GUIDELINE

Cardiac: Cardioversion (DC) and Defibrillation

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NICU KEMH, NICU PCH, NETS WA

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations

Read the full statement here:
CAHS Child Safe Organisation Commitment Statement

This document should be read in conjunction with this disclaimer

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Aim

This policy describes the use the of the Phillips Heartstart Intrepid Defibrillator to deliver DC cardioversion / defibrillation to a patient.

Risk

DC cardioversion is an emergent procedure to save a life, and failure to use promptly and correctly increases morbidity and mortality for the patient. Incorrect use of a defibrillator also poses a risk to staff.

Key Points

- For arrhythmia algorithms and cardiac arrest on NICU algorithm see Arrhythmia and Cardiac Arrest on NICU: Treatment Algorithms.
- Please note: Medical Staff only to deliver a shock via defibrillator in the NICU and preferably under the supervision of senior registrar/ consultant.
- Where the patient is severely compromised, DC cardioversion or defibrillation should not be delayed.
- **If unsynchronised shock is used incorrectly, it could generate an unrecoverable rhythm.**

Background

DC cardioversion and defibrillation are used for rapid termination of a tachyarrhythmia which is either unresponsive to medical treatment or where the patient has cardiovascular compromise.

Where the patient is severely compromised, with loss of consciousness, respiratory or cardiac arrest, DC cardioversion/ defibrillation should not be delayed.

Where the patient is relatively stable and vascular access is rapidly available, baseline medical treatment consists of; Correction of metabolic abnormalities, vagal manoeuvres (ice to face/ deep suctioning) and use of medications (e.g. adenosine, digoxin, amiodarone, lignocaine).

Defibrillators can deliver two modes of shock, **synchronised** and **unsynchronised:**

- Synchronised shocks typically start at a lower dose (0.5-2 J/kg) and used for cardioversion.
- Unsynchronised shocks have a default dose of 4 J/kg and are used for defibrillation.

Cardioversion (synchronised):

- **Urgent** – Used in unstable patients with a tachyarrhythmia who have a perfusing rhythm but with signs of cardiovascular compromise e.g.
    - Supraventricular tachycardia (SVT) with poor perfusion or no access and shock
    - Ventricular tachycardia (VT) with pulse but poor perfusion
    - Atrial flutter with shock
    - Atrial fibrillation (AF) with shock (rare in neonate)
- **Elective** – Used in patients with stable SVT/ VT/ atrial flutter/ AF unresponsive to other treatments

NB If unsynchronised shock is used in these circumstances, could convert into an unrecoverable rhythm.

Defibrillation (unsynchronised):

Used in pulseless arrest with a shockable rhythm: (pulseless VT or ventricular fibrillation (VF).

NB Asystole is NOT a shockable rhythm

Preparation for Cardioversion/ Defibrillation

If in pulseless arrest, then without delay commence CPR and follow the Cardiac arrest in NICU algorithm' from Arrhythmia and Cardiac Arrest on NICU: Treatment Algorithms.

Patients with a perfusing rhythm (pulse present):

- Personnel to be present:
  - If cardioversion / defibrillation is being contemplated, call the NICU consultant if not already present and cardiologist immediately.
  - If in PCH 3B NICU and patient in pulseless arrest, or using defibrillator urgently out of hours with no NICU consultant on site then call hospital code blue '55'.

  Refer to '*Who to call in the event of an arrhythmia or cardiac arrest on NICU'* Algorithm in 'Arrhythmia and Cardiac Arrest on NICU: Treatment Algorithms'

Patient preparation:

- Ensure good vascular access – preferably cannula in antecubital fossa, well placed UVC or short CVC (femoral or IJ). Consider emergency UVC/ intraosseous if difficult access.
  - Note, PICC <3F generally not suitable as this takes too long to inject bolus medication/ flush, however can be used in emergency under direction of Consultant/ SR.
- If time and patient status allows, patient should be intubated / ventilated and sedated appropriately.
- Ensure adequate FiO_2 (100% for most near-term and term neonates).
- If no intra-arterial BP monitoring, then cycle BP cuff every 2 mins.
- Try to get 12-lead ECG or at least a rhythm strip printed.
- Confirm rhythm with cardiology.
- Review blood gas / electrolytes and correct any abnormalities as able.
- **Use relevant arrhythmia algorithm.** See Arrhythmia and Cardiac Arrest on NICU: Treatment Algorithms

