibrillator) R Series Quick Reference Guide (SickKids modified) R Series ALS Script (SickKids)
Helpful Resources	Videos Quick reference guides Operator Guide All resources above can be found on the SickKids Resuscitation Education website

Multifunction Electrodes and Indications

Electrode/Pad Type	CPR Feedback	Indications	Pad Placement
OneStep **Pediatric** CPR Electrodes	Yes	**0-8 years, 3-25 kg**	Anterior/Posterior 
OneStep **Adult** CPR Electrodes	Yes	**> 25 kg** (Anterior/Anterior placement for Defibrillation and Cardioversion) (Anterior/Posterior placement for Pacing or refractory arrhythmias)	Anterior/Anterior 
PADPRO **Mini Infant:** (Alternate company)	No	**< 3 kg**	Anterior/posterior 
Pedi-padz **Radiolucent**	No	**Paeds 3 kg - 15 kg** • Cardiac Catheterization Lab • Operating Room • Open sternum • Sternal dressing < 48 hr • Dehisced/infected sternal wounds • Sternal ECMO cannulation	Anterior/Posterior or Anterior/Anterior 

Pro-Padz Adult **Radiolucent** (Note: Cath lab only: Conmed Radiotransparent Electrode – Adult/ Child ≥ 10 kg)	No	**Adult > 15 kg** • Cardiac Catheterization Lab • Operating Room • Open sternum • Sternal dressing < 48 hr • Dehisced/infected sternal wounds • Sternal ECMO cannulation	Anterior/Anterior 

JITT #1: Basic Life Support (BLS)
Activity - (15 minutes)
Objectives End Users will select the correct Multifunction Electrodes and provide high quality CPR with real time feedback, as per AHA standards.

A - BLS Overview

- Tour of the defibrillator (review): monitor (grey), defibrillator (red), pacer (green)
- Review Multifunction Electrodes and indications (See diagram above)
  - OneStep Adult CPR Multifunction Electrodes (CPR feedback) (>8 yrs; > 25 kg)
  - OneStep Pediatric CPR Multifunction Electrodes (CPR feedback) (≤ 8 yrs; ≤ 25 kg)
  - Conmed PADPRO Mini Infant Electrodes (Basic Pad) (< 3 kg)
  - Pro-Padz Radiolucent Adult Multifunction Electrodes (Basic Pad) (> 15 kg)
  - Pedi-Padz Radiolucent Multifunction Electrodes (Basic Pad) (≤ 15 kg)
  - Conmed Radiotransparent Electrode (Basic Pad) (Adult/Child ≥ 10 kg) (Cath Lab Only)
  - Practice connecting and disconnecting Multifunction Electrodes. Apply one end and roll pad to ensure no air is trapped within electrode. Review proper multifunction electrode placement by following directions on packaging. Exceptions are when pacing with OneStep Adult pads (A-P position & remove puck), and refractory arrhythmias as covered in main Facilitator Guide.

B - Connecting External Paddles

- Select and apply correct paddles: Child (≤ 8 yrs; ≤ 25 kg); Adult (>8 yrs; > 25 kg)
- Connect and disconnect paddles
- Remove paddles from defibrillator
- Demonstrate removing secondary paddle plate for children ≤25 kg. To release adult paddle – depress toward the metal paddle and push up away from handle
- Use conduction gel pads

C - Performs High Quality CPR using Real CPR Feedback

- Symbio Simulator: (Set to CPR filtered) – start compressions
- Symbio Simulator: (Set to CPR artifact) – start compressions- compression artifact is filtered out
- Review CPR Dashboard
- Review Adult and Pediatric with Real Help CPR *(Refer to Quick Ref. Guide pg. 5)*

D - OneStep **Adult** CPR Electrodes: Set CPR Filtered. Start compressions and review

- Trigger CPR rate Metronome (both) (100-120 compressions/min)
- OneStep Adult compression depth: **5-6 cm**
- Visualize compression release (recoil) display, Voice prompts, Perfusion Performance Indicator
- Review Chest compressions waveform display. Review See-Thru CPR *(Refer to Quick Guide pg. 5)*
- Pay attention to all CPR cues! PPI, Release Recoil and Rate. "Purple is Perfect CPR"

Caution: If the voice prompts you to push harder, cross check that your release/recoil bar remains fully purple. If not assess whether you are leaning on the patient and therefore not allowing complete recoil.

CASE 1: Set Symbio Simulator on Ventricular Fibrillation (*Set"CPR Filtered" so can see V-fib)

10 yr old, 30 kg boy with hyperkalemia, K+ 7.1. The rhythm is ventricular fibrillation.

What pad will you select? What do you anticipate next? What is your depth, rate?

Pay attention to the idle time and the 2 min time/person performing CPR

- ✓ Chooses OneStep **Adult** CPR Electrodes. Lines puck correctly in-line with trachea and axilla
- ✓ Review BLS: Calls a code and begins compressions (When compressing, set Symbio on CPR

artifact so they can see how Zoll filters out the compressions)

- ✓ Performs high quality CPR, rate 100-120/min with depth 5 cm, full recoil, full PPI. There are no voice prompts. If they pump too fast metronome will come back on to help pace the compressions
- ✓ Observes idle timer (time off chest); time doing CPR (max 2min)

Note: This patient will get defibrillated (Facilitators may move into defibrillation)

E - OneStep **Pediatric** CPR Electrodes: Start Compressions

Trigger CPR rate Metronome (both) (100-120 compressions/min)

Depth for **Infant** compressions: **4 cm;** Depth for **Child** compressions: **5 cm**

Review chest Compressions Waveform Display; Review See-Thru CPR

The pediatric electrodes do not show you the "release/recoil" or the "PPI" highlight in yellow the depth or rate. You will not hear any voice prompts for depth or rate. Your rate will be coached by the metronome.

CASE 2: Place Symbio Simulator on Sinus Bradycardia

4 kg septic baby in sinus bradycardia has a HR of 40 b/min. What pad will you select? What will you do next? What is your depth, rate? How much idle time is acceptable in high quality CPR?

