CPR IN THE HOSPITAL UNDER UNUSUAL CIRCUMSTANCES
Part I

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In my role as cardiac clinical nurse specialist and CPR Committee co-chair at a major tertiary medical center, I was asked questions about how to perform cardiopulmonary resuscitation (CPR) under circumstances that were unusual and infrequent. So that I could respond knowledgeably, I would review the literature, contact manufacturers of involved equipment, and converse with colleagues around the country. In these next two issues of Code Communications, I would like to answer the following questions so that you can benefit from what I have learned.

How should I adjust the performance of CPR when the victim

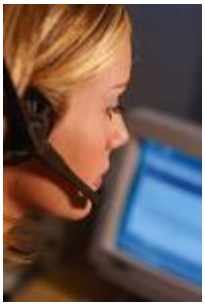
- Is in a public area of the hospital?
- Is on the property just outside the hospital?
- Arrests in a small, confined space?
- Is on the floor?
- Is on a dynamic, pressure-relieving mattress?
- Is pregnant?
- Has a tracheal stoma?
- Is in a Halo fixation system?

How Should I Adjust the Performance of CPR When the Victim is in a Public Area of the Hospital?

Cardiac arrest may occur unexpectedly in the public areas of hospitals, such as information desks, waiting areas, shops, and cafeterias. The victims may be visitors, outpatients, employees, or even inpatients away from their hospital units. Ethical and legal considerations obligate hospitals to urgently treat these victims.[1] Resuscitation care will be described under this unusual circumstance using a structure, process, and outcome framework.

Structure

It should be clearly outlined in hospital policy what group of responders will be called to administer care when the cardiac arrest victim is in a public area. Will it be the CPR team, the Medical Emergency Response (MET) team, the Emergency Department (ED) staff, or perhaps even Emergency Medical Systems (EMS) on staff at the hospital? If extrication or significant immobilization is required, having a plan for back-up by the local community EMS is helpful.



The operator should always obtain complete, clear information about the nature of the event and the exact location (building, level, area name, nearby landmarks), which may be difficult since the caller could be a passerby. The caller's message may be garbled, confusing, excited, and incomplete so the operator may need to ask probing questions in order to send out a clear, concise message to the correct responder group. Questions may need to be asked, such as "Is the person awake? Is the person breathing normally?" in order to determine if the event is a cardiopulmonary arrest or other medical problem. If the operators do not have specific training in handling medical emergency calls, instruction and practice are in order.

It is helpful to have a security agent or two always respond to an emergency in a public area. They may be the first skilled responders on the scene, so they should be competent in Basic Life Support (BLS). Security, having knowledge of all areas of a hospital/ medical center, can provide directions to the location of the victim for the team of responders running through the hallways. At times the security agent may have to provide a clear pathway to the victim or even open locked areas. Crowds are often a problem in public areas; thus a usual role for the security agent is to clear traffic and provide privacy for the resuscitation.

Basic equipment should be stocked in public areas where a large number of persons pass through. For example, all public areas should have a public telephone, upon which the emergency number is posted since, if the caller dials "O", it may take longer to reach the emergency operator. See sample of emergency telephone sticker in Figure 1.

Figure 1 Example of Emergency Telephone Sticker

Figure 2 ZOLL AED Plus in Alarmed Wall Cabinet

It is helpful to have this standard of care understood as building expansion occurs, so that the cost of a phone doesn't have to be added as an afterthought. Place resuscitation masks and gloves in public areas, e.g., at information desks, at all doors to the outside, and in food service areas. Automated external defibrillators (AEDs) should be placed in public areas so that a defibrillator is never further away than a fast one-minute walk; see Figure 2.

When the team of responders is called, there should be a plan for emergency equipment to be quickly brought to the site. It is helpful for CPR team members to bring a portable pack of medical supplies and medications (see Figure 3), a battery operated device for measuring oxygen saturation and end tidal CO_2, a portable monitor/manual defibrillator/ pacemaker with respective supplies (see Figure 4), oxygen, and portable suction. In some hospitals emergency equipment is obtained from the nearest nursing station.

Figure 3 Example of CPR Team Portable Emergency Pack

Figure 4 ZOLL M Series Portable Monitor/Defibrillator/Pacemaker

Emergency mobile cots with soft stretchers (so the victim can be lifted off the floor) should be placed strategically around the hospital, so that the closest one can be brought to the emergency site. See Figure 5.

