Pediatric Advanced Life Support
New Provider Course Remodel

Instructor Guidance for “Breakout” Learning Stations
Developed by Advanced Life Support (ALS) Program Staff
Effective 1 January 2013
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I. Purpose
This outline was developed in conjunction with the 2013 Pediatric Advanced Life Support (PALS) course remodel. It was designed to establish a standard of training and to be a uniform training approach for Instructors aligned with the UNC-Community Training Center (CTC).

The course outlines will be specific to New Provider and Renewal courses and will consist of three combined “Breakout” learning stations: (1) Respiratory Emergencies, (2) Shock and Fluid Resuscitation and (3) Cardiac Emergencies. Instructors will be presenting clinically related material within each of the learning stations, and in a video driven/scenario-based format. We believe this approach will enhance the learning process through practice and realistic hands-on simulation.

II. Respiratory Emergencies Learning Station
The Respiratory Emergencies station is a 70-minute rotation consisting of three segments, all of which combine respiratory and airway management related content. This station will be conducted in a video-driven/scenario-based format by utilizing the respiratory core case videos, while integrating clinical skills, simulation and hands-on practice.

Reference: PALS Provider Manual Parts 4 and 5; Pages 37-67

A. PALS Core Cases 1-4
1. In this segment, Instructors should progress through individual core case scenarios, pausing during respiratory and airway related conditions and demonstrating respiratory and airway related interventions.

B. Airway Management
1. During each core case scenario pause, Instructors should verbalize and demonstrate step-by-step basic and advanced treatment options, while allowing time for hands-on practice.

2. Instructors should meet all of the following objectives during the course of the rotation station:

   - Demonstrate head-tilt, chin-lift method to open the airway;
   - Demonstrate modified jaw thrust method to open the airway;
   - Demonstrate insertion of the OPA and NPA airway and their indications;
   - Demonstrate the correct process of orally suctioning a patient;
   - Demonstrate oxygen delivery methods using nasal cannula and non-rebreather mask devices;
Demonstrate using a Bag Valve Mask to effectively manage a simulated respiratory arrest case for one minute;

- Review waveform capnography and ETCO2 measurement and its importance during cardiac arrest resuscitation; and
- Identify advanced airway devices and their indications

**Note: Endotracheal Intubation (ETI) is no longer a priority in this station, as this advanced skill does not typically fall within the Scope of Practice for many students. Instructors may demonstrate the skill or answer treatment related questions specific to ETI ONLY if time permits. ETI training equipment will remain available in this station for special situations.**

C. Respiratory Specific Flowcharts
   1. Instructors should incorporate the respiratory recognition and treatment flowcharts into stations, which may be introduced and explained during the core case scenarios (recommended) or at the completion of the station. See Attachments A & B.

   2. Instructors should place emphasis on first-line medications and dosages during this station.

III. Shock and Fluid Resuscitation Learning Station

   The Shock and Fluid Resuscitation station is a 70-minute rotation consisting of three segments, all of which combine shock related content. This station will be conducted in a video-driven/scenario-based format by utilizing the shock core case videos, while integrating clinical skills, simulation and hands-on practice.

   *Reference: PALS Provider Manual Parts 6 and 7; Pages 69-111*

   A. PALS Core Cases 5-8
      1. In this segment, Instructors should progress through individual core case scenarios, pausing during shock related conditions and demonstrating related interventions.

   B. Vascular Access
      1. During each core case scenario pause, Instructors should verbalize and demonstrate step-by-step vascular access treatment options, while allowing time for hands-on IV/IO skills practice. For EZ-IO reference material, See Attachments E & F.
2. Instructors should meet all of the following objectives during the course of the rotation station:

- Identify indications for Intraosseous (IO) device insertion;
- Identify correct landmarks for IO device insertion;
- Identify contraindications for IO device placement;
- Demonstrate the IO device placement process;
- Identify ways to confirm placement and then how to secure the IO device;
- Identify steps for proper Intravenous (IV) placement; and
- Demonstrate how to select correct drug doses by using a color-coded length-based tape or other resource.

C. Shock Specific Flowcharts

1. Instructors should incorporate the shock recognition and treatment flowcharts into learning stations, which may be introduced and explained during the core case scenarios (recommended) or at the completion of the station. See Attachments C & D.

2. Instructors should place emphasis on first-line medications and dosages during this station.

IV. Cardiovascular Emergencies Learning Station

The Cardiovascular Emergencies station is a 70-minute rotation consisting of three segments, all of which combine cardiovascular related content. This station will be conducted in a scenario-based only format, while integrating clinical skills, simulation and hands-on practice. Unlike other stations within this course, the core case videos are not utilized in this station. Instructors should utilize pre-written simulation scenarios.

