ECPR Simulation at Seattle Children’s Hospital

Justin Sleasman CCP, MS, FPP
Larissa Yalon BSN, RN, CCRN

ECPR- Why?

- AHA Get with the Guidelines Resuscitation Registry: Hospital cardiac arrest in children occurs in 2% - 6% of all PICU patients.
  - Asystole / PEA = 84.8
  - Vfib / Pulseless Vtach = 15.2%
ECPR Survival vs Conventional CPR

![ECPR Survival vs Conventional CPR Chart]

ECPR Algorithm

**eCPR Algorithm**

- **Code Blue/Green Initiated**
- First Dose of Epinephrine Administered
- Charge Nurse Asks ICU Code Responder (Fellow or Attending)
  - If patient is Eligible for eCPR

**Inclusion Criteria:**
- Witnessed Arrest
- Ongoing adequate CPR with secure airway in place
  - Shockable rhythm treated
- Has a potentially reversible cause for arrest

**Exclusion Criteria:**
- Has a terminal illness
- Intracranial hemorrhage within last week
- Hemorrhagic Shock

If Yes, Call 7-9999 and request activation of eCPR by stating:
- "Activate eCPR. Patient location (of cannulation) is _____
  - patient weight is _____."

Continue Code Blue/Green efforts; Move Patient to ICU despite ongoing CPR unless in ED, OR, or Cath lab.
ECPR Specialist

- Carries ECPR pager
- Trained to blood prime
- Recipe book for consistency

Pumps

- Two clear primed pumps
- ECPR medication box
- Cannula charts
Emergency equipment located in all 3 ICUs

- ECPR/open chest cart
- Bovie and head lamp

Emergency O negative Uncrossmatched Blood

2 Units non-irradiated PRBCs
Early Simulations

• “Bucket Head” for cannulating

• RNs yearly competency included mock ECPR

Multidisciplinary High Fidelity Simulation

• Recognized the need for all members of the team to participate in full scale simulations on a regular basis

• Proposal to leadership to fund 2 hour simulations twice a month

• Buy in from Cardiac and General Surgeons, ICU Physicians, ICU RNs, RTs, OR RNs
Cannulation Devices

- Increases realism
- Coordination of surgery and CPR
- Team focus on high quality CPR
- Communication between surgeon and specialist
- Troubleshooting/sabotage of ECLS circuit as part of event

Location – In Situ

- ED
- Cath Lab
- PICU

10/17/2017
Participants

- Cardiac or General Surgeon +/- Fellow
- Intensivist/ Neonatologist
- 8-10 ICU RNs
- 2 RTs
- 1-2 OR RNs
- 2 ECLS Specialists
- Pharmacist
- 1 ICU Tech
- RN and MD facilitator
- 1-2 Simulation Techs

Simulation Debrief

- 45 minutes for debrief and review
- All members of the team participate
- Areas of emphasis
  - Activation process for eCPR
  - Preparation of room and patient for eCPR
  - High quality CPR
  - CPR during cannulation
  - ECLS Pump prime and initiation of support
Layout

- Based on feedback during debrief
- ECPR layout map created & placed on all code carts

Simulation Survey

- From February 2014 to October 2015, a total of 332 healthcare professionals participated in ECPR simulations
  - 243 (73%) nurses
  - 34 (10%) ICU attendings and surgeons
  - 21 (6%) respiratory therapists
  - 14 (4%) ICU and surgical fellows
  - 20 (6%) ECMO specialists and other healthcare specialists (ICU technician, operating room technician, pharmacists, nursing assistants, etc.).

- ECPR simulation participation surveys were received from 87 healthcare professionals
  - 70 (80%) found the simulation to be ‘very valuable’
  - 16 (18%) found the simulation to be ‘somewhat valuable’
  - Only 1 respondent did not find the simulation valuable.
Simulation Survey

• All participants (100%) reported learning something from this simulation that would change their future practice.
• Learning themes identified by participants from participation in the ECPR simulation included:
  o The importance of eye contact and closed loop communication
  o The use of end tidal carbon dioxide for feedback regarding effectiveness of CPR
  o Equipment and steps needed for ECPR
  o Importance of communicating clearly with the surgeons
  o Compressions on sterile field during ECMO cannulation
  o How to communicate better with the blood bank
  o Importance of ordering the heparin bolus for cannulation
  o Importance of role assignment.

SCH ECPR Data

• Since November 2008
  o 134 ECPR activations
  o 64 patients placed on ECLS via ECPR
  o Mean time from ECPR activation to commencement of ECLS is 42 minutes
    o 33 minutes day shift
    o 49 minutes night and weekend
  o Survival to hospital discharge is 48.2%.
Conclusion

- ECPR requires a significant investment in both resources and time but saves lives.
- Multidisciplinary, high fidelity simulation is an essential part of an ECPR program.
- Initiating ECPR is a technically challenging undertaking that requires a large-scale, well-orchestrated, inter-professional team. Thus, centers providing ECPR must offer educational programs to train healthcare providers in rapid deployment ECLS. Simulation-based training is critically important to optimize patient outcome.