Figure 5 Example of Emergency Stretcher

It is important to have a plan for maintaining the portable equipment, so that supplies are complete and not expired, and devices are in working order. The technical staff on the units with portable packs can check for the security of the breakaway locks on a daily basis, and do a complete check of the inventory once per month. After an emergency there should be a plan to have the portable packs restocked within several hours. During the yearly skill competency demonstrations, staff should complete an inventory of the portable packs so they can more easily locate items during an emergency. It is a challenge to stock supplies for provision of emergency care to victims of all ages.

Process of Care

The response team will be out of their comfort zone in executing a resuscitation in a public area since they are used to having all the resources readily available to handle a lengthy resuscitation in patient care areas. The resuscitation should be handled in a manner similar to coming upon a pre-hospital medical emergency, but the concept of quick stabilization and then “scoop and run” is not in their mindset.

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Medical Center in Lebanon, New Hampshire. I have included his thoughts on the subject of responding to codes in a public area.

> While most Code Blue calls are to acute care areas, they do occur in public areas of the hospital and in areas or units not set up for acute care. A cardiac arrest in a public area of the hospital often generates discussion about how long the CPR Team should stay "on scene," and at what point they should try to move the patient to an acute care area for further treatment. In the pre-hospital care community, "scene time," the amount of time spent at the scene of an accident or at a patient's home, has long been a topic of consideration. This has been best addressed in the area of trauma care. Perhaps the most famous case of late was the care of Princess Diana who was "too sick to move" and expired at the scene of her accident. Contrast this with the attempted assassination of then-President Ronald Reagan, who was pushed into his car and was moving before it was even realized that he had been shot, and who arrived at a tertiary care center within a few minutes.
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> A medical cardiac arrest does differ in some respects from a trauma event. In the pre-hospital environment it is obligatory to deliver countershocks for ventricular fibrillation (VF) and to secure an airway if possible, and it is generally accepted as wise to obtain vascular access and deliver the first round of Advanced Cardiac Life Support (ACLS) medications, all prior to moving the patient. Prolonged on-scene times are still discouraged however, in part because lengthy resuscitative efforts are best handled at the receiving ED with good lighting, plenty of help and diagnostic tools, but also because BLS and ACLS can very adequately be delivered while moving the patient. In an urban environment rescuers find themselves performing resuscitation while bringing a patient down from a multi-story walk-up (see tips below). In short, pre-hospital providers are (or should be) taught to provide only what is necessary and beneficial at the scene, and to provide the rest while transporting the patient to definitive care. A Code Blue in a public or non-acute area of the hospital is not unlike a pre-hospital cardiac arrest:
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> - Competent emergency responders are limited.
> - The ability to deliver many of the ACLS treatment options is not available.
> - The portable equipment brought to the site (e.g., oxygen, suction, small packs of supplies, and manual defibrillator) will operate for a limited time and AC current may not be close by.
> - Communication is difficult. Phones are seldom close, and there may not be a reliable mechanism for sending arterial blood gases (ABGs) to the Lab.
> - Other resources, such as x-ray capability, are limited.
>
> One final consideration, equally important, is that it is almost impossible to maintain privacy for the patient in a public area. A Code Blue in a public area is spectacular enough to draw a crowd, and it usually does just that.

Probably one major reason that we stay “on scene” too long is that no one thinks of moving. We all get caught up in the resuscitative effort. There may occasionally be specific reasons not to move, but we should probably at least consider the question at ALL codes in non-acute care areas.

TIPS for Performing a Moving Resuscitation

- Maintain compressions during movement by having one rescuer get onto the bed and kneel astride or beside the patient. If a stretcher is present, it may be possible to stand on a railing, or to keep the cot low to the ground (half height).

- If moving past obstacles (e.g., narrow doorways, stairs), make a coordinated stop, move efficiently, and resume CPR as soon as you are past the obstacle.

- Move the stretcher at a reasonably slow pace so that everyone can keep up and continue to do the required tasks. It is everyone's instinct to rush, which make ventilation and compressions very difficult. It also increases the risk of extubating the patient, tipping over intravenous poles, disconnecting wires and lines, etc.

- If you need to check the rhythm, check pulses, or deliver countershock or medications, stop the gurney. A brief stop is usually more efficient in the long run.

- Make sure the receiving unit knows you are coming, and use Security personnel to clear the way.

In summary, a public or non-acute area of the hospital is probably not the best place to conduct a lengthy resuscitation. After initial resuscitative efforts, consider the possibility of moving and decide how quickly you can get the patient to a more amenable environment. Make sure the receiving unit is aware that you are en route. If resuscitation is still in progress, it is still possible to move the patient, but it requires an organized, calm, and efficient effort by all.

Outcomes of Care

It is important to retrospectively review the process of care when the emergency occurs in a public area. A representative of the CPR committee should talk with the staff who found the victim, since they are often nonmedical and need to be reassured that they acted in a helpful

manner. They should be encouraged to tell their stories as a means of relieving their anxiety and dealing with a frightening event. It should not be surprising to learn that there are quality issues that will need to be addressed since resuscitations in public areas are often chaotic and the response may be delayed.

Brooke Army Medical Center, a 550-bed community teaching hospital in the southeastern United States, reported on their 6 cardiac arrests in public areas, out of the total of 749 arrests for the center.[2] They found that the time to defibrillation and the immediate survival rate for the 3 public arrest victims with VF were significantly worse than for the in-hospital VF control group (P=<0.0001). None of their public area patients requiring defibrillation survived, an unsurprising fact given that they received defibrillation well past the recommended American Heart Association benchmark interval of 3 minutes.[3] See Table 1.

Table 1 Characteristics of VF Cardiorespiratory Arrests at Brook Army Medical Center (Adams)

	Arrests in Public Areas	In-hospital Arrests
Average time to defibrillation	12.3 minutes	2.5 minutes
Return of spontaneous circulation for those in VF	25%	72%

Patient outcomes, i.e., return of spontaneous circulation and discharge from the hospital, should be kept separate from that for in-hospital patients since circumstances and processes of care are so different. Resuscitations of victims in public areas of hospitals can be tracked within the National Registry of Cardiopulmonary Resuscitation (NRCPR) database, and with use of Microsoft Access, characteristics of these events can be extracted for review.

How Should I Adjust the Performance of CPR When the Victim is Outside, Yet on Hospital Property?

The question of whether the hospital is obligated to respond to cardiopulmonary arrests (and other medical emergencies) when the victim is outside the hospital buildings, yet on hospital property, was clarified in the Emergency Medical Treatment and Active Labor Act (EMTALA), Section 1867(a) of the Social Security Act, part of the U.S. Code which governs Medicare.[4] The EMTALA web site provides helpful information about this topic:

EMTALA is a statue which governs when and how a patient may be refused treatment or transferred from one hospital to another when he is in an unstable medical condition. EMTALA applies only to “participating hospitals,” i.e., to hospitals that have entered into “provider agreements” under which they will accept payment from the Department of Health and Human Services, Centers for Medicare and Medicaid Services (CMS). In practical terms, this means that it applies to virtually all hospitals in the U.S., with the exception of the Shriner’s Hospital for Crippled Children and many military hospitals. Its provisions apply to all patients, and not just to Medicare patients.

The issue came to the forefront in 1998, when emergency room personnel at Ravensvood Hospital in Chicago failed to provide assistance to 15-year-old Christopher Sercye, who had been shot at a nearby school playground and whose friends had brought him to an alley just off hospital grounds. The boy died from his wounds. The reason for their non-response allegedly was because of a hospital policy prohibiting personnel from leaving the grounds while on duty. The Clinton administration lost no time in announcing its intention to punish the hospital, and reportedly the Office of Inspector General imposed a $40,000 fine, but in truth there was nothing in the hospital's response to this tragic situation which violated the EMTALA rules as they then existed.

In 2000, the CMS issued new amendments to the rules under 42 CFR 489.24, expanding the responsibility of the emergency room to respond to any "presentation" on the hospital campus or at any provider-based off-campus facility of the hospital. In 2003, these rules were significantly revised.

The "250-yard rule" comes from the definition of "Campus" found at 42 CFR 413.65: "Campus means the physical area immediately adjacent to the provider's main buildings, other areas and structures that are not strictly contiguous to the main buildings but are located within 250 yards of the main buildings, and any other areas determined on an individual case basis, by the Health Care Financing Administration (HCFC) regional office, to be part of the provider's campus." This would include parking lots and garages, sidewalks, driveways, etc.

The 2003 revisions provide:

- A person who presents anywhere on the hospital campus and requests emergency services, or who would appear to a reasonable prudent person to be in need of medical attention, must be handled under EMTALA.

- The 250-yard zone will continue to apply when defining the "hospital campus." Now, however, that sphere does not include non-medical businesses (shops and restaurants located close to the hospital), nor does it include physicians' offices or other medical entities that have a separate Medicare identity.

The essential provisions of the statute are as follows: Any patient who "comes to the emergency department" requesting "examination or treatment for a medical condition" must be provided with "an appropriate medical screening examination" to determine if he is suffering from an "emergency medical condition." If he is, then the hospital is obligated to either provide him with treatment until he is stable or to transfer him to another hospital in conformance with the statute's directives.

In essence, then, the statute imposes an affirmative obligation on the part of the hospital to provide a medical screening examination to determine whether an "emergency medical condition" exists, and when found, to institute treatment. A hospital may not, however, meet its EMTALA obligations merely by summoning EMS personnel. However, EMS may be used in conjunction with an appropriate hospital response to treat and move an individual who is already on hospital property.[5]

Structure, Process and Outcomes

Each hospital should develop a safe, appropriate and timely response plan should a cardiac arrest occur outside of the facility yet on hospital grounds. Designated responders may be a security agent, a registered nurse (RN) member of the flight/ground transport team, an ED nurse, and local community EMS. Security, who should be trained in BLS, can respond on foot or in their van, which should be equipped minimally with resuscitation masks, gloves, gauze, tape, AED, and blanket. Many institutions have designed a portable "jump kit" of medications and supplies to use in the field. The local EMS can collaborate in providing medical care, and then transport the victim in their ambulance to the ED unless the hospital has its own transport vehicle.

The team members should respond based on 1) the 250-yard rule, 2) the approximate time to reach the victim versus the time it should take the EMS to reach the victim, 3) the environmental conditions (ice, rain, snow) and 4) the terrain and safe access to the site.

If emergency phones are installed in hospital parking lots, calls to the hospital emergency operator can be direct. It is important for the operator to get specific directions on the location of the emergency, since the victim will most likely be on the ground and not easily seen.

You might consider placing close to each entrance a wall cabinet of emergency supplies that contains resuscitation masks (sizes for adults, toddlers, and infants), gloves, first aid kit, and blanket – and also an AED.

All staff should be oriented upon employment and yearly during safety training regarding how to call for help when the victim is outside, in a public area inside the hospital, and in their own patient care area – whether for a medical emergency or a cardiopulmonary arrest. In addition, the expectation should be clear that staff members who find the victim are to remain at the scene and respond within their scope of practice and demonstrated competencies.

With good documentation of outside arrests, the process of care and outcomes can be tracked. NRCPR does accept events from "all patients, visitors, employees, and staff within the facility campus (inpatient areas and ambulatory areas adjacent to the hospital and surrounding areas)."[6] The CPR committee should review all cases of cardiac arrest outside on hospital property so that the response systems can be optimized under this unusual circumstance.

How Should I Adjust the Performance of CPR When the Victim is in a Small, Confined Area?

Finding an unconscious patient on the floor in the bathroom is a nightmare no provider desires to encounter. In this small, confined space it is difficult to do an adequate assessment of cardiopulmonary arrest, and it becomes immediately evident that performing CPR using a standard technique with the provider kneeling at the side of the victim may be impossible. Once the patient is moved away from the toilet, CPR may be initiated using an over-the-head (OTH) technique. A single rescuer can both ventilate and compress while at the head of the victim. For 2 rescuers it is possible for one rescuer to ventilate from the head and the other to perform chest compression while straddling the victim's legs. These alternative methods are taught to those who work on aircraft and in ambulances.

Although OTH CPR has been utilized in human victims, there are no published reports on efficacy and outcome. Thus, we must turn to the research with CPR simulation on a manikin. A first published study by Maier compared single operator OTH CPR using a bag-valve-mask device for ventilation against current guidelines.[7] These authors concluded that OTH CPR could be performed to the standards laid down in the current European Resuscitation Council guidelines.

Another study in 2002 by Wolcke using 44 trained paramedics from Germany found that the number of correct ventilations and compressions was similar using 1-person OTH CPR compared to standard 2-person CPR.[8] Longer delays between cycles of ventilations and compressions were reported with the OTH CPR technique – probably due to the fact that only one rescuer provided both compressions and ventilations. Importantly, this study found that the OTH position allowed more rapid defibrillