

# Pediatric Pharmacists' Participation in Cardiopulmonary Resuscitation Events

*PPAG understands the dilemma and varying factors that many institutions face concerning the routine participation of pharmacists in emergency resuscitation activities. Acknowledging these obstacles, PPAG encourages all institutions to strongly consider creating, adopting and upholding policies to address pharmacists' participation in code events because of the profound and evidenced impact pharmacist participation has shown on hospital medication error and mortality rates in children. PPAG advocates that all institutions requiring a pharmacist's participation in codes should consider adoption of preparatory training programs. While PPAG does not advocate any one specific program, consideration should be taken to ensure that pharmacists are educated on the pharmacotherapy of drugs used in the CPR process including but not limited to, inotropes and vasoactive medications, BLS, medication compatibility, ACLS/PALS algorithms, and a general familiarity with the institutional code cart prior to participation in code events.*

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## **Background:**

Pharmacist attendance at respiratory and cardiac arrests or emergencies (codes) in a hospital setting has been discussed in numerous venues over the past 20 years.<sup>1-2</sup> Most information comes from studies conducted by surveys at various institutions with differing degrees of clinical and academic statuses. The first report of pharmacist participation was in the 1970s<sup>3</sup>, and by 1992, Bond et.al. reported participation in these events at 30% of responding institutions.<sup>4</sup> In 1991 and 1995, surveys were conducted and results published by Raehl et.al.<sup>1</sup> and Shimp et.al.<sup>5</sup>, respectively. Both of these articles concluded that pharmacist attendance at codes only occurred in about 30-35% of hospitals represented. These surveys however did not differentiate between adult and pediatric codes. In 2000, Hahn et.al., conducted a survey that was distributed

to pediatric hospitals; the results showed that a pediatric pharmacist participated in codes in approximately 63% of the children's hospitals surveyed.<sup>6</sup>

While there are currently no studies in pediatrics that investigate the benefit of having a pediatric pharmacist on the emergency code team, there is sufficient literature to show that a pharmacist has a significant impact on patient care when participating in multidisciplinary rounding teams. In 2006, Sanghera, et.al., did a systematic literature review to determine if pediatric pharmacist interventions improved drug therapy for children.<sup>7</sup> They concluded that a ward based clinical pharmacist did have a positive impact on drug ordering and administration in these patients. Studies by Kaushal et.al.<sup>8</sup> and Leape et.al.<sup>9</sup> both showed that clinical pharmacists in an ICU significantly reduced medication error rates by 70% and 66% in pediatric and adult patients, respectively. Given that pharmacists have such a significant impact on ward teams and in critical care units, one can extrapolate that they would have a similar positive impact upon the ordering, preparation and administration of medications during cardiopulmonary resuscitation events.

Pharmacotherapy services have consistently evolved and increased over the past decades in pace with increasingly complex drug therapies and have grown to include pharmacists on many multidisciplinary teams.<sup>1</sup> Therefore including a pharmacist as an integral member to the resuscitation team is the next logical progression to follow. Pediatric Pharmacy Advocacy Group (PPAG) supports the inclusion of a pediatric pharmacist in every part of the medication use process, due to the highly specialized nature of dosing and administering medications to pediatric patients. In code situations, the need for specially trained and experienced pediatric pharmacists to dose pediatric medications is particularly critical.

For the purposes of this statement, a code is defined as an emergency or life threatening medical situation where a child is in respiratory or cardiac arrest and needs emergent intervention with cardiopulmonary resuscitation (CPR) and/or pharmacologically active agents as defined by the American Heart Association (AHA) Pediatric Advanced Life Support (PALS) Guidelines.

### **Description of the Issue:**

Sudden cardiac death comprises more than 50% of all related deaths, with approximately 750,000 adult and pediatric patients in the US suffering an in-hospital cardiac arrest necessitating a resuscitation attempt annually.<sup>10-11</sup> Despite attempts of CPR and defibrillation, pharmacologic therapy is often indicated in many of these cases. Pharmacists have developed a wide variety of consistent roles during resuscitation events such as dosing, preparing and administering medications, providing drug information, asserting critical interventions, keeping records and operating medication delivery equipment. This advancing role is endorsed by the American Society of Health System Pharmacists (ASHP) in their statement on "Pharmacy Services to the Emergency Department".<sup>12</sup> Nevertheless, several challenges exist in expanding pharmacy services to resuscitation teams which are frequently cited, including but not limited to inadequate staffing within the pharmacy department, a lack of advanced formal resuscitation training for pharmacists, apprehension and a lack of perception of the pharmacist's role on the resuscitation team.<sup>10</sup> CPR is a very complex process, and there is considerable variability regarding pharmacists' participation and baseline expertise in CPR events.

## **Rationale and Role:**

The role and participation of a pharmacist as part of a multidisciplinary team of physicians, nurses and respiratory therapists in cardiopulmonary resuscitation efforts during code situations is crucial. The limited need for pediatric CPR underscores the importance of an expert in drug therapy to be immediately available for clinical pharmacotherapeutic consultation. It is not the role of PPAG to dictate the creation of new employment descriptions or interfere with individual institutions' staffing models, but rather to substantiate and justify the endeavor toward a higher level of professional practice and improved patient care. The most prevalent category of medical errors, particularly in children, are medication errors made during the ordering process.<sup>9,13-15</sup> Correspondingly, the medication ordering process during code situations is neither immune nor less subject to the same mechanisms or occurrence of errors. Pharmacists are the incontestable experts of medication dosing, preparation, administration and monitoring needed to evaluate a patient's drug and dose response to therapy. A pharmacist's core credentials, including their formal education, training and licensure, ensure their baseline qualification and ability for development and application of these precise areas of expertise. Advancement and development of these skills in life threatening disease states is not only feasible but teachable with the correct setting and developed educational programs (e.g., PALS certification training, peer mentorship, institutionally developed programs, instructional simulation, formal continuing education).<sup>11, 16-17</sup>

## **Recommendations:**

A variety of educational programs are available for code events. Machado et.al. found that pharmacists had a more favorable attitude toward participation in CPR events if they felt that they had adequate training including basic life support (BLS), advanced cardiac life support (ACLS), self-study programs, continuing education programs and institution specific training programs.<sup>11</sup> The AHA provides training courses on BLS, ACLS for adults, PALS and the neonatal resuscitation program (NRP). Despite the rigor of these courses, there is limited information available in the programs related to certain aspects of pharmacotherapy including but not limited to: medication doses, compatibility concerns with intravenous medications and medication reconstitution. All of these programs require participation in simulated CPR events, but they may not have specific roles defined for various healthcare disciplines. In addition, these experiences alone may not prepare the pharmacist for routine participation in hospital code events. Some institutions may consider adopting their own internal training programs to prepare pharmacists for participation in resuscitation events. Marlowe and Woods prepared a training program including instruction on various aspects of pharmacotherapy for advanced cardiac support and some additional hands-on training time to familiarize themselves with code trays and intravenous admixtures.<sup>17</sup> They conducted their study with twenty-eight full-time and part-time pharmacists and found a significant improvement in written post-tests and pharmacist comfort levels following the lecture and hands-on training.

There is no one universally applicable approach to training that can be recommended and implemented for all institutions based on the role of pharmacists as defined by the code team and institution specific patient acuity. Anderson and Gouveia-Pisano detailed a quality improvement project in which they analyzed the implementation process of pharmacist participation in CPR

events.<sup>18</sup> These authors noted that this process should include careful consideration of patient demographics, CPR event demographics, review of policy and procedures, etc. Prior to the implementation of an institution specific training program, it is prudent that hospital pharmacy leadership analyze data to determine the specific training needs of their pharmacists. One approach to assist in the preparation of pharmacists might include the following:

- AHA Certification in BLS
- AHA Certification in ACLS/PALS/NRP or equivalent training with focus on the pharmacology, calculations and compatibility/admixture concerns of ACLS/PALS/NRP CPR event algorithms
- “Hands-on” practical training with all equipment and medication utilizing the institution’s code cart
- Participation in various settings of simulated code events on a semi-annual basis
- Formative and summative feedback evaluations ensuring competency in pharmacotherapy, medication dispensing/administration, etc.

### **Conclusions:**

PPAG understands the dilemma and varying factors that many institutions face concerning the routine participation of pharmacists in emergency resuscitation activities. Acknowledging these obstacles, PPAG encourages all institutions to strongly consider creating, adopting and upholding policies to address pharmacists’ participation in code events because of the profound and evidenced impact pharmacist participation has shown on hospital medication error and mortality rates in children. PPAG advocates that all institutions requiring a pharmacist’s participation in codes should consider adoption of preparatory training programs. While PPAG does not advocate any one specific program, consideration should be taken to ensure that pharmacists are educated on the pharmacotherapy of drugs used in the CPR process including but not limited to, inotropes and vasoactive medications, BLS, medication compatibility, ACLS/PALS algorithms, and a general familiarity with the institutional code cart prior to participation in code events.

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