SPARK OF LIFE INTERNATIONAL RESUSCITATION CONFERENCE

SYDNEY 2019

DON HARRISON PERPETUAL LECTURE

RICHARD AICKIN
DON HARRISON

• NATIONAL CHAIRMAN OF THE ARC FROM 1989-1993
• STARTED THE SPARK OF LIFE CONFERENCE SERIES
• BROUGHT ARC AND AHA TOGETHER IN EARLY STAGES OF ILCOR
• SERVED ON THE ARC FOR 12 YEARS (1987-1999)
• A VALUED FRIEND & MENTOR TO SUBSEQUENT CHAIRMAN AND COUNCIL MEMBERS
DISCLOSURES

• NO FINANCIAL CONFLICTS OF INTEREST

• PAEDIATRIC EM PHYSICIAN STARSHIP

• CHAIR, NEW ZEALAND RESUSCITATION COUNCIL

• EXEC MEMBER & PAEDIATRIC COMMITTEE LEAD, AUSTRALIAN RESUSCITATION COUNCIL

• CHAIR, AUSTRALIAN & NEW ZEALAND COMMITTEE ON RESUSCITATION

• VICE CHAIR, ILCOR PAEDIATRIC TASK FORCE
Paediatric Life Support

An Advisory Statement by the Paediatric Life Support Working Group of the International Liaison Committee on Resuscitation

V. Nadkarni *, M.F. Hazinski, D. Zideman, J. Kattwinkel, L. Quan, R. Bingham, A. Zaritsky, J. Bland, E. Kramer, J. Tiballs
<table>
<thead>
<tr>
<th>MANOEUVRE</th>
<th>ADULT AND OLDER CHILD</th>
<th>YOUNG CHILD</th>
<th>INFANT</th>
<th>NEWBORN</th>
<th>CPR/RESCUE BREATHING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AIRWAY</strong></td>
<td>Head tilt-chin lift (If trauma, use jaw thrust)</td>
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<td>CHECK RESPONSIVENESS Open Airway Activate EMS</td>
</tr>
<tr>
<td>Initial</td>
<td>2-5 breaths at approximately 1 1/2 sec per breath</td>
<td>2-5 breaths at approximately 1 1/2 sec per breath</td>
<td>2-5 breaths at approximately 1 1/2 sec per breath</td>
<td>2-5 breaths at approximately 1 sec per breath</td>
<td></td>
</tr>
<tr>
<td>Subsequent</td>
<td>12 breaths/min (approximate)</td>
<td>20 breaths/min (approximate)</td>
<td>20 breaths/min (approximate)</td>
<td>30-60 breaths/min (approximate)</td>
<td></td>
</tr>
<tr>
<td>Foreign body airway obstruction</td>
<td>Abdominal thrusts or back blows</td>
<td>Abdominal thrusts or back blows or chest thrusts</td>
<td>Back blows or chest thrusts (No abdominal thrusts)</td>
<td>Suction, (No abdominal thrusts or back blows)</td>
<td></td>
</tr>
<tr>
<td>CIRCULATION</td>
<td>Pulses check (Trained healthcare providers only*)</td>
<td>Compression landmarks</td>
<td>Compression method</td>
<td>Compression depth</td>
<td>Compression rate</td>
</tr>
<tr>
<td>-------------</td>
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</tr>
<tr>
<td>*Carotid</td>
<td>Lower half of sternum</td>
<td>Heel of one hand, other hand on top</td>
<td>Approximately 1/3 the depth of the chest</td>
<td>Approximately 100/min</td>
<td>15:2 (single rescuer) 5:1 (two rescuers)</td>
</tr>
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<td>*Carotid</td>
<td>Lower half of sternum</td>
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<td>Approximately 100/min</td>
<td>5:1</td>
</tr>
<tr>
<td>*Brachial</td>
<td>One finger width below inter mammary line</td>
<td>Two or three fingers</td>
<td>Approximately 1/3 the depth of the chest</td>
<td>Approximately 100/min</td>
<td>5:1</td>
</tr>
<tr>
<td>*Umbilical</td>
<td>*One finger width below inter mammary line</td>
<td>*Two fingers or Encircling thumbs</td>
<td>*Approximately 1/3 the depth of the chest</td>
<td>*Approximately 120/min</td>
<td>*3:1</td>
</tr>
</tbody>
</table>