- ✓ Chooses OneStep **Pediatric** CPR Electrodes
- ✓ Review BLS: Calls a code and begins compressions. (Set Symbio on CPR Artifact)
- ✓ Performs high quality CPR with real time feedback
- ✓ Compresses at 100-120/min, depth 4 cm for the **infant**; 5 cm for **child**. Reviews idle time off chest
- ✓ For basic multifunction electrodes (cm measurements as above or 1/3 the anterior posterior chest wall diameter)

For a 1.8 kg, what multifunction electrodes will you use? PADPRO Mini Infant for < 3 kg

JITT #2: Advanced Life Support (ALS) – Applying Energy

(Cardioversion, Defibrillation, Pacing)

Activity (15 minutes)
Objective: Apply energy (defibrillation, cardioversion, pacing) safely and according to AHA standards

A - Defibrillation

- Review selecting correct Electrode or Paddle Placement. (*Refer to Quick Reference Guide pg. 2)*
- Review Adult-Pediatric Manual Defibrillation with Hands-Free Electrodes. *(Refer to Quick Reference Guide pg. 4*)
- Demonstrate Manual Defibrillation with External Paddles.

Leave paddles in device to discharge safely into defibrillator during practice. Set 30J only - max dose can be delivered into the defibrillator through paddles whilst in paddle holders.

- Preferred mode is manual defibrillation dosing in Joules/kg (not Analyze/AED mode)
- Defibrillation dosing: 2J/kg, 4J/kg, and then 6-10J/kg (Maximum dose capable is 200J). If Analyze/AED select, to get to manual mode turn to monitor and back to defib, then adjust Joules and continue to defibrillate

CASE 3: Set Symbio Simulator on ventricular fibrillation (CPR Artifact)

10 yr old, 30 kg boy with hyperkalemia - K+ 7.1. Rhythm is ventricular fibrillation

What pad will you select?

What do you anticipate next?

What is your rate and depth?

Pay attention to the idle time and the 2 min time/person performing CPR

- ✓ Chooses OneStep **Adult** CPR Electrodes. Lines puck correctly in-line with trachea and axilla
- ✓ Review BLS: Calls a code and begins compressions
- ✓ Performs high quality CPR, with rate 100-120/min, depth 5 full recoil, full PPI

- ✓ Observes idle timer (time off chest); time doing CPR (max 2min)
- ✓ Sets 75 J – unsynchronized shock – there is no 60 J. Calls "I'm Clear, Your Clear, Oxygen is clear", Defibrillates at 75 J). Uses Manual mode vs Analyze AED mode
- ✓ Demonstrates disarming the defibrillator if the charge button has been selected by decreasing or increase energy select

B - Internal Cardioversion/Defibrillation (Internal Paddles)

- Manual Mode. Dose: 0.5 J/kg

C - Synchronized Cardioversion

CASE 4: Set Symbio simulator to atrial fibrillation

5 yr old 20 kg girl with atrial fibrillation, 24 hours ago and her sternal dressing is intact. She has a pulse and is lethargic. What do you anticipate next? Can you shock without a medical order?

- Review Manual Mode - Cardioversion dosing: 0.5 – 1J/kg, then 2J/kg

- ✓ Selects correct pad - (Adult Pro-padz) **(Radiolucent).** Sternal wound dressing < 48 hrs
- ✓ Applies ECG leads and selects Lead II for most reliable rhythm. (*Refer to Quick Reference Guide pg.* 6). Sedates patient
- ✓ Demonstrates synchronized cardioversion at 10 J or 20 J. ``Synch" ON and R wave marker is mapping out R-waves (not T waves). When Synch is turned on, look on the main screen for the words "Synch" vs "Defib"
- ✓ 1 – Sets Joules; 2- Press Charge
- ✓ 3 – discharge: `Press and hold to discharge until the shock is delivered, as the energy is synchronized to the R-wave

Note: If you want to turn synchronized mode OFF due to a pulseless arrest, you must reselect the Synch button.

D - Pacing

CASE 5: Set Symbio Sim to 3rd Degree Heart Block with HR of 40 b/min. Connect ECG leads to simulator. Must be attached to ECG leads and on lead II on Symbio Sim

7 kg child in 3rd degree Heart Block from drug overdose

- Review Mode Non-invasive Temporary Pacing (VVI/Demand) (*Quick Reference Guide pg.* 6)
- Review Pad Placement - Adult OneStep CPR – multifunction electrodes - Anterior/Posterior)
- Review Pad Placement - Pediatric CPR Electrode (multifunction electrodes - Anterior/Posterior)
- Review Pad placement – Basic pads – PADPRO Mini; Pedi-padz, Adult-padz
- Non-invasive Temporary Pacing (VOO/Asynchronous/Fixed) Emergency Only

- ✓ Selects correct pad and performs high quality CPR - OneStep **Pediatric** CPR Electrodes
- ✓ Uses correct pad placement. Ensures ECG Leads are ON patient (* in this case ECG leads should be on the Symbio simulator) as the therapy cable can't transmit pacing and read ECG simultaneously. Set on Pacing with a rate of 70/min or appropriate rate for age. Starts with 0 mA and no capture (spikes but no QRS and intrinsic HR of 38 b/min
- ✓ Demonstrates pacing. Increases mA until the pacing spikes with capture is observed and the rate on the top of the monitor matched the paced set rate. Leave mA 10% above capture

What if this was a 30 kg patient, how would you move the multifunction electrodes?

Note the atypical placement - Remove puck from the OneStep **Adult** CPR Electrodes and move the blue anterior pad to the back the move the lateral electrode on the front

JITT # 3: Functional Testing and Visual Inspections	
JITT # 3	Activity - (10 minutes):
Objective	Perform regular defibrillator and system checks to ensure the defibrillator (and accessories) is code ready at all times.

A - Functional Testing

Functional testing is required every 12-24 hours (not weekly). Frequency should be consistent with

your area's current standard of practice for defibrillator checks. Each clinical area is responsible for establishing and maintaining a process for these functional checks.