Process of Delivery shock

APLS 2024 and adult resus guidelines use the mnemonic ‘COACHED’ for the process of delivering a shock to a patient:

- **C:** Compressions Continue
- **O:** Oxygen away (if free flowing BVM)
- **A:** All others clear
- **C:** Charging defibrillator
- **H:** Hands off (compressor should say I’m safe)
- **E:** Evaluating rhythm
- **D:** Defibrillate or Disarm

MANUAL DEFIBRILLATION/ CARDIOVERSION using Philips Heartstart Intrepid Defibrillator

1. Bring defibrillator to bedside. (As long as has been charging, does not need to be plugged into mains. If not fully charged, then plug in.)
2. Apply HeartStart infant defib pads to patient:
   - Pad labelled FRONT in middle of chest anteriorly (see illustration on pack).
   - Pad labelled BACK in middle of upper back posteriorly (see illustration on pack).

   NB Make sure that the pads do not touch and there is no gel on chest.
3. Plug defib pad leads into therapy cable.
4. Turn therapy knob to 'MONITOR' – the pads will now read the ECG trace.
5. For SVT/ VT with pulse: press 'SYNC' button. Confirm that the 'SYNC' button lights up, the Sync indicator is present and R-wave arrows appear.
6. For VF/ pulseless VT/ polymorphic VT or VT which won't capture on 'SYNC', then make sure 'SYNC' is OFF.
7. Dial up therapy knob to required Joules:
   - 1J/kg and subsequently 2J/kg for SVT/ VT
   - 4J/kg for pulseless arrest with VF/ pulseless VT
   - If using 1-10J, then use navigation arrows below screen to set desired dose. Round UP to nearest joule.
8. Used 'COACHED' mnemonic to prepare for delivering shock (see above) – **person delivering shock should lead and make sure all steps completed.**

   C: Compressions Continue

   O: 'Oxygen away' (if free flowing BVM) – **state and check**

   A: 'All others clear' – **state and check**

   C: 'Charging defibrillator' – **state and press 'CHARGE' button**

   H: 'Hands off' – **state, then compressor should state 'I'm safe'**

   E: Evaluating rhythm – **check rhythm still requires delivery shock**

   D: Defibrillate or Disarm – **press 'SHOCK' button** until discharged (may take some time in 'SYNC' mode)

   To disarm the charge, press **Cancel Charge** soft key.
9. Printer will automatically print from a few seconds before shock until stopped by pressing 'PRINT' button.
10. Repeat as necessary and according to arrhythmia/ cardiac arrest algorithms.

Related CAHS internal policies, procedures and guidelines
Arrhythmias and Cardiac Arrest on NICU: Treatment Algorithms
Recognising and Responding to Clinical Deterioration

References and related external legislation, policies, and guidelines
1. Phillips HeartStart Intrepid Instruction Manual 2. Advance Paediatric Life Support: The Practical Approach (Australia & New Zealand 7th Edition), published 2024

This document can be made available in alternative formats on request.

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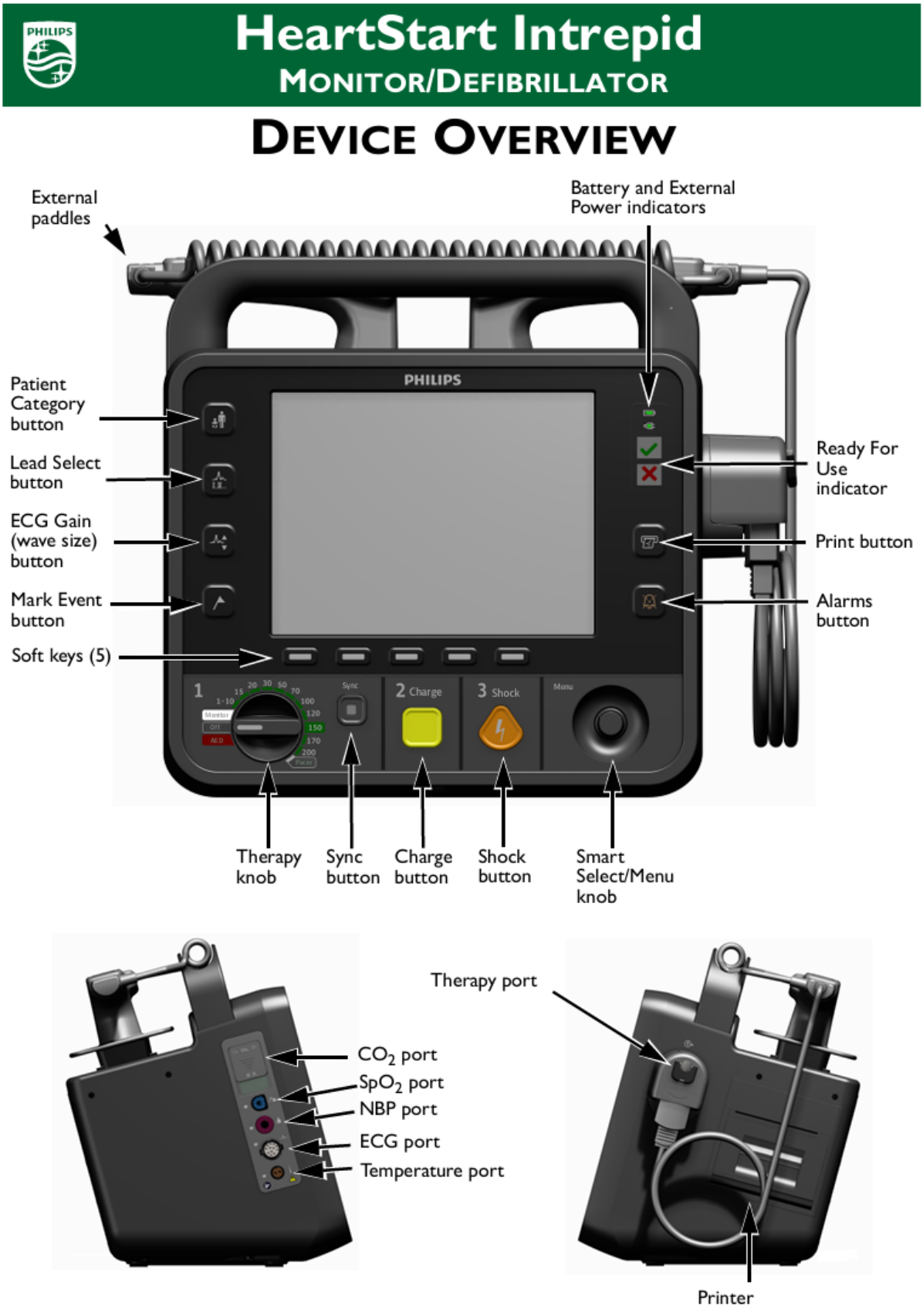
Healthy kids, healthy communities

Compassion Excellence Collaboration Accountability Equity Respect

Appendix 1: HeartStart Intrepid Defibrillator Device Overview



READY FOR USE INDICATOR/ALARMS

Ready For Use Indicator

Indicator Appearance	Device Status
Blinking green	Defibrillation, pacing, and ECG functions are ready for use, and sufficient battery power is available for device operation.
Blinking red with periodic audio chirp	The battery is low and not currently charging, or there is no battery installed and the device is running on AC power only.
Blinking red with no audio chirp	The battery is low but is currently charging. The device can be used, but its battery-only operation time is limited.
Solid red with periodic audio chirp	A critical failure has been detected that may prevent the delivery of defibrillation therapy, pacing, or ECG acquisition.
Solid red with no audio chirp	No power is available or the device cannot power on.

Alarm Display Notifications

Type	Alarm Message	Alarm Status
Alarms On	None	Audio and visual indications are on.
Alarm Audio Pause	• **Alarm Audio Paused min** (message includes pause duration) • **Audio Pause**	Only visual indications are on for the configured audio pause timeframe. Audio indications resume when the pause timeframe is complete.
Alarm Audio Off	• **Alarm Audio Off** • **Audio Off**	Only visual indications are on.
Alarms Off	**Alarms Off**	Audio and visual indications are off.