ASSESS FOR SIGNS OF LIFE:
If pulse present but breathing absent: provide rescue breaths

If pulse not confidently felt or < 60/min and poor perfusion: chest compressions

Continue BLS: Integrate procedures appropriate for newborn, pediatric, or adult advanced life support at earliest opportunity

**Fig. 1.**
UNIVERSAL PAEDIATRIC TEMPLATE
(Healthcare provider)

1. STIMULATE and CHECK RESPONSIVENESS
2. OPEN AIRWAY
3. CHECK BREATHING
4. BREATHE
   - If breathing, place in Recovery position
   - If no chest rise, reposition and reattempt up to 5 times.
   - If no success, move to Foreign Body Airway Obstruction sequence

If present

- ASSESS SIGNS OF LIFE
  - Palpable movement of pupils: Check for 10 seconds
  - CHEST COMPRESSIONS

If Pulse present

- PROVIDE VENTILATION AND OXYGENATION

- ASSESS RHYTHM and CHECK PULSE
  - NO PULSE PRESENT
    - VFVT
    - NON VFVT
      - Defib X 3 as necessary
        - Epinephrine
        - CPR x 3 min
      - CPR x 3 min

DURING CPR:
- Attempt/verify Tracheal and Vascular access
- Check ECG/Paddle position and contact
- Give Epinephrine every 3 min
- Correct reversible causes:
  - Hypoxemia
  - Hypovolemia
  - Hyper/hyperkalemia
  - Hypothermia
  - Tension ptx
  - Tachycardia
  - Seizure
  - Hypotension
  - Toxic disturbances
  - Thromboemboli

Fig. 4.
ILCOR EVIDENCE REVIEW PROCESS

• 1992 STARTING POINT
  • BOGSATS (BUNCHES OF GUYS SITTING AROUND TALKING)

• 1992-2005 TASK FORCE VOLUNTEERS
  • RESPONSIBLE FOR LITERATURE SEARCH, SCREENING, QUALITY REVIEW
  • SYSTEMATIC REVIEWS RARELY PUBLISHED SEPARATELY TO COSTR

• 2010 IMPROVEMENTS WITH GRADE SYSTEM FOR EVIDENCE REVIEW
  • MORE CONSISTENT APPROACH TO CERTAINTY OF EVIDENCE, FRAMING OF RECOMMENDATIONS
  • PUSH AWAY FROM “NEITHER FOR NOR AGAINST”

• 2015 PROFESSIONAL LITERATURE SEARCH, PUBLISHED SYSTEMATIC REVIEWS INFORMING EACH COSTR, PUBLIC COMMENT BEFORE FINALIZING...
  • HIGHER THRESHOLD OF EVIDENCE CERTAINTY REQUIRED TO DRIVE CHANGE IN RECOMMENDATIONS
    • FEAST, THAPCA IH, THAPCA OH, EPOCH
PAEDIATRIC RESUSCITATION 2015

• 21 PICO FORMAT GRADE EVIDENCE REVIEWS COMPLETED

• 5 PRE-ARREST CARE, PREVENTION, RECOGNITION

• 3 CPR

• 7 ADVANCED LIFE SUPPORT

• 6 POST ARREST CARE AND PROGNOSTICATION
PAEDIATRIC RESUSCITATION 2015

PRE-ARREST CARE, PREVENTION OF ARREST

• PEDIATRIC MEDICAL EMERGENCY TEAM (MET) AND RAPID RESPONSE TEAM (RRT) (PEDS 397)
• PEDIATRIC EARLY WARNING SCORES (PEWS) (PEDS 818)
• PRE-ARREST CARE OF PEDIATRIC DILATED CARDIOMYOPATHY OR MYOCARDITIS (PEDS 819)
• ATROPINE FOR EMERGENCY INTUBATION (PEDS 821)
• FLUID RESUSCITATION IN SEPTIC SHOCK (PEDS 545)
PAEDIATRIC RESUSCITATION 2015

• BLS & CPR:
  • SEQUENCE OF CHEST COMPRESSIONS AND VENTILATIONS: C-A-B VERSUS A-B-C (PEDS 709)
  • CHEST COMPRESSION DEPTH (PEDS 394)
  • CHEST COMPRESSION—ONLY CPR VERSUS CONVENTIONAL CPR (PEDS 414)
PAEDIATRIC RESUSCITATION 2015

• ALS
  • ENERGY DOSES FOR DEFIBRILLATION (Peds 405)
  • INVASIVE BLOOD PRESSURE MONITORING DURING CPR (Peds 826)
  • END-TIDAL CARBON DIOXIDE (ETCO₂) MONITORING DURING CPR (Peds 827)
  • AMIODARONE VERSUS LIDOCAINE FOR SHOCK-RESISTANT VF OR PVT (Peds 825)
  • VASOPRESSOR USE DURING CARDIAC ARREST (Peds 424)
  • EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION (ECPR) FOR IHCA (Peds 407)
  • INTRA-ARREST PROGNOSTIC FACTORS (Peds 814)
PAEDIATRIC RESUSCITATION 2015

• POST ROSC CARE

  • POST-ROSC TTM (PEDS 387)
  • POST-ROSC PAO2 (PEDS 544)
  • POST-ROSC VENTILATION (PEDS 815)
  • POST-ROSC FLUID/INOTROPES (PEDS 820)
  • POST-ROSC ELECTROENCEPHALOGRAPHY (EEG) (PEDS 822)
  • POST-ROSC PREDICTIVE FACTORS (PEDS 813)
SURVIVAL FROM PAEDIATRIC ARREST

TETSUHISA KITAMURA 2010

• NATIONWIDE (JAPAN), PROSPECTIVE, POPULATION-BASED, OBSERVATIONAL STUDY

• OUT-OF-HOSPITAL CARDIAC ARREST JAN 1, 2005 - DEC 31, 2007. 5170 CHILDREN 0-17YRS

• PRIMARY OUTCOME WAS SURVIVAL WITH FAVOURABLE NEUROLOGICAL STATUS AT 1 MONTH.
SURVIVAL FROM PAEDIATRIC ARREST

- 3675 (71%) CHILDREN HAD ARRESTS OF NON-CARDIAC CAUSES AND 1495 (29%) CARDIAC CAUSES.

- 1551 (30%) RECEIVED CONVENTIONAL CPR AND 888 (17%) COMPRESSION-ONLY CPR. (DATA FOR TYPE OF CPR WERE NOT AVAILABLE FOR 12 CHILDREN)
CPR IN PAEDIATRIC ARREST

FOR AGES 1–17 YEARS

- Arrests of non-cardiac causes, good neurological survival was more common after bystander CPR than no CPR
  - 5.1% vs 1.5% or 4.17

- Conventional CPR produced was better than compression-only CPR
  - 7.2% vs 1.6% or 5.54

- No difference in survival for compression only CPR vs no bystander CPR

- Arrests of presumed cardiac causes, good neurological outcome was more common after bystander CPR than no CPR
  - 9.5% vs 4.1% or 2.21
  - No difference between conventional vs compression-only CPR in this group
CPR

• For children with out of hospital cardiac arrest there is better survival with full CPR rather than compression only CPR.

• Survival for children with OHCA who receive “compression only” bystander CPR is no better than the outcome with NO bystander CPR.

• For health professionals, ventilation is crucial in child CPR, not simply an option if “willing and able”.
Bad News

• SURVIVAL TO DISCHARGE FROM OUT-OF-HOSPITAL PEDIATRIC CARDIAC ARREST IS 5 – 12%.

Worse News

• NO IMPROVEMENT IN PAST 20 YEARS
• ONLY ~1/3 OF PEDIATRIC CARDIAC ARREST PATIENTS GET BYSTANDER CPR
• ONLY 6% ARE DISCHARGED FROM THE HOSPITAL WITH GOOD NEUROLOGIC OUTCOME

MONICA KLEINMAN

ERC MEETING 2012
DEFIBRILLATION

• WE DON’T KNOW WHAT THE BEST DEFIBRILLATION ENERGY IS FOR CHILDREN,

• 2-4J/KG SEEMS EFFECTIVE, AND A SINGLE NUMBER OF 4J/KG IS EASY TO REMEMBER

• IT SEEMS SAFE AND EFFECTIVE TO USE UNMODIFIED AEDS IN CHILDREN OF ANY AGE IF NECESSARY
  - MANUAL DEFIBRILLATORS OR AEDS WITH ENERGY STEP DOWN PREFERRED

• WE HAVE ONLY ANECDOTES RE USE OF AEDS IN INFANTS. EXPERT OPINION IS THAT WE SHOULD USE THEM IF THIS IS WHAT IS AVAILABLE.

• SHOCKABLE RHYTHMS OCCUR IN AROUND 15% OF PAEDIATRIC CARDIAC ARRESTS
CARDIAC ARREST DRUGS

• UNCLEAR WHETHER ANY DRUG IMPROVES LONG TERM SURVIVAL IN PAEDIATRIC CARDIAC ARREST

• ADRENALINE INCREASES CHANCE OF ROSC BUT NOT SURVIVAL

• EVIDENCE FOR LIGNOCAINE/AMIODARONE IN SHOCK RESISTENT VF/VT IS SLENDER

• ALTHOUGH AMIODARONE IS SEEN AS PREFERRED TO LIGNOCAINE IN OUR EXISTING GUIDELINES, THE EVIDENCE IS ABOUT THE SAME FOR BOTH DRUGS.

• DRUGS SHOULD NOT TAKE PRIORITY OVER HIGH QUALITY CPR/VENTILATION/CIRCULATORY SUPPORT
PAEDIATRIC RESUSCITATION 2019

- ADVANCED AIRWAY INTERVENTIONS IN PEDIATRIC CARDIAC ARREST:

- **POPULATION:** INFANTS AND CHILDREN IN ANY SETTING (IN-HOSPITAL OR OUT-OF-HOSPITAL) WHO HAVE RECEIVED CHEST COMPRESSIONS OR A DEFIBRILLATION DOSE ON WHOM CPR IS BEING PERFORMED.

- **INTERVENTION:** PLACEMENT OF AN ADVANCED AIRWAY DEVICE.

- **COMPARATORS:** PRIMARY: BAG-MASK VENTILATION, ALONE OR WITH NON-ADVANCED AIRWAY INTERVENTIONS., SECONDARY: ANOTHER ADVANCED AIRWAY DEVICE

- **OUTCOMES:** ANY CLINICAL OUTCOME.
PAEDIATRIC RESUSCITATION 2019

• ADVANCED AIRWAY INTERVENTIONS IN PEDIATRIC CARDIAC ARREST

• TREATMENT RECOMMENDATIONS:
  • WE SUGGEST THE USE OF BMV RATHER THAN TI OR SGA IN THE MANAGEMENT OF CHILDREN DURING CARDIAC ARREST IN THE OUT-OF-HOSPITAL SETTING (WEAK RECOMMENDATION, VERY LOW CERTAINTY EVIDENCE).

• WE CAN MAKE NO RECOMMENDATION ABOUT THE USE OF TI OR SGA IN THE MANAGEMENT OF CHILDREN WITH CARDIAC ARREST IN THE IN-HOSPITAL SETTING OWING TO LIMITED EVIDENCE.
• **ANTI-ARRHYTHMIC DRUGS FOR CARDIAC ARREST - PEDIATRICS**

- **POPULATION:** Patients of all ages (neonates, children, and adolescents < 18) in any setting (in-hospital or out-of-hospital) with cardiac arrest and a shockable rhythm at any time during cardiopulmonary resuscitation (CPR) or immediately after return of spontaneous circulation (ROSC).

- **INTERVENTION:** Administration (intravenous or intra-osseous) of an antiarrhythmic drug during CPR and immediately (within 1 hour) after ROSC.

- **COMPARATORS:** Another anti-arrhythmic drug or placebo or no drug during CPR or immediately after ROSC.

- **OUTCOME:** Survival to hospital discharge with good neurologic outcome and survival to hospital discharge were ranked as critical outcomes. Return of spontaneous circulation (ROSC) was ranked as an important outcome. For antiarrhythmic drugs after ROSC – re-arrest was included as an important outcome.
ANTI-ARRHYTHMIC DRUGS FOR CARDIAC ARREST - PEDIATRICS

TREATMENT RECOMMENDATION:

- WE SUGGEST AMIODARONE OR LIDOCAINE BE USED IN THE TREATMENT OF PEDIATRIC SHOCK-REFRACTORY VF/PVT (WEAK RECOMMENDATION, VERY LOW QUALITY EVIDENCE).
• **CPR**: CHEST COMPRESSION TO VENTILATION RATIO - BYSTANDER – PEDIATRIC

• **POPULATION**: PATIENTS OF ALL AGES (I.E., NEONATES, CHILDREN, ADULTS) WITH CARDIAC ARREST FROM ANY CAUSE AND ACROSS ALL SETTINGS (IN-HOSPITAL AND OUT OF-HOSPITAL). STUDIES THAT INCLUDED ANIMALS WERE NOT ELIGIBLE. INTERVENTION: ALL MANUAL CPR METHODS INCLUDING COMPRESSION-ONLY CPR (CO-CPR), CONTINUOUS COMPRESSION CPR (CC-CPR), AND CPR WITH DIFFERENT COMPRESSION-TO-VENTILATION RATIOS. CO-CPR INCLUDED COMPRESSION WITH NO VENTILATIONS, WHILE CC-CPR INCLUDED COMPRESSION WITH ASYNCHRONOUS VENTILATIONS OR MINIMALLY-INTERRUPTED CARDIAC RESUSCITATION (MICR) STUDIES THAT MENTIONED THE USE OF A MECHANICAL DEVICE DURING CPR WERE ONLY CONSIDERED IF THE SAME DEVICE WAS USED ACROSS ALL RELEVANT INTERVENTION ARMS AND WOULD THEREFORE NOT CONFOUND THE OBSERVED EFFECT.

• **COMPARATORS**: STUDIES HAD TO COMPARE AT LEAST TWO DIFFERENT CPR METHODS FROM THE ELIGIBLE INTERVENTIONS; STUDIES WITHOUT A COMPARATOR WERE EXCLUDED.

• **OUTCOMES**: THE PRIMARY OUTCOME WAS FAVORABLE NEUROLOGICAL OUTCOMES, MEASURED BY CEREBRAL PERFORMANCE OR A MODIFIED RANKIN SCORE. SECONDARY OUTCOMES WERE SURVIVAL, ROSC, AND QUALITY OF LIFE.
• CPR: CHEST COMPRESSION TO VENTILATION RATIO - BYSTANDER – PEDIATRIC

• TREATMENT RECOMMENDATION

• WE SUGGEST THAT BYSTANDERS PROVIDE CPR WITH VENTILATION FOR INFANTS AND CHILDREN YOUNGER THAN 18 YEARS WITH OHCA (WEAK RECOMMENDATION, VERY LOW QUALITY EVIDENCE)

• WE CONTINUE TO RECOMMEND THAT IF BYSTANDERS CAN’T PROVIDE RESCUE BREATHS AS PART OF CPR FOR INFANTS AND CHILDREN YOUNGER THAN 18 YEARS WITH OHCA (GOOD PRACTICE STATEMENT), THEY SHOULD AT LEAST PROVIDE CHEST COMPRESSIONS.

• IN 2015, THIS WAS CITED AS A STRONG RECOMMENDATION BASED ON VERY LOW QUALITY EVIDENCE (MACONOCHIE, 2015, E147, DE CAEN, 2015, S177).
PAEDIATRIC RESUSCITATION 2019

• PEDIATRIC TARGETED TEMPERATURE MANAGEMENT POST CARDIAC ARREST

• POPULATION: PEDIATRIC PATIENTS (>24 HOURS TO 18 YEARS OF AGE) WHO ACHIEVED RETURN OF SUSTAINED CIRCULATION (ROSC) AFTER OUT-OF-HOSPITAL OR IN-HOSPITAL CARDIAC ARREST

• INTERVENTION: TARGETED TEMPERATURE MANAGEMENT (TTM) WITH A TARGET TEMPERATURE OF 32-36°C

• COMPARATORS: NO TTM OR TTM AT AN ALTERNATIVE TARGET TEMPERATURE RANGE

• OUTCOMES:
  • PRIMARY OUTCOME:
    • GOOD NEUROBEHAVIORAL SURVIVAL LONG-TERM
PAEDIATRIC RESUSCITATION 2019

• PEDIATRIC TARGETED TEMPERATURE MANAGEMENT POST CARDIAC ARREST

• TREATMENT RECOMMENDATIONS

• WE SUGGEST USING TTM 32-34°C OR TTM 36-37.5°C FOR COMATOSE PEDIATRIC PATIENTS (> 24 HOURS TO 18 YEARS OF AGE) WHO ACHIEVED ROSC AFTER OHCA (WEAK RECOMMENDATION, VERY LOW CERTAINTY OF EVIDENCE).

• WE SUGGEST USING TTM 32-34°C OR TTM 36-37.5°C FOR COMATOSE PEDIATRIC PATIENTS (> 24 HOURS TO 18 YEARS OF AGE) WHO ACHIEVED ROSC AFTER IHCA (WEAK RECOMMENDATION, VERY LOW CERTAINTY OF EVIDENCE).
PAEDIATRIC RESUSCITATION 2019

• DISPATCHER INSTRUCTION IN CPR (PEDIATRICS)

• **POPULATION**: INFANTS AND CHILDREN WITH PRESUMED CARDIAC ARREST IN OUT-OF-HOSPITAL SETTINGS.

• **INTERVENTION**: PATIENTS/CASES OR EMS SYSTEMS WHERE DISPATCH ASSISTED CPR IS OFFERED.

• **COMPARATORS**: STUDIES WITH COMPARATORS WHERE EITHER SYSTEMS OR SPECIFIC CARDIAC ARREST CASES ARE NOT OFFERED DISPATCH-ASSISTED CPR ARE INCLUDED.

• **OUTCOMES**: CRITICAL OUTCOMES INCLUDED: SURVIVAL WITH GOOD NEUROLOGICAL FUNCTION (AT HOSPITAL DISCHARGE, 1 MONTH OR 6 MONTHS), SURVIVAL (HOSPITAL DISCHARGE, 1 MONTH OR 1 YEAR SURVIVAL), SHORT TERM SURVIVAL (RETURN OF SPONTANEOUS CIRCULATION – ROSC, HOSPITAL ADMISSION), PROVISION OF BYSTANDER CPR (BCPR), WHILST IMPORTANT OUTCOMES WERE INITIAL SHOCKABLE RHYTHM, TIME TO CPR.
PAEDIATRIC RESUSCITATION 2019

• DISPATCHER INSTRUCTION IN CPR (PEDIATRICS)

• TREATMENT RECOMMENDATIONS
  • WE RECOMMEND EMERGENCY MEDICAL DISPATCH CENTERS OFFER DISPATCH-ASSISTED CPR INSTRUCTIONS FOR PRESUMED PEDIATRIC CARDIAC ARREST (STRONG RECOMMENDATION, VERY LOW CERTAINTY EVIDENCE).
  • WE RECOMMEND EMERGENCY DISPATCHERS PROVIDE CPR INSTRUCTIONS FOR PEDIATRIC CARDIAC ARREST WHEN NO BYSTANDER CPR IS IN PROGRESS (STRONG RECOMMENDATION, LOW CERTAINTY EVIDENCE).

• WE CANNOT MAKE A RECOMMENDATION FOR OR AGAINST EMERGENCY DISPATCHERS TO PROVIDE CPR INSTRUCTIONS FOR PEDIATRIC CARDIAC ARREST WHEN BYSTANDER CPR IS ALREADY INITIATED (NO RECOMMENDATION, VERY LOW CERTAINTY EVIDENCE).
PAEDIATRIC RESUSCITATION 2019

• EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION (ECPR) FOR CARDIAC ARREST – PEDIATRICS

• POPULATION: ADULTS (≥ 18 YEARS) AND CHILDREN (<18 YEARS) WITH CARDIAC ARREST IN ANY SETTING (OUT-OF-HOSPITAL OR IN-HOSPITAL).

• INTERVENTION: ECPR INCLUDING EXTRACORPOREAL MEMBRANE OXYGENATION OR CARDIOPULMONARY BYPASS, DURING CARDIAC ARREST.

• COMPARATOR: MANUAL CPR AND OR MECHANICAL CPR.

• OUTCOMES: CLINICAL OUTCOMES, INCLUDING SHORT-TERM SURVIVAL AND NEUROLOGICAL OUTCOMES (E.G. HOSPITAL DISCHARGE, 28-DAYS, 30-DAYS, AND 1-MONTH), AND LONG-TERM SURVIVAL AND NEUROLOGICAL OUTCOMES (E.G. 3-MONTHS, 6-MONTHS, AND 1-YEAR).
• EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION (ECPR) FOR CARDIAC ARREST – PEDIATRICS

• TREATMENT RECOMMENDATIONS
  • WE SUGGEST ECPR MAY BE CONSIDERED AS AN INTERVENTION FOR SELECTED CHILDREN WITH IN-HOSPITAL CARDIAC ARREST REFRACTORY TO CONVENTIONAL CPR IN SETTINGS WHERE RESUSCITATION SYSTEMS ALLOW ECPR TO BE IMPLEMENTED (WEAK RECOMMENDATION, VERY LOW CERTAINTY OF EVIDENCE).
  • THERE IS INSUFFICIENT EVIDENCE IN PEDIATRIC OUT-OF-HOSPITAL CARDIAC ARRESTS TO FORMULATE A RECOMMENDATION FOR THE USE OF ECPR.
UNIVERSAL PAEDIATRIC TEMPLATE
(Healthcare provider)

1. **STIMULATE** and **CHECK RESPONSIVENESS**
2. **OPEN AIRWAY**
3. **CHECK BREATHING**
   - If Breathing, Place in Recovery position
4. **BREATHE**
   - If No chest rise, Reposition and reattempt up to 5 times.
   - If No success, move to Foreign Body Airway Obstruction Sequence
5. **ASSESS SIGNS OF LIFE**
   - (Rabbits movement of pupils)
   - (5 breaths in 10 seconds)
6. **CHEST COMPRESSIONS**
7. **PROVIDE VENTILATION AND OXYGENATION**
8. **ASSESS RHYTHM and CHECK PULSE**
   - **NO PULSE PRESENT**
     - **VF/VT**
     - **DEFIBRATE**
     - **Epi**
       - **Epinephrine**
       - **If necessary**
9. **DURING CPR**
   - Attempt/verify Tracheal and Vascular access
   - Check ECG/Paddle position and contact
   - Give Epinephrine every 3 min
   - Correct reversible causes:
     - Hypoxemia
     - Hypovolemia
     - Hyper/hypokalemia
     - Hypothermia
     - Tension gx
     - Tension ptx
     - Toxic disturbances
     - Thromboemboli

Fig. 4.
FEDORA FLOWCHART

DO YOU NEED ONE?

NO

NO FEDORA.

YES

NO, YOU DON'T.
Engineering Flowchart

DOES IT MOVE?

No

Should it?

No

Problem

Yes

WD-40

Yes

Should it?

Yes

No Problem

No

No Problem

No

No
Advanced Life Support for Infants and Children

Start CPR
2 breaths :15 Compressions
Minimise Interruptions

Attach
Defibrillator / Monitor

Assess Rhythm

Shockable
Shock (4 J/kg)
CPR for 2 minutes

Non Shockable

Return of Spontaneous Circulation?

CPR for 2 minutes

Post Resuscitation Care

During CPR
Airway adjuncts (LMA / ETT)
Oxygen
Waveform capnography
IV / IO access
Plan actions before interrupting compressions
(e.g. charge manual defibrillator to 4 J/kg)

Drugs
Shockable
* Adrenaline 10 mcg/kg after 2nd shock
  (then every 2nd loop)
* Amiodarone 5mg/kg after 3 shocks
Non Shockable
* Adrenaline 10 mcg/kg immediately
  (then every 2nd loop)

Consider and Correct
Hypoxia
Hypovolaemia
Hyper / hypokalaemia / metabolic disorders
Hypothermia / hyperthermia
Tension pneumothorax
Tamponade
Toxins
Thrombosis (pulmonary / coronary)

Post Resuscitation Care
Re-evaluate ABCDE
12 lead ECG
Treat precipitating causes
Re-evaluate oxygenation and ventilation
Targeted Temperature Management
Advanced Life Support for Adults

**Start CPR**
30 compressions : 2 breaths
Minimise Interruptions

**Attach**
Defibrillator / Monitor

**Assess Rhythm**

**Shockable**

**Shock**

CPR for 2 minutes

**Return of Spontaneous Circulation?**

**Non Shockable**

**CPR for 2 minutes**

**Post Resuscitation Care**

---

**During CPR**
- Airway adjuncts (LMA / ETT)
- Oxygen
- Waveform capnography
- IV / IO access
- Plan actions before interrupting compressions (e.g. charge manual defibrillator)

**Drugs**

**Shockable**
- Adrenaline 1 mg after 2nd shock (then every 2nd loop)
- Amiodarone 300mg after 3 shocks

**Non Shockable**
- Adrenaline 1 mg immediately (then every 2nd loop)

**Consider and Correct**
- Hypoxia
- Hypovolaemia
- Hyper / hypokalaemia / metabolic disorders
- Hypothermia / hyperthermia
- Tension pneumothorax
- Tamponade
- Toxins
- Thrombosis (pulmonary / coronary)

**Post Resuscitation Care**
- Re-evaluate ABCDE
- 12 lead ECG
- Treat precipitating causes
- Aim for: SpO2 94-98%, normocapnia and normoglycaemia
- Targeted temperature management
PAEDIATRIC RESUSCITATION

• ARE CHILDREN EVER JUST SMALL ADULTS?

• UNIVERSAL ALGORITHM FOR CPR
  • CAB
  • 30:2
  • PUSH HARD (4CM INFANT, 5CM CHILD VS. 5CM ADULT)
  • PUSH FAST (100-120/MIN)
  • MINIMISE INTERRUPTIONS TO COMPRESSIONS
  • CALL FOR HELP & FIND AN AED AS SOON AS POSSIBLE
APPROACHING A UNIVERSAL ALS APPROACH?

• RECOMMENDATIONS FOR RATE AND DEPTH OF COMPRESSION ARE VERY SIMILAR ADULT & CHILD GUIDELINES

  • 4-5CM, 100-120/MIN, HAND POSITION IS CENTRE OF THE CHEST

  • 15:2 RATIO IS TAUGHT IN PAEDIATRIC SETTINGS BUT NO EVIDENCE THAT THIS IS BETTER OR WORSE THAN 30:2 FOR CHILDREN

• MORE TO BE GAINED BY FOCUS ON QUALITY OF CPR THAN ON DIFFERENCES IN TECHNIQUE BETWEEN CHILDREN AND ADULTS

• DIFFERENCES ARE DRUG DOSES AND DEFIBRILLATION ENERGY, & PRACTICAL SKILLS