Reference: PALS Provider Manual Parts 8, 9 and 10; Pages 113-167

A. Technology Review

1. In this segment, Instructors should first conduct an in-depth review of the Zoll M-Series CCT Monitor, incorporating the Monitor function, Defibrillation function, and Synchronized Cardioversion function.

Note: Non-Invasive Transcutaneous/Transthoracic Pacing (NTP) is not a priority in this station, as Pediatric Bradycardia is commonly related to Hypoxia. However, a small percentage of the Pediatric population suffers from congenital AV Blocks and Bradyarythmias, requiring NTP. Instructors may review NTP function ONLY if time permits.
2. Instructors may utilize the “Zoll M-Series Technology Review Guide” found as Attachment G.

3. At this point in the station, students should have a basic understanding of monitor related functions, as they will receive hands-on electrical therapy skills throughout the scenarios.

B. Rhythm Disturbances

1. It is recommended that this segment be completed prior to beginning the PALS simulation segment, however may be integrated into simulation scenarios. Instructors should review the basics of rhythm identification (i.e. rate, regularity, QRS width) and review the following rhythms related to PALS cardiac algorithms:

- Regular Sinus Rhythm;
- Sinus Tachycardia;
- Sinus Bradycardia;
- First Degree AV Block;
- High and Low Degree AV Blocks;
- Tachyarrhythmias (Narrow Complex);
- Tachyarrhythmias (Wide Complex);
- Ventricular Fibrillation (VF);
- Pulseless Ventricular Tachycardia (VT); and
- Asystole

C. Simulation Scenarios

1. In this segment, Instructors should choose one or more of the scenarios from the list below. Once selected, the Instructor will progress through the scenario, while pausing for cardiovascular related conditions and demonstrating associated interventions. The direction of scenario progression will be based upon each Instructors expertise and experience.

- **Ventricular Fibrillation**: While charting, you are *frantically called to assist another co-worker performing chest compressions on a 9 year old child admitted for “Syncope”...*

- **Tachycardia**: You are *evaluating a 4 year old child presenting with weakness, lethargy and mild shortness of breath...*
**PEA:** You are evaluating an 8 year old child admitted for severe Hypotension secondary to Dehydration. During your assessment, the child becomes unresponsive, pulseless and apneic...

**Bradycardia:** You are evaluating a 2 year old child presenting with an “Altered Mental Status” following an MRI...

### D. Electrical Therapy

1. During each scenario pause, Instructors should verbalize and demonstrate step-by-step electrical therapy treatment options, while allowing time for hands-on skills practice.

2. Instructors should meet all of the following objectives during the course of the rotation station:

   - Proper application of ECG leads and pediatric multi-function pads;
   - Review of rhythm-based electrical therapy with correct interpretation of life threatening cardiac rhythms;
   - Demonstration of Synchronized Cardioversion with emphasis on age-appropriate energy levels, pathway to and application of the “Sync” soft key, purpose of synchronizing to R-wave, as well as safe and timely shock delivery; and
   - Demonstration of manual defibrillation with emphasis on age-appropriate energy levels, charging and clearing, as well as safe and timely shock delivery.

### E. Cardiac Specific Treatment Algorithms

1. Instructors should incorporate the cardiac specific treatment algorithms into learning stations, which may be introduced and explained during the core case videos (recommended) or at the completion of the station. See Attachments H-J.

2. Instructors should place emphasis on first-line medications and dosages during this station.
Attachment A

Recognition of Respiratory Problems
Flowchart
## Pediatric Advanced Life Support

### Signs of Respiratory Problems

<table>
<thead>
<tr>
<th>Clinical Signs</th>
<th>Upper Airway Obstruction</th>
<th>Lower Airway Obstruction</th>
<th>Lung Tissue Disease</th>
<th>Disordered Control of Breathing</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Patency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Airway open and maintainable/not maintainable</td>
<td>Increased</td>
<td>Grunting</td>
<td>Normal</td>
</tr>
<tr>
<td>B Respiratory Rate/Effort</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stridor (typically inspiratory)</td>
<td>Wheezing (typically expiratory)</td>
<td>Grunting Crackles</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Barking cough Prolonged expiratory phase</td>
<td>Decreased breath sounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hoarseness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Air Movement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Decreased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D Heart Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tachycardia (early) Bradycardia (late)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E Skin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pallor, cool skin (early) Cyanosis (late)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F Level of Consciousness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anxiety, agitation (early) Lethargy, unresponsiveness (late)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G Temperature</td>
<td></td>
<td></td>
<td>Variable</td>
<td></td>
</tr>
</tbody>
</table>