Functional testing includes:

- Defibrillator Testing with Hands-Free Therapy Electrodes
- Pacer Testing
- Recorder Check

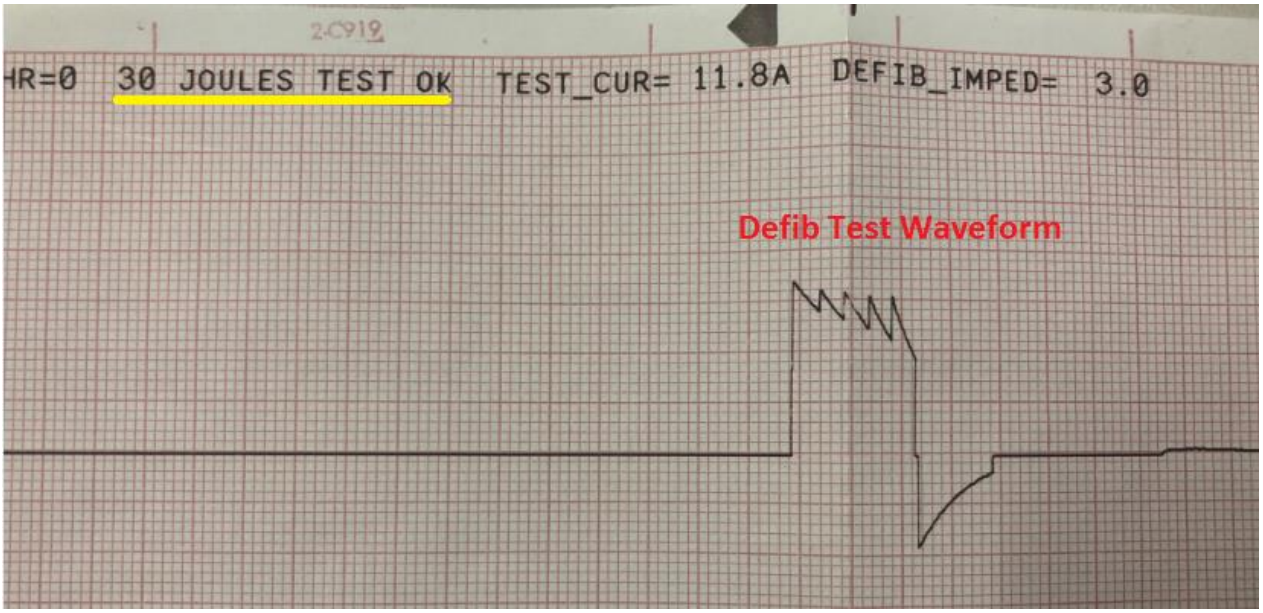
Refer to reference cards attached to the defibrillation carts.

R Series® Defibrillator Testing -- Demonstrates defibrillator check – (Refer to card on Zoll)

To test the manual defibrillation function using hands-free therapy electrodes:

1. Connect the R Series to AC Mains (power outlet)
2. Turn the defibrillator off for at least 10 seconds.
3. Turn the Mode Selector to DEFIB. The defibrillator emits a four- beep tone indicating successful completion of the power-on self-test. The ECG source is PADS, and ECG size is X1. "DEFIB 10J SEL." The ECG trace appears as a solid line while the OneStep™ cable is connected to either the Test Port or OneStep electrodes.
4. Press the ENERGY SELECT buttons to set the energy to 30 joules. DEFIB PAD SHORT appear on the display.
5. Press the CHARGE button on the front panel.
6. When the charge-ready tone sounds, press the ENERGY SELECT buttons to set the energy to 20 joules. Defibrillator will disarm itself.
7. Press the ENERGY SELECT buttons to reset the energy to 30 joules. *Note: For testing, the unit discharges the defibrillator only if the energy is set to 30 joules.*
8. Press the CHARGE button on the front panel.
9. When the Ready tone sounds, press the SHOCK button on the front panel until the shock is delivered. **The defibrillator displays the message 30J TEST OK and prints a stripchart indicating 30J TEST OK and the delivered energy**. If the message 30J TEST FAILED appears, contact clinical engineering or the ZOLL Technical Service.

Defib Check:

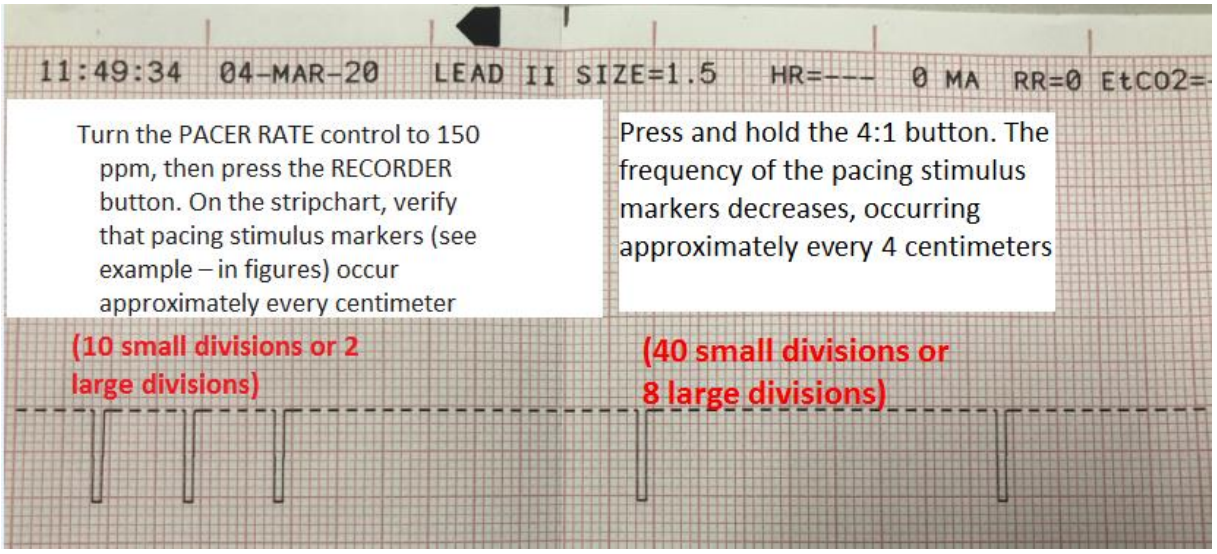


R Series® Pacer Testing - Demonstrates pacer check

1. Ensure the R Series is connected to AC Mains (power outlet).
2. Turn the Mode Selector to PACER.
3. Turn the PACER RATE control to 150 ppm, then press the RECORDER button. On the stripchart, verify that pacing stimulus markers (see example – in figures) occur approximately every centimeter
   (10 small divisions or 2 large divisions)
4. Press and hold the 4:1 button. The frequency of the pacing stimulus markers decreases, occurring approximately every 4 centimeters
   (40 small divisions or 8 large divisions)
5. Turn the PACER OUTPUT control to 0 mA.
6. Disconnect the OneStep cable from the test port or OneStep electrodes, and slowly turn the PACER OUTPUT control to 16 mA or more. The messages CHECK PADS and POOR PAD CONTACT appear alternately. The pace alarm sounds, and the Clear Pace Alarm softkey flashes.

7. Reconnect the OneStep cable, and press the Clear Pace Alarm softkey. The messages CHECK PADS and POOR PAD CONTACT disappear, and the alarm tone stops.

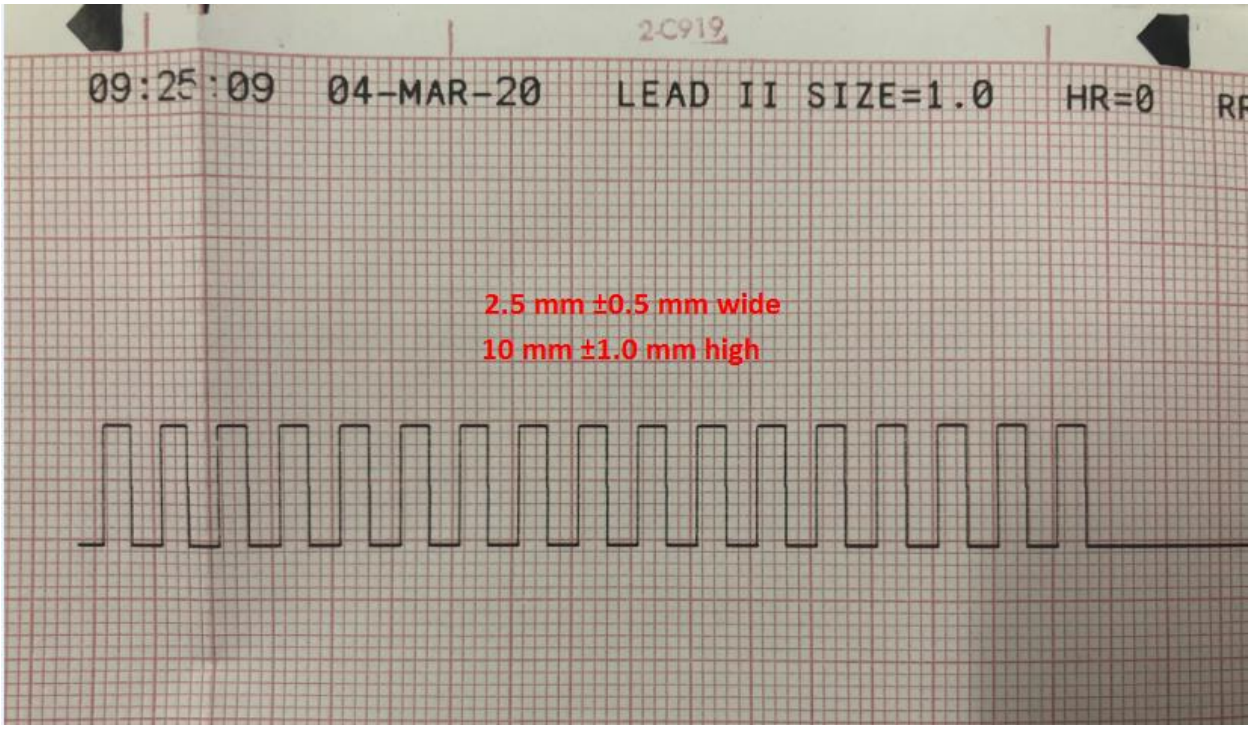
Pacer Check:



R Series® Recorder Checks - Demonstrates recorder check

1. Ensure the R Series is connected to AC Mains (power outlet).
2. Check the printer for an adequate supply of paper, then press the RECORDER button.
3. Press and hold the SIZE button for at least 2 seconds. A calibration pulse of 1 mV appears on the display while the button is held.
   The amplitude of the calibration pulse is independent of the SIZE setting.
4. Inspect the recorder waveform for uniformity and darkness.
5. Inspect for uniformity of annotated characters and completeness of words.
6. Check the printer speed by verifying that the resulting waveform is:
   2.5 mm ±0.5 mm wide
   10 mm ±1.0 mm high

Recorder Check:



D Visual Inspections

Visual inspections are required every 12-24 hours. The frequency of these inspections are to be consistent with the area's current practice for defibrillator inspections i.e. Q12H or Q24H. To perform Visual Inspections, refer to the "Code Readiness Checklist: Zoll R Series Checklist" form next to the device (see image below). Each clinical area is responsible for establishing and maintaining a process for these inspections.

Visual Inspections (required Q12-24h as per your area's current practice)

Device Front & Top Panel
- ✓ Code Readiness Indicator shows green checkmark (passed self-test)
- ✓ AC and Battery Lights are both solid green
- ✓ Battery in place and displays fully charged when index finger button is pressed
- ✓ Battery does not display "low battery", "replace battery"; or an Amber/Red light in the "?"/"X" sections for >5 seconds
- ✓ Recorder paper present and correctly loaded in recorder tray

Device Back Panel
- ✓ Plugged into AC outlet
- ✓ Accessory cables all present and connected
- ✓ Finger sat probe present (black mesh pocket)
- ✓ Neonatal and Paediatric End Tidal CO2 (ETCO2) adaptors present (black mesh pocket)
- ✓ OneStep CPR Pediatric Multifunction Electrodes (X1) Connected to OneStep Cable

Plastic Bag Contents
- ✓ BP cuffs (4 sizes) present
- ✓ OneStep CPR Adult Multifunction Electrodes (X1) present
- ✓ Conmed PROPAD Mini Infant <3 Kg Radiotranslucent Electrodes (X1)
- ✓ Pro-padz Radiolucent Adult Multifunction Electrodes (X 1)
- ✓ Pedi-padz Radiolucent Multifunction Pediatric Electrodes (X1)

Readily Accessible
- ✓ Spare deck of recorder printer paper
- ✓ Orange Gel conduction pads (X2)
- ✓ Razor
- ✓ ECG electrodes (X1) package

Disposables
- ✓ All disposables unexpired; replace any expired disposables

Note: Replacement Zoll and related supplies will be stocked in your area

Functional Testing:

Functional testing is required every 24 hours (NOT weekly) and involves a) Defibrillator Testing with Hands-free Therapy Electrodes, Pacer Testing, and a Recorder Check. For instructions on how to perform these tests refer to the laminated cards attached to the device.

- ✓ Correctly demonstrates functional testing and visual inspections

Key Points

Manual Mode vs Analyze AED. Which energy mode are we to use?

The preferred mode is Manual. The Analyze/AED button initiates ECG analysis to determine whether a shockable rhythm is present. Use of the Analyze/AED function on the Zoll is for advanced users ONLY (not BLS).

Application of energy (cardioversion, defibrillation, pacing) in a patient care area is a delegated medical act and requires a Physician's order. As Advanced providers, the Manual mode on Zoll is the principle mode of use. Although the AED function is available, it is not preferred and is not the norm at SickKids.

AED/Analyze may be used in an uncertain situation and ONLY as a delegated medical act. If used, consider setting Joules in weight-based dosing for optimal energy delivery vs deferring to automated presets (Paediatric: 10J - 20J – 30J); (Adult: 75J - 150J - 200J).

Note: The Lifepak AEDs can be used in non-patient care areas and can be used by BLS providers without delegation by a medical order. Resuscitation Oversight Committee (ROC), Feb 2020

Pre-connecting ECG leads when performing cardioversion. What is the process?

A standard ECG cable and ECG electrodes are recommended for use during synchronized cardioversion.

Will we be using weight-based dosing in J/kg or the automated presets?

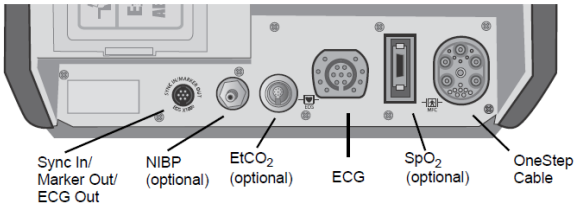
Weight-based dosing at SickKids will be primarily used vs automated presets.

SickKids - R Series ALS In-service Script

CABLES

1. One-Step Electro therapy Cable- (Red)
2. SpO2 (Blue)
3. ECG Cable
4. EtCO2 (Yellow)
5. NIBP- Non-Invasive Blood Pressure (Black) attached
6. Cable Compartment for all cables
7. External Paddles on sides of the defibrillator

One-Step Cable: *Comes out the right side and is 8 feet in length.*

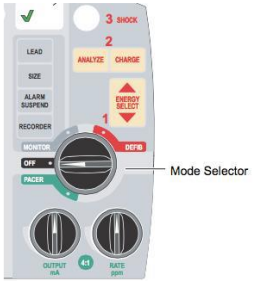


DEVICE OVERVIEW

CONTROL KNOB used to turn ON or OFF and is COLOR CODED for ease of use

- RED zone for Defibrillation and Synchronized Cardioversion
- GREEN zone for Pacing
- GREY zone for monitoring

There are **Soft Keys** on the bottom that allow for many different functions/options



SETUP ON CODE CART: *How can you keep your defib Code Ready?*

- The Defibrillator should always be plugged into a working outlet
- *OneStep Paediatric CPR Multifunction Electrode should ***ALWAYS*** be connected to the therapy cable which allows "Code-Readiness"
- [*Exception: Some units may choose to test into the right side BASE port directly with the OneStep Cable; (e.g. Cath Lab, Cardiac OR, NICU) as they may be mostly using procedural multifunction electrodes or other multifunction electrodes which don't contain a testing wire*)]
- *Can also perform a 30J test directly into the pad set.* OneStep pads have built-in testing wire which allows the device to pass its Automated Daily Self-Test

Power LED lights: Battery Indicator: **GREEN** = Charged, **AMBER**=Charging, **FLASHING**=Problem (Check Battery) A/C Power Indicator **GREEN** = Device is plugged in No lights = the defibrillator is *not* plugged in	
Code Readiness Indicator: • GREEN Check mark ✓ = Code Ready, RED "**X" =** Not Code Ready • **Self-Test -** Every 24 hours, the device will do a 100 point test and will display a ✓ if the device is ready for use, or **X** if it failed a part of the test. For areas that will not leave a multifunction electrode attached, they will need to leave the OneStep cable in the base port. • **Failed Test**- The device will display "Readiness Test Failed" on the screen and will highlight what needs to be fixed, if configured, the defib will also print out why the test failed. ○ These are usually easily fixable problems (eg. *No pads plugged in, no battery, no A/C power, pads expired*) ○ The Red **X** *may* be fixed by performing a manual 30J test ▪ (***DEMO 30J Manual Test into sealed Pads***) ▪ If Red **X** still there after 30J Manual Test – call Biomed to troubleshoot the defib ○ If the device reads "DEFIB FAILURE", call BioMed, DO NOT USE defib.	
Battery - *Push the index finger button on the battery to check the remaining time of the battery* Indicator lights show 30 min. increments for total of 4 hours of run time. • If **AMBER** light appears on "?" section of battery for > 5 sec's or • **RED** light appears on the "X" section of the battery for > 5 sec's, ***call BioMed***.	
Recorder Tray - Press button to open door, insert the paper *similar to the picture inside the paper tray* – Folded crease to the top right, with black arrow facing towards the back of the device	

<table>
<tr><td>

Pull a strip or two forward and let paper drop. Then close the door on top of the strip.
Will print a pre and post shock/cardioversion strip, or press “Recorder” to print/stop a strip

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<tr><td>
<u>USING THE DEVICE</u>- Everything will be pre connected and ready for use. This means it is CODE READY (ready for use and ready for testing).
Connecting and Disconnecting Pads (“Lightning Bolt Up”)

The LATCH locking lever holds pads and cable into place
Press on the far ridged end of the latch, pull apart hard to release.

<u>USING THE PADS</u>

<u>It is important to prep the skin as best as you possibly can</u>.
Wipe the patient down, remove as much hair as possible

“PRESS AND ROLL” the pad firmly into place.


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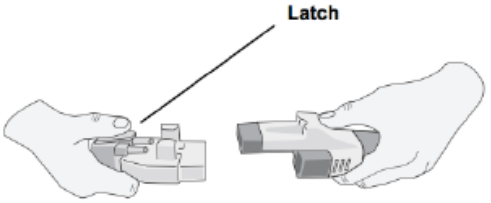

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<tr><td>
<u>ONESTEP PAEDIATRIC CPR MULTIFUNCTION ELECTRODE</u>

0-8 Years of Age, and up to 25kg (< 55lbs)

ONLY A/P positioning recommended, CPR Sensor mid-sternum
Defib recognizes Pediatric Pads and uses a Pediatric Algorithm
Always apply 3 lead ECG to pace and for synchronized cardioversion

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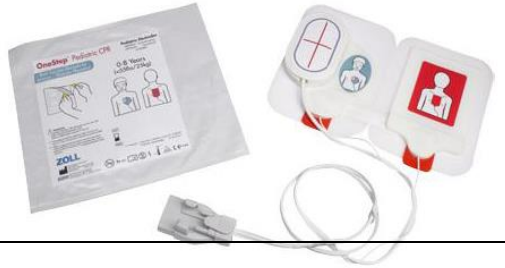
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ONESTEP ADULT CPR MULTIFUNCTION ELECTRODE

Recommended Placement (Anterior-Anterior)

For all pad placements follow pictogram

1. ***Lateral Pad*** (**RED**) Place 1st

2. ***Anterior Pad*** (**BLUE**) Place 2nd

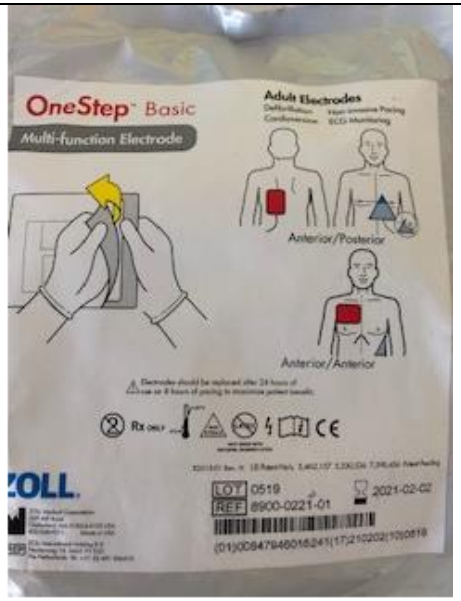
- **Anterior Pad** is placed anterior with the ***CPR sensor Mid Sternum*** -where you will perform chest compressions
- **Placement -** Take the pad from packaging and then "***Press and Roll"*** the pad firmly into place

Alternate Placement: A/P Positioning (If A/A is not applicable) **Gold standard for pacing**

1. Lateral Pad- Put Lateral Pad in Anterior position (APEX)

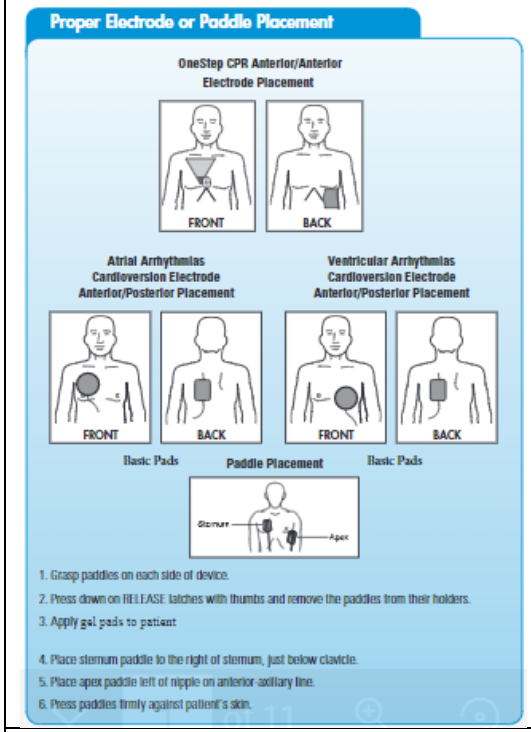
2. Anterior Pad- Tear CPR sensor off pad, place pad in the posterior position

- **Place the CPR censor in the center of the chest**



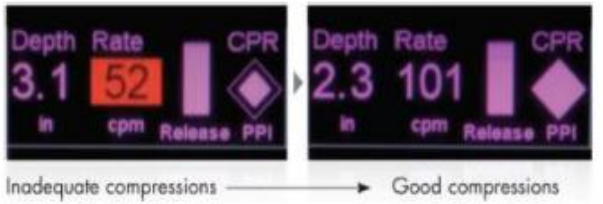
Note: if unsure of pad placement, refer to electrode position on package

Adult PAD Placement



CPR SENSOR, COMPRESSIONS, FEEDBACK

- **CPR Sensor:** Is built into the pad
- **CPR Feedback**: Lets us know how we are doing with our compressions based on **RATE, DEPTH, and RECOIL and PPI; for Adult pads**, and will display **only Depth and Rate for Ped Pads**
- **Idle Timer:** Will display after 3 seconds on inactivity in the "CPR Dashboard" Zone of the monitor
- **Rate and Depth Numerical Values:** Will display once you start compressions.
- **Release Bar:** Checks the status of your release and recoil off the chest. Full Bar=full/quick release
- **Diamond/PPI (Perfusion Performance Indicator)**: Mimics perfusion pressure and will begin to fill. It may take multiple good compressions to completely fill the PPI



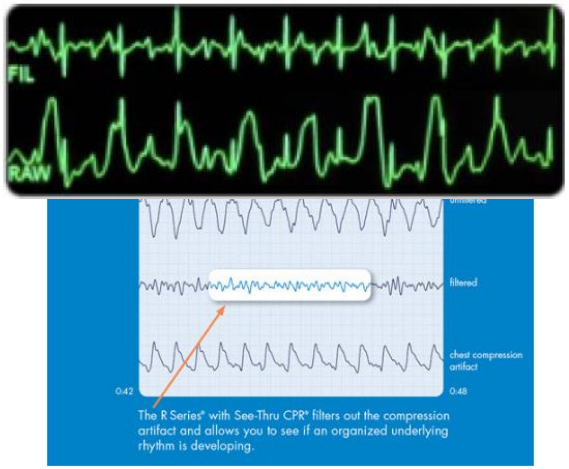
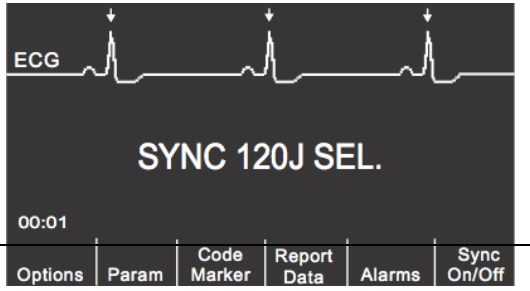
What we want to see:

1. **Depth: At least 5-6 cm for adults**
2. **Rate** (compressions per minute) **100-120 CPM**

***Adult Pads CPR Dashboard*:**
• **Scenario 1)** Not going deep enough the depth number highlights YELLOW
  ○ The device will say "**Push Harder**" to get you above 5cm in depth
  ○ Once you have sufficient depth, the device will say "**Good Compressions**"
  ○ The device will not provide voice prompt to have you adjust your depth if you are deeper than 6cm, however your dept will be highlighted in YELLOW for you to self-correct.
• **Scenario 2)** Compressions to slow or too fast (not proper rate) number highlights YELLOW
  ○ Follow the metronome to get back to the right rate between 100 - 120 CPM
• **Scenario 3)** Not fully/quickly releasing (*not proper "recoil"*)
  ○ The Release Bar will not be full - release more fully and quickly to have it filled
	3. Good Recoil: Release Bar needs to be full
	4. PPI: We want diamond to be full
	Caution: If the voice prompts you to push harder, cross check that your release/recoil bar remains fully purple. If not assess whether you are leaning on the patient and therefore not allowing complete recoil.

Pediatric CPR Dashboard: will only show Depth and Rate, no Recoil, no PPI.
  ○ Pediatric pads are recommended for ages 0-8 yrs; Rate = 100-120 CPM (*follow the metronome*)
  ○ Infant's Depth should be at 1/3 their AP diameter of their chest
  ○ Pediatric Depth should be about 1/3 their AP diameter of their chest
  ○ *Rational: A 6 month's old 1/3 AP depth is completely different than a 7-year old's 1/3 AP depth*
  ○ *You will have to use your clinical judgment on your patient's 1/3 AP diameter;* ***you will only see your Depth and your Rate*** *in the Pediatric CPR Dashboard to help guide you*
	What we want to see:
	1. Depth: 4 cm for infant
	Depth: 5 cm for child
	2. Rate (compressions per minute)
	100-120 CPM
	3. Good Recoil: No release bar in paediatric CPR Dashboard

MANUAL MODE DEFIBRILLATION - ✔ Preferred mode at SickKids • **Turn defib to the RED DEFIB zone** **1.** ***ENERGY SELECT desired joules 2J/kg; 4J/Kg; then 6-10J/kg (incrementing up by two each time.*** ***Internal shock for open sternum: 0.5 J/kg***	**Note: Although there are default auto escalating energy settings in the Analyze/AED mode, at SickKids we are using the Manual mode and selecting the Joules according to weight based dosing.**

2. CHARGE ***3. SHOCK*** **AED/ANALYZE MODE – Not the preferred mode at SickKids. Auto dosing escalation:** • Default energy selections for OneStep Adult electrodes: 75 J – 150 J – 200 J • Default energy selections for OneStep Pediatric electrodes: 10 J - 20 J - 30 J	Always look at the display, and verify that the selected energy is appropriate, and as ordered by MD. To do this adjust the ''default auto energy setting by selecting the 'up' or 'down' arrow until you achieve the correct joules.
SEE-THRU CPR TECHNOLOGY ***Simulator is changed 3 different times during this demo:*** **1.** Change sim box to **VF CPR FILTERED** ***(to show ECG and FIL traces)*** a. **Two Wave Forms** i. ECG = ***Raw "True" ECG***-Same waveform with CPR artifact ii. FIL = ***Filtered ECG-*** Internal algorithm that filters out any CPR artifact allowing you to see if an organized underlying rhythm is developing. **2.** Change sim box to **VF CPR ARTIFACT** *when starting compressions, (FIL filters out CPR artifact)* • As you are doing compressions, you can ***get an idea*** of the underlying rhythm without letting off the chest. **(*FIL ECG it is not meant to diagnose*)** • Allows you to **charge defib WHILE doing compressions**. *The charge will hold for 60 seconds* ***3.*** Change sim box to **VF CPR FILTERED** *when releasing off the chest to analyze the ECG* a. When stopping CPR to analyze the rhythm, wait for the ECG tracing to resolve CPR artifact and make your "official analysis" of the rhythm. b. SHOCK if needed, or disarm (energy select down) if not needed	
CARDIOVERSION- (Synchronized Cardioversion – *stay in the RED zone*) ***(Simulator should be in "AFIB")*** 4. *We need to "Synchronize" the energy to the R Wave. Apply ECG cable on Lead II, to ensure a clear ECG signal). Sedate patient* 5. ***Sync:*** *Press "SYNC ON/OFF" soft key located far lower right of screen* i. ***Note the word SYNC instead of Defib; and the selected joules are displayed*** 6. ***Arrow:*** *Wait to see white SYNC indicators on top of the "R" wave* **7. Select Energy, Charge and Shock-** When we shock on a Cardioversion,	

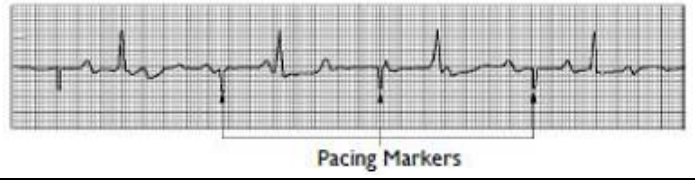
"CLEAR" and "Press and Hold" SHOCK button until the device shocks

- ***Press and Hold* the SHOCK button 1-2 milliseconds until the *Shock light* stops illuminating**
- ***Device will stay in sync mode once "sync", you need to remember to turn sync OFF in the event of a non- "synchronizable" rhythm eg. VT (no pulse); VF)***

Note: Hands –free therapy electrodes may be used as an ECG source. Signal quality will be that of standard leads except immediately following a discharge when there may be more noise due to muscle tremors, especially if an electrode is not in complete contact with the skin. Therefore, at SickKids we will continue to apply the ECG leads from the defibrillator to the patient. Leave the patient on the monitor if they are on it, and apply a second set of electrodes to the chest

PACING (Simulator is changed to "3rd Degree HB" – 3 ECG leads must be connected to sim box to demo). Place on Lead II.

- Turn to **GREEN PACER zone** for PACING
- ***What we see****: ECG with Downward pacing markers*
- **Default Settings: DEMAND** Pacing pre-set at **70ppm** and **0mA**
- **Dials:** Two dials (turn clockwise increases and counterclockwise decreases)
  - Rate ppm – set desired Rate first
  - Output mA - slowly increase mA until electrical capture is achieved
- ***How can we see Electrical capture?***
  - ***Increase mA until each Pacer Marker is followed by widened QRS.***
  - Most *ADULT* pt's **Capture** between 40-80mA. **(Sim box initially captures around 48mA)**



- **How do we confirm Mechanical capture?**
  - Check the Femoral or right radial pulse of the patient – **should feel a pulse with each QRS**
  - *If no central pulse felt, it's possible the pt's BP is low; increase PPM which may give a better BP and allow for better central pulses*.

- Once both captures are achieved Increase mA 10% ***above*** the threshold

- **Underlying Rhythm**: "Press and hold" the **4:1 BUTTON** at the button of the screen
  - **4:1 BUTTON:** *Suppresses the pacer to 1/4 the set rate allowing us to see the underlying rhythm without losing capture. Release the 4:1 button to return to full pacing.*

MONITOR MODE: turn to the GREY zone (Sim box changed to NSR)

- **LEAD Key:** *Can change the lead by pressing lead- Circulates through Lead I, II, III, PADS*
- **SIZE Key:** *The gain of the trace. Makes the waveform bigger or smaller cm/mV.* **(Sim box turned OFF)**
- **ALARM SUSPEND:** *Alarms defaulted to be "Off". (Unless otherwise Configured)*
  - **Alarm Suspended OFF icon is a non-flashing bell with an X**
  - **To turn the Alarms ON,** press ALARM SUSPEND once so the So the X disappears from the bell
  - **Temporary Silence-** Press ALARM SUSPEND and it will be temp disabled (15 for Lethal and 90 for non- lethal). **NOTE: see flashing Bell icon in the ECG window with temp suspend alarm**
  - **Alarm Off-** Press and hold ALARM SUSPEND for 5 seconds and the alarm will be SILENCED until otherwise activated by the user. NOTE: see NON-FLASHING bell icon

- **RECORDER:** Starts or stops the paper recorder at any time.

SOFT KEYS:

1. Options: *Includes:*

- *QRS Vol On/QRS Vol Off: Turns QRS tone on or off.*
- *Low Bright/High Bright: Adjust Screen Brightness Low and High*
- *Traces: Waveforms you can bring up. Options——Traces——Trace 2, ——Trace 3.*
- *More: Reveals "Clock Set" to change time the Defib displays.*

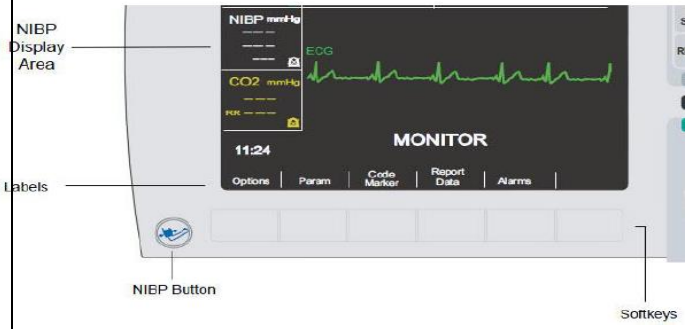
2. Param: *includes various parameters for each component (SPO2, 3 Lead, ETCO2, NIBP)*

- **To deploy EtCO2, place Single Patient Airway Adapter into place**
  - *Only need to ZERO when using a new size of adaptor (from ped to adult)*
  - *CO2 Warms up when defib is turned on (takes 60-90 seconds)*
  - *Everything happens automatically… "Plug and Play"*
  - *To Bring up the waveform: Options——Traces——Trace 3——EtCO2*
- **NIBP Key** (If applicable)- **Press Once=stat NIBP reading. Press again to abort reading.**
  - *Press and hold for 2 Seconds for Auto Interval reading (if configured)*
  - *NIBP: press Param—Setting—Auto Interval (set time for Auto Interval)*

3. Code Marker: *-Allows you to time stamp different clinical actions and retrieve later on.*

4. Report Data: *Transcript of the entire code start to finish (can store up to 6 hours of Code Summary Data)*

- ***Print Chart:*** *All codes start to finish, including waveforms during the code.*
  - ***Print All****: Will print the ENTIRE Code Summary (like printing the entire "Book of the Code")*
  - ***Print Range:*** *Select and print specific event (like selecting the "chapters/highlights of the code")*
- ***Print Log****: Time stamp of everything that has happened since the device has been on for the current code and previous codes that are stored*



• ***Erase***: *erases the code summary data (erase all data or last code) will automatically erase all after 1.5 days.* • ***Test Log:*** *Holds the last 1000 tests performed and can be retrieved here.* • ***Transfer Mode:*** *see DATA TRANSFER below…* **5. Alarms:** *Set highs and lows for different parameters.* *-The alarms will be defaulted back once the device is off for 10 Seconds*	
DATA TRANSFER: SICKKIDS: *Code Summary data* will be pushed automatically via Wi-Fi, when device is turned off for internal review.	

References

Zoll R Series® Operator's Guide

Zoll R Series® ALS Brief Overview video

Zoll Pediatric Patients R Series® In Service video

Zoll Real CPR Help R Series® In Service video

Zoll R Series® Quick Guide 2016

Zoll R series® Trainer Guide

Zoll SuperUser R Series® ALS Inservice Guide

Zoll R Series® ALS Crash Cart Card March 2017

Have feedback on this Facilitator Guide? Please contact the Resuscitation Oversight Committee Chair