A Closer Look at the Critical Care PRN

Overview of the PRN

The Critical Care PRN is made up of pharmacists practicing in intensive care units and emergency departments across the world. The PRN has a rich history. Since its establishment as one of the two original PRNs in 1992, the membership has grown to include 2361 active members, including 225 residents and 455 students. Rarely does a day go by where there is not active discussion on the newest evidence being published on the care of critically ill patients, sharing of best practices between institutions, and weighing in of experts on the clinical controversies we face in our practices. The Critical Care PRN is exceptionally proud of the financial support it has been able to provide to its members. The PRN has funded members to participate in both of ACCP's researcher training programs, Focused Investigator Training and Mentored Research Investigator Training, because of the strong belief that well-trained clinical pharmacist researchers have and will continue to move the profession forward. The PRN also has supported the ACCP Research Institute by donating to the Frontiers Fund since 2003 and has had seven members on its Board of Trustees.

Opportunities and Resources for Resident and Fellow Members of the PRN

This year, the PRN is supporting the registration or travel to the ACCP Global Conference on Clinical Pharmacy in San Francisco for four residents and one student member. Students, residents, and fellows serve on each of the six committees and have an active voice within the PRN. Complementary PRN memberships are provided to all interested PGY2 critical care and emergency medicine residents. In addition, the opportunities for networking are plentiful, both through online interactions and in person at the PRN business meeting. Residents who received research grant awards will present their findings at the Critical Care PRN business meeting on Tuesday, October 20, from 6:00 p.m. to 9:00 p.m. at the Hilton San Francisco.

Clinical Issue: ACLS 2015: A Preview

Advanced cardiac life support (ACLS) is an area of practice that critical care pharmacy practitioners encounter regularly. The pharmacist has many potential roles as part of the resuscitation team, and pharmacist participation in ACLS has been shown to improve compliance with treatment guidelines.[1] Therefore, it is important that pharmacists practicing in this role understand the evidence behind the guidelines for ACLS. Recently, the councils of the International Liaison Committee on Resuscitation (ILCOR) met to finalize systematic evidence evaluations regarding cardiopulmonary resuscitation (CPR) and emergency cardiovascular care (ECC) during the 2015 International Consensus Conference on CPR and ECC science, in preparation for the Consensus on Science with Treatment Recommendations (COSTR), scheduled for online publication in the medical journals *Circulation* and *Resuscitation* on October 15, 2015. The task force discussed 150 questions, including those regarding recommendations for ACLS. Below is a synopsis of three recent areas of debate regarding ACLS that were addressed by ILCOR and the expected recommendations that will be included in the 2015 ACLS treatment guidelines. These recommendations are currently in DRAFT format and will be finalized on publication in October.

1. **Induced Hypothermia:** Two landmark trials in 2002 led to the 2010 recommendation, "*Comatose adult patients (not responding in a meaningful way to verbal commands) with spontaneous circulation after out-of-hospital VF cardiac arrest should be cooled to 32 to 34°C for 12 to 24 hours. Induced hypothermia might also benefit comatose adult patients with spontaneous circulation after out-of-hospital cardiac arrest from a nonshockable rhythm, or cardiac arrest in hospital.*"[2-4] These two studies showed that out-of-hospital cardiac arrest (OHCA) with ventricular fibrillation (VF) and pulseless ventricular tachycardia

(VT) cooling to 32°C–34°C compared with no temperature management was associated with a risk ratio (RR) and odds ratio (OR) for good neurologic outcome at 6 months and hospital discharge of 1.4 (95% CI, 1.08–1.81) and 2.65 (95% CI, 1.02–6.88), respectively.[3,4] A 2013 *New England Journal of Medicine* publication by Nielsen et al. described cooling to 33°C compared with tight temperature control at 36°C in 939 adult patients with OHCA and any rhythm except asystole and suggested that therapeutic hypothermia does not decrease death or poor neurological outcomes (HR for mortality at end of trial 1.06; 95% CI, 0.89–1.28; RR for death or poor neurologic outcome at 6 months 1.02; 95% CI, 0.88–1.16).[5] The committee responded in support of therapeutic hypothermia with varying strengths of recommendation on the basis of initial rhythm and in-hospital cardiac arrest (IHCA) versus OHCA, labeling the Nielsen trial as moderate quality.[6]

2. **Chest Compression Rate:** According to results from a 2005 study by Abella et al.,[7] the 2010 Adult Basic Life Support (BLS) guidelines conclude, "*It is reasonable for lay rescuers and healthcare providers to perform chest compressions for adults at a rate of at least 100 compressions per minute. There is insufficient evidence to recommend a specific upper limit for compression rate.*"[6] Two observational studies by Idris et al. in 2012 and 2015 were cited as very low-quality evidence. These did not show a significant increase in rates of survival at compression rates greater than 140 chest compressions per minute after adjusting for covariates.[8,9] Abella et al. found optimal return of spontaneous circulation (ROSC) at a rate of greater than 120 chest compressions (CCs) per minute.[7] The committee provided a weak recommendation in favor of a CC rate of 100–120 CC per minute, downgrading the quality of evidence because of potential bias and citing "costs of implementation" in a values statement as a reason for lower strength of recommendation.[6]

3. **Steroids:** No recommendations are made for the use of corticosteroids or mineralocorticoids in the 2010 ACLS guidelines.[2] Two studies by Mentzelopoulos et al. in 2009 and 2013 studied 368 patients with IHCA and showed an improved rate of ROSC with the use of methylprednisolone and vasopressin in addition to epinephrine with or without hydrocortisone compared with the use of epinephrine and placebo (39/48 [81.3%] vs. 27/52 [51.9%], p<0.003).[10,11] The 2009 study showed improved survival to discharge (9/48 [19%] vs. 2/52 [4%], p=0.02).[10] The 2013 study showed improved survival with favorable neurological outcome (18/130 [13.9%] vs. 7/138 [5.1%]; OR 3.28; 95% CI, 1.17–9.20; p=0.02).[11] Previous studies involving OHCA varied in showing benefit for ROSC and survival to patients administered steroids in addition to epinephrine.[12,13] According to this evidence, the committee provides a weak recommendation for administering the combination of methylprednisolone, vasopressin, and epinephrine as an alternative to epinephrine alone for IHCA. They recommend against adding steroids for OHCA because of poor-quality evidence.[6]

Table 1

Question	Outcome	Evidence[3-18]	Recommendation[6]
Inducing mild hypothermia (target temp 32°C–34°C), compared with normothermia (36°C–37°C)	Survival with favorable neurological/ functional outcome at discharge, 30 days, 60 days, 180 days AND/OR 1 yr	**OHCA Shockable Rhythm:** *Bernard 2002, p. 557* *The Hypothermia After Cardiac Arrest Study Group 2002, p. 549* *Nielsen 2013, p. 2197* **OHCA Nonshockable Rhythm:** *Dumas 2011, p. 877* *Nielsen 2013, p. 2197*	**OHCA Shockable Rhythm:** Recommend targeted temperature management (strong recommendation, low-quality evidence) **OHCA Nonshockable Rhythm & IHCA:** Recommend targeted

		Testori 2011, p. 1162 *Vaahersalo 2013, p. 826* **IHCA:** *Nichol 2013, p. 620*	temperature management (weak recommendation, very low-quality evidence)
	Survival only at discharge, 30 days, 60 days, 180 days AND/OR 1 yr	**OHCA Shockable Rhythm:** *Bernard 2002, p. 557* *The Hypothermia After Cardiac Arrest Study Group 2002, p. 549* *Nielsen 2013, p. 2197* **OHCA Nonshockable Rhythm:** *Nielsen 2013, p. 2197* *Testori 2011, p. 1162* **IHCA:** *Nichol 2013, p. 620*	
Chest compression (CC) rate (compared with 100 CC/min)	Survival only at discharge, 30 days, 60 days, 180 days AND/OR 1 yr	**Chest compression rates of > 140, 140, 120–139 per min:** *Abella 2005, p. 428* *Idris 2012, p. 3004* *Idris 2015, Epub*	Recommend manual chest compression rate of 100–120 CC/min for adults in cardiac arrest in any setting (weak recommendation, very low quality of evidence)
Use of steroids in addition to epinephrine	ROSC	**IHCA:** *Mentzelopoulos 2009, p. 15* *Mentzelopoulos 2013, p. 270* **OHCA:** *Paris 1984, p. 1008* *Tsai 2007, p. 318*	**IHCA:** Combination of methylprednisolone, vasopressin and epinephrine may be considered as an alternative to epinephrine alone during CPR (weak recommendation, low-quality evidence) **OHCA:** Recommend against the routine use of steroids during CPR
	Survival with favorable neurological/ functional outcome at discharge, 30 days, 60 days, 180 days AND/OR 1 yr	**IHCA:** *Mentzelopoulos 2013, p. 270*	
	Survival only at discharge, 30 days, 60 days, 180 days AND/OR 1 yr	**IHCA:** *Mentzelopoulos 2009, p. 15* **OHCA:** *Paris 1984, p. 1008* *Tsai 2007, p. 318*	

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Clinical Issue
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