### Pediatric Advanced Life Support

#### Identification of Respiratory Problems by Severity

<table>
<thead>
<tr>
<th>Respiratory Distress</th>
<th>Respiratory Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Open and maintainable</td>
<td>Not maintainable</td>
</tr>
<tr>
<td>Tachypnea</td>
<td>Bradypnea to apnea</td>
</tr>
<tr>
<td>Work of breathing (nasal flaring/retractions)</td>
<td>Apnea</td>
</tr>
<tr>
<td>Increased effort</td>
<td>Decreased effort</td>
</tr>
<tr>
<td>Good air movement</td>
<td>Poor to absent air movement</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>Bradycardia</td>
</tr>
<tr>
<td>Pallor</td>
<td>Cyanosis</td>
</tr>
<tr>
<td>Anxiety, agitation</td>
<td>Lethargy to unresponsiveness</td>
</tr>
<tr>
<td>Variable temperature</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2.** Signs of respiratory problems and identification of respiratory problems by severity.
Attachment B

Management of Respiratory Emergencies Flowchart
Recall that the use of succinylcholine for intubation of children with neuromuscular diseases may trigger life-threatening conditions, such as hyperkalemia or malignant hyperthermia. Several commonly used drugs, such as aminoglycosides, have intrinsic neuromuscular blocking activity that can worsen respiratory muscle weakness.

**Summary: Management of Respiratory Emergencies Flowchart**

The Management of Respiratory Emergencies Flowchart summarizes general management of respiratory emergencies and specific management by etiology. Note that this chart does not include all respiratory emergencies; it provides key management strategies for a limited number of diseases.

### Management of Respiratory Emergencies Flowchart

<table>
<thead>
<tr>
<th>Airway positioning</th>
<th>Pulse oximetry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction as needed</td>
<td>ECG monitor (as indicated)</td>
</tr>
<tr>
<td>Oxygen</td>
<td>BLS as indicated</td>
</tr>
</tbody>
</table>

#### Upper Airway Obstruction

**Specific Management for Selected Conditions**

<table>
<thead>
<tr>
<th>Group</th>
<th>Anaphylaxis</th>
<th>Aspiration Foreign Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nebulized epinephrine</td>
<td>IM epinephrine (or autoinjector)</td>
<td>Allow position of comfort</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>Albuterol</td>
<td>Specialty consultation</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>Antihistamines</td>
<td></td>
</tr>
</tbody>
</table>

#### Lower Airway Obstruction

**Specific Management for Selected Conditions**

<table>
<thead>
<tr>
<th>Bronchiolitis</th>
<th>Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal suctioning</td>
<td>Albuterol ± ipratropium</td>
</tr>
<tr>
<td>Bronchodilator trial</td>
<td>Corticosteroids</td>
</tr>
<tr>
<td></td>
<td>Subcutaneous epinephrine</td>
</tr>
<tr>
<td></td>
<td>Magnesium sulfate</td>
</tr>
<tr>
<td></td>
<td>Terbutaline</td>
</tr>
</tbody>
</table>

#### Lung Tissue Disease

**Specific Management for Selected Conditions**

<table>
<thead>
<tr>
<th>Pneumonia/Pneumonitis</th>
<th>Pulmonary Edema</th>
<th>Cardiogenic or Noncardiogenic (ARDS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infectious Chemical Aspiration</td>
<td></td>
<td>Consider noninvasive or invasive ventilatory support with PEEP</td>
</tr>
<tr>
<td>Albuterol</td>
<td></td>
<td>Consider vasoactive support</td>
</tr>
<tr>
<td>Antibiotics (as indicated)</td>
<td></td>
<td>Consider diuretic</td>
</tr>
</tbody>
</table>

#### Disordered Control of Breathing

**Specific Management for Selected Conditions**

<table>
<thead>
<tr>
<th>Increased ICP</th>
<th>Poisoning/Overdose</th>
<th>Neuromuscular Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid hypoxemia</td>
<td>Antidote (if available)</td>
<td>Consider noninvasive or invasive ventilatory support</td>
</tr>
<tr>
<td>Avoid hypercarbia</td>
<td>Contact poison control</td>
<td></td>
</tr>
<tr>
<td>Avoid hyperthermia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 1: Management of Respiratory Emergencies Flowchart.*
Attachment C

Recognition of Shock Flowchart
Treatment of obstructive shock is cause specific; immediate recognition and correction of the underlying cause of the obstruction can be lifesaving. The most critical tasks for PALS providers are prompt recognition, diagnosis, and treatment of obstructive shock.

**Recognition of Shock Flowchart**

<table>
<thead>
<tr>
<th>Clinical Signs</th>
<th>Hypovolemic Shock</th>
<th>Distributive Shock</th>
<th>Cardiogenic Shock</th>
<th>Obstructive Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Patency</td>
<td></td>
<td>Airway open and maintainable/not maintainable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B Respiratory rate</td>
<td></td>
<td>Increased</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B Respiratory effort</td>
<td></td>
<td>Normal to increased</td>
<td>Labored</td>
<td></td>
</tr>
<tr>
<td>B Breath sounds</td>
<td>Normal</td>
<td>Normal (± crackles)</td>
<td>Crackles, grunting</td>
<td></td>
</tr>
<tr>
<td>C Systolic blood pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Pulse pressure</td>
<td>Narrow</td>
<td>Variable</td>
<td>Narrow</td>
<td></td>
</tr>
<tr>
<td>C Heart rate</td>
<td></td>
<td>Increased</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Peripheral pulse quality</td>
<td>Weak</td>
<td>Bounding or weak</td>
<td>Weak</td>
<td></td>
</tr>
<tr>
<td>C Skin</td>
<td>Pale, cool</td>
<td>Warm or cool</td>
<td>Pale, cool</td>
<td></td>
</tr>
<tr>
<td>C Capillary refill</td>
<td>Delayed</td>
<td>Variable</td>
<td>Delayed</td>
<td></td>
</tr>
<tr>
<td>D Urine output</td>
<td></td>
<td>Decreased</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D Level of consciousness</td>
<td></td>
<td>Irritable early</td>
<td>Lethargic late</td>
<td></td>
</tr>
<tr>
<td>E Temperature</td>
<td></td>
<td>Variable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2.** Recognition of Shock Flowchart.

**Suggested Reading List**


Attachment D

Management of Shock Flowchart
## Management of Shock Flowchart

### Hypovolemic Shock
#### Specific Management for Selected Conditions

<table>
<thead>
<tr>
<th>Nonhemorrhagic</th>
<th>Hemorrhagic</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 20 mL/kg NS/LR bolus, repeat as needed</td>
<td>• Control external bleeding</td>
</tr>
<tr>
<td>• Consider colloid</td>
<td>• 20 mL/kg NS/LR bolus, repeat 2 or 3x as needed</td>
</tr>
<tr>
<td></td>
<td>• Transfuse PRBCs as indicated</td>
</tr>
</tbody>
</table>

### Distributive Shock
#### Specific Management for Selected Conditions

<table>
<thead>
<tr>
<th>Septic</th>
<th>Anaphylactic</th>
<th>Neurogenic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Algorithm:</td>
<td>• IM epinephrine (or autoinjector)</td>
<td>• 20 mL/kg NS/LR bolus, repeat PRN</td>
</tr>
<tr>
<td>• Septic Shock</td>
<td>• Fluid boluses (20 mL/kg NS/LR)</td>
<td>• Vasopressor</td>
</tr>
<tr>
<td></td>
<td>• Albuterol</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Antihistamines, corticosteroids</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Epinephrine infusion</td>
<td></td>
</tr>
</tbody>
</table>

### Cardiogenic Shock
#### Specific Management for Selected Conditions

<table>
<thead>
<tr>
<th>Bradyarrhythmia/Tachyarrhythmia</th>
<th>Other (eg, CHD, Myocarditis, Cardiomyopathy, Poisoning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Algorithms:</td>
<td></td>
</tr>
<tr>
<td>• Bradycardia</td>
<td></td>
</tr>
<tr>
<td>• Tachycardia With Poor Perfusion</td>
<td></td>
</tr>
<tr>
<td>• 5 to 10 mL/kg NS/LR bolus, repeat PRN</td>
<td></td>
</tr>
<tr>
<td>• Vasoactive infusion</td>
<td></td>
</tr>
<tr>
<td>• Consider expert consultation</td>
<td></td>
</tr>
</tbody>
</table>

### Obstructive Shock
#### Specific Management for Selected Conditions

<table>
<thead>
<tr>
<th>Ductal-Dependent (LV Outflow Obstruction)</th>
<th>Tension Pneumothorax</th>
<th>Cardiac Tamponade</th>
<th>Pulmonary Embolism</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Prostaglandin E₁</td>
<td>• Needle decompression</td>
<td>• Pericardiocentesis</td>
<td>• 20 mL/kg NS/LR bolus, repeat PRN</td>
</tr>
<tr>
<td>• Expert consultation</td>
<td>• Tube thoracostomy</td>
<td>• 20 mL/kg NS/LR bolus</td>
<td>• Consider thrombolytics, anticoagulants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Expert consultation</td>
</tr>
</tbody>
</table>

---

*Figure 2. Management of Shock Flowchart.*
Attachment E

EZ-IO “G3” Product Fact Sheet
VIDACARE® EZ-IO® G3 POWER DRIVER

DESCRIPTION: The Vidacare EZ-IO G3 Power Driver is a sealed, hand-held, lithium-battery powered medical device. G3 Power Drivers are capable of producing a maximum of 500 human insertions. G3 Power Battery life expectancy may be dependent on actual usage (dose density & average insertion time), storage and frequency of testing. The G3 Power Driver is intended for the controlled insertion of an intravenous needle into human bone.

STORAGE: The G3 Power Driver and accessories may be stored at temperatures between -20°C to 50°C (4°F to 122°F).

Shell life for the G3 Power Driver is 16 years. When storing in the soft Vascular Access Pack (VAP) remove the trigger guard to prevent accidental activation of the G3 Power Driver.

CLEANING AND DISINFECTION OF THE VIDACARE® G3 POWER DRIVER:
1. Maintain BS1 or PPE precautions.
2. Wipe entire exterior surface of G3 Power Driver with soft, clean, moistened cloth. (If soiled, detach, clean and soak lawn trigger guard.) Use soft bristled brush to remove any visible soil or debris, paying particular attention to crevices and seams.
3. Spray exterior surface of G3 Power Driver with the antimicrobial commonly used by your institution, making sure to follow the antimicrobial manufacturer’s recommendations.
4. Gently wipe exterior surfaces with gauze pads until visible debris is removed.
5. Clean and manipulate trigger using cloth moistened with selected anti-microbial.
6. Using sterile swab, moisten with selected anti-microbial solution, gently dry inside opening around metal drive shaft.
7. After cleaning, inspect to ensure no visible debris remains, and no damage has occurred to the driver.
8. Dry driver with a soft, clean cloth (re-attach lawn and trigger guard) and return to appropriate location.

If your clinical environment requires sterilization the G3 Power Driver can be sterilized using the STERAD® 110X, STERAD® 100X Standard cycle, and DOPRAX® Standard cycle. STERAD® is a product of Advanced Sterilization Products, a Johnson and Johnson Company.

Do not immerse or expose excessive amount of liquid when performing cleaning and disinfecting. In the unlikely event of a driver failure, remove the G3 Power Driver, grasp the needle set by hand and advance the needle set into the medullary space while twisting the needle set.

VIDACARE LIMITED EXPRESS WARRANTY AND DISCLAIMERS

(1) Warranty: Vidacare warrants to the original purchaser of the new products only (“Purchaser”) that during the applicable warranty period, (a) the hardware Product will conform with Vidacare’s written product specifications for such Products in all material respects for the shorter of (i) one year after shipment to Purchaser or (ii) the number of times of such hardware product as are specified by Vidacare, and (b) the Disposables will conform with Vidacare’s written product specifications for such Products in all material respects for the shorter of (i) one year after shipment to Purchaser or (ii) the expiration date designated therefore on such Disposables (collectively, the “Warranty Period”). The foregoing warranty shall not apply if the Products have been subjected to physical abuse, misuse, abnormal use, use not consistent with Vidacare’s published directions and instructions for use, food, tampering, unusual physical stress, negligence or accidents. (2) Limited remedy: Warranty Procedures. If a Product fails to conform to the warranty set forth under Section (1) above, Vidacare agrees to, in its discretion, repair, replace or refund the purchase price to the non-conforming Product. If a Product fails to conform to the warranty set forth under Section (1), Purchaser shall return the non-conforming Product to Vidacare during the applicable Warranty Period, at Purchaser’s expense, provided, however, that Purchaser shall first give prompt written notice to Vidacare, at which time Vidacare shall issue a Return Material Authorization (“RMA”) number for the nonconforming Product. Products sent to Vidacare for warranty replacement within the valid RMA number displayed on the shipping container may, at Vidacare’s discretion, be returned to Purchaser at Purchaser’s expenses. If a Product is returned in compliance with the foregoing requirements, Vidacare shall repair or replace the returned Product as soon as reasonably practicable at no additional cost to Purchaser if Vidacare has previously received payment for the returned Product or if Vidacare’s discretion, refund the purchase price. NOTWITHSTANDING ANYTHING TO THE CONTRARY IN THIS WARRANTY, THE REMEDIES PROVIDED UNDER THIS SECTION (1) SHALL BE PURCHASER’S SOLE AND EXCLUSIVE REMEDY FOR A FAILURE OF A PRODUCT TO CONFORM TO THE WARRANTY SET FORTH UNDER SECTION (2) ABOVE. (3) Warranty Disclaimers. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, THE EXPRESS WARRANTY SET FORTH IN SECTION (1) IS THE SOLE AND EXCLUSIVE WARRANTY AND GIVEN IN LEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, FITNESS FOR A PARTICULAR PURPOSE, SATISFACTORY QUALITY OR SUITABILITY. IF THE DISCLAIMER OF ANY IMPLIED WARRANTY IS NOT PERMITTED BY APPLICABLE LAW, THE DISCLAIMER AND LIMITATION OF SUCH WARRANTY IS LIMITED TO Twenty (20) DAYS FROM THE DATE OF ORIGINAL PURCHASE OTHER THAN AS MANDATED UNDER SECTION (1), THE PRODUCTS ARE PROVIDED "AS IS.” THE PRODUCTS ARE DESIGNED FOR USE SOLELY BY TRAINED AND CERTIFIED MEDICAL PROFESSIONALS USING REASONABLE MEDICAL DISCRETION IN EMERGENCY MEDICAL SITUATIONS REGARDLESS OF ANY CLAIM OR INJURY. VIDEACARE DISCLAIMS ANY AND ALL LIABILITY WITH RESPECT TO THE PRODUCTS ARISING FROM ANY USE OF THE PRODUCTS THAT IS NOT CONFORMING WITH VIDACARE’S PUBLISHED DIRECTIONS AND INSTRUCTIONS FOR USE. (4) Limitations of Liability. IN NO EVENT SHALL VIDACARE BE LIABLE TO PURCHASER, ANY CUSTOMER OR ANY OTHER PARTY TO ANY AMOUNT FOR ANY SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR STATUTORY OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING, WITHOUT LIMITATION, DIRECT PROFITS, LOST SALES, LOST REVENUE OR LOSS OF USE, REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT, NEGLIGENCE, STRICT PRODUCTS LIABILITY OR OTHERWISE, EVEN IF VIDACARE HAS BEEN ADVISED OF THE POSSIBILITY OF ANY SUCH DAMAGES IN ADVANCE. VIDACARE’S TOTAL AGGREGATE LIABILITY IN CONNECTION WITH THIS AGREEMENT OR THE PRODUCTS SHALL BE LIMITED TO THE SUM OF THE AMOUNTS PAID TO REPRESENTATIVE BY VIDACARE DURING THE TWELVE (12) MONTHS IMMEDIATELY PRECEDING THE DATE OF THE EVENT GIVING RISE TO A CLAIM AGAINST VIDACARE.
The G3 Power Driver is designed and tested to run intermittently with a duty cycle of 30 seconds on 1 minute off cycle. The use of Accessories, transducers and cables other than those specified by the manufacturer, may result in increased EMI. The G3 Power Driver is intended for use in the electromagnetic environment specified below. The customer or the user of the G3 Power Driver should ensure that it is used in such an environment.

### Guidance and Manufacturer’s Declaration — Electromagnetic immunity

The G3 Power Driver is intended for use in the electromagnetic environment specified below. In certain installations, the G3 Power Driver may be expected to perform satisfactorily, depending on the nature of the installation and the equipment used.

#### Immunity test

**IEC 60601 test level**

<table>
<thead>
<tr>
<th>Mode of operation</th>
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<th>Compliance Level</th>
<th>Electric fast transient (ESD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact</td>
<td>&lt;1.2 kV air</td>
<td>3 V/m</td>
<td>3 kV/m</td>
</tr>
<tr>
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#### Emission test

**IEC 60601 test level**

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<th>Electromagnetic environment</th>
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<tr>
<td>50Hz</td>
<td>3 kV/m</td>
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Attachment F

EZ-IO Infusion System Needle Insertion Guide
**To Insert Needle Set:**

- Locate landmarks ...................... 1
- Clean site .................................. 2
- Insert EZ-IO® Needle Set ............... 3
- Remove stylet from catheter ............ 4
- Attach primed EZ-Connect®
- Consider IO 2% lidocaine without preservatives or epinephrine (cardiac lidocaine) for patients responsive to pain – prior to flush

*Follow institutional protocols/policy*

- Medications intended to remain in the medullary space, such as a local anesthetic, must be administered very slowly until the desired anesthetic effect is achieved
- Syringe bolus (flush) IO with 10 ml normal saline................................. 5
- Start infusion under pressure ............. 6

A Medical Director or qualified prescriber must authorize appropriate dosage range.

**Do Not Leave the EZ-IO catheter in for more than 24 hours.**

**To Remove Catheter:**

- Stabilize patient’s extremity
- Connect sterile Luer lock syringe to hub of catheter
- Rotate catheter clockwise – while pulling straight back
- When catheter has been removed, immediately place in appropriate biohazard container.

**DO NOT ROCK** the catheter while removing. Rocking or bending the catheter may cause the catheter to separate from the hub.

Emergency contact in US or Canada call: 1-800-680-4911

For international assistance contact your local Vidacare Distributor
ZOLL DEFIBRILLATOR/CARDIOVERSION/PACING

Biphasic Defibrillator – uses less energy – restricts electricity to core- max is 200 joules

A. **Defibrillation**
   1. Describe proper pad placement
      - Place anterior/anterior
      * Rectangular Pad → under right Clavicle (near square shoulder)
      * Round Pad → left Mid-axillary line (near round stomach)
      - may also place Anterior/Posterior
      - takes longer to place (due to having to turn/roll patient)
      - If used → think of two pieces of white bread (myocardial sandwich)

INSTRUCTOR TURN SIMULATOR ON AND TO V-FIB

2. Turn machine On to → 1Defib
   - **Heather’s suggestion:** In emergency situation, never turn selector dial to monitor.
   - In emergency the question is whether defib is needed.
3. Adjust energy level to 200 joules, per UNC standing orders
4. Select # 2 Charge
   - Wait for the red light and the continuous alarm
5. Call out→ All clear and confirm with eye contact
6. Press # 3 Shock
   - If energy is adjusted to different joules, the energy level will not automatically change

B. **Synchronized Cardioversion**

INSTRUCTOR SETS SIMULATOR TO SVT

1. Describe proper pad placement
   - Anterior/posterior (heart sandwich) is preferred
   - May use anterior/anterior in emergency
2. Turn machine On to → 1Defib
3. Turn on SYNC. Located on the bottom right-hand corner of the screen
4. Look for an arrow on each QRS
5. If do not see arrow, then
   a. Increase amplitude of QRS
   b. Change to a different lead
   c. Change electrode patches

INSTRUCTOR REQUESTS ENERGY LEVEL TO BE AT 75 joules
6. Adjust energy level to ordered joules (NO standing order for cardioversion)
7. Select # 2 Charge
   - Wait for the red light and the continuous alarm
8. Call out→ All clear and confirm with eye contact
9. Press # 3 Shock
10. Recognize that SYNC turns off after each shock
Note: -For safety, someone must be depressing the shock button in order for shock to be delivered. During cardioversion, Zoll monitor must find the correct place to fire (on the R-wave). So sometimes need to press and HOLD shock button to get cardioversion.

C. Pacing

INSTRUCTOR SET SIMULATOR TO 3RD DEGREE HEART BLOCK or CHB
NOTES: -Pace only if patient is unstable (pacing hurts)
  *unstable is: low BP, decrease LOC, chest pain, SOBr
  -Asynchronous pacing → never used without physician order

1. Describe proper pad placement to pace
   a. Pads MUST be anterior/posterior (myocardial sandwich)
   b. AND must have the EKG leads attached to patient and to back of the Zoll
   c. If pacing 100% of the time, change pads every 8 hours (Pads dry out; then do not conduct as well)

2. Select Pacer Mode (Green) (Turn selector switch counterclockwise)
   a. pace at a rate of 70, per UNC Standing order
      i. Machine automatically turns on at 70 pulses per minute
   b. Pacing consists of two parts
      i. Electrical capture
      ii. Mechanical capture

3. Turn mA (milliamps) knob and looking for capture
   a. Capture → a pacer spike before each wide bizarre QRS
      i. This represents electrical capture
   b. Also check radial or femoral pulse instead of carotid pulse
      i. You’re checking for mechanical capture
      ii. Carotid pulse could reflect muscle contraction rather than a pulse
      iii. If no pulse, increase mAs
   c. Assess need for pain medication (pacing is painful)
   d. Once calm, Check threshold→
      i. Decrease mAs until lose capture
      ii. Slowly increase mAs until get 100% capture. The EXACT energy required to get 100% capture is the THRESHOLD.
      iii. Increase mAs by 2, as safety measure
      iv. Machine only does mAs in even numbers

NOTES in general:
  - If patient in v-tach and rate is < 150, AED will not shock
  - defibrillation for Peds patients
    -2 joules/kilo initially, then
    -4 joules/kilo for each subsequent shock

Remember: an additional resource can be found on the Zoll’s website: there are several PPT presentations that you may find helpful:

Attachment H

Pediatric Tachycardia Treatment Algorithm
Pediatric Tachycardia
With a Pulse and Poor Perfusion

1. Identify and treat underlying cause
   - Maintain patent airway; assist breathing as necessary
   - Oxygen
   - Cardiac monitor to identify rhythm; monitor blood pressure and oximetry
   - IO/IV access
   - 12-Lead ECG if available; don’t delay therapy

2. Evaluate QRS duration
   - Narrow (≤0.09 sec)
   - Wide (>0.09 sec)

3. Evaluate rhythm with 12-lead ECG or monitor

4. Probable sinus tachycardia
   - Compatible history consistent with known cause
   - P waves present/normal
   - Variable R-R; constant PR
   - Infants: rate usually <220/min
   - Children: rate usually <180/min
   - Search for and treat cause

5. Probable supraventricular tachycardia
   - Compatible history (vague, nonspecific); history of abrupt rate changes
   - P waves absent/abnormal
   - HR not variable
   - Infants: rate usually ≥220/min
   - Children: rate usually ≥180/min
   - Consider vagal maneuvers (No delays)

6. Synchronized cardioversion
   - If IO/IV access present, give adenosine
   - OR
   - If IO/IV access not available, or if adenosine ineffective, synchronized cardioversion

7. Consider adenosine if rhythm regular and QRS monomorphic

8. Cardiopulmonary compromise?
   - Hypotension
   - Acutely altered mental status
   - Signs of shock

9. Possible ventricular tachycardia
   - No

10. Doses/Details
    - **Synchronized Cardioversion:** Begin with 0.5-1 J/kg; if not effective, increase to 2 J/kg. Sedate if needed, but don’t delay cardioversion.
    - **Adenosine IO/IV Dose:** First dose: 0.1 mg/kg rapid bolus (maximum: 6 mg). Second dose: 0.2 mg/kg rapid bolus (maximum second dose 12 mg).
    - **Amiodarone IO/IV Dose:** 5 mg/kg over 20-60 minutes or
    - **Procaïnamide IO/IV Dose:** 15 mg/kg over 30-60 minutes
    - Do not routinely administer amiodarone and procaïnamide together.

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Attachment I

Pediatric Bradycardia Treatment Algorithm
Pediatric Bradycardia
With a Pulse and Poor Perfusion

1. Identify and treat underlying cause
   - Maintain patent airway; assist breathing as necessary
   - Oxygen
   - Cardiac monitor to identify rhythm; monitor blood pressure and oximetry
   - IO/IV access
   - 12-Lead ECG if available; don’t delay therapy

2. Cardiopulmonary compromise continues?
   - No
   - Yes

3. CPR if HR <60/min with poor perfusion despite oxygenation and ventilation

4a. Support ABCs
   - Give oxygen
   - Observe
   - Consider expert consultation

4. Bradycardia persists?
   - No
   - Yes

5. 
   - Epinephrine
   - Atropine for increased vagal tone or primary AV block
   - Consider transthoracic pacing/transvenous pacing
   - Treat underlying causes

6. If pulseless arrest develops, go to Cardiac Arrest Algorithm

Cardiopulmonary Compromise
- Hypotension
- Acutely altered mental status
- Signs of shock

Doses/Details
Epinephrine IO/IV Dose:
0.01 mg/kg (0.1 mL/kg of 1:10 000 concentration).
Repeat every 3-5 minutes.
If IO/IV access not available but endotracheal (ET) tube in place, may give ET dose:
0.1 mg/kg (0.1 mL/kg of 1:1000).

Atropine IO/IV Dose:
0.02 mg/kg. May repeat once. Minimum dose 0.1 mg and maximum single dose 0.5 mg.

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Attachment J

Pediatric Cardiac Arrest Treatment Algorithm
Pediatric Cardiac Arrest

Shout for Help/Activate Emergency Response

1. Start CPR
   - Give oxygen
   - Attach monitor/defibrillator

2. Rhythm shockable?
   - Yes
   - VF/VT
   - Shock
   - CPR 2 min
     - IO/IV access

3. Shock

4. CPR 2 min
   - IO/IV access
   - Epinephrine every 3-5 min
   - Consider advanced airway

5. Rhythm shockable?
   - Yes
   - Shock

6. CPR 2 min
   - Epinephrine every 3-5 min
   - Consider advanced airway

7. Shock

8. CPR 2 min
   - Amiodarone
   - Treat reversible causes

9. Rhythm shockable?
   - Yes
   - CPR 2 min
     - IO/IV access
     - Epinephrine every 3-5 min
     - Consider advanced airway

10. Rhythm shockable?
    - Yes
    - CPR 2 min
      - IO/IV access
      - Epinephrine every 3-5 min
      - Consider advanced airway

11. CPR 2 min
    - Treat reversible causes

12. Rhythm shockable?
    - Yes
    - CPR 2 min
      - IO/IV access
      - Epinephrine every 3-5 min
      - Consider advanced airway

Doses/Details

CPR Quality
- Push hard (2/3s of anterior-posterior diameter of chest) and fast (at least 100/min) and allow complete chest recoil
- Minimize interruptions in compressions
- Avoid excessive ventilation
- Rotate compressor every 2 minutes
- If no advanced airway, 15:2 compression-ventilation ratio. If advanced airway, 8-10 breaths per minute with continuous chest compressions

Shock Energy for Defibrillation
First shock 2 J/kg, second shock 4 J/kg, subsequent shocks 24 J/kg, maximum 10 J/kg or adult dose.

Drug Therapy
- Epinephrine IO/IV Dose: 0.01 mg/kg (0.1 mL/kg of 1:1000 concentration). Repeat every 3-5 minutes. If no IO/IV access, may give endotracheal dose: 0.1 mg/kg (0.1 mL/kg of 1:1000 concentration).
- Amiodarone IO/IV Dose: 5 mg/kg bolus during cardiac arrest. May repeat up to 2 times for refractory VF/pulseless VT.

Advanced Airway
- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm ET tube placement
- Once advanced airway in place give 1 breath every 6-8 seconds (8-10 breaths per minute)

Return of Spontaneous Circulation (ROSC)
- Pulse and blood pressure
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes
- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypoglycemia
- Hypo-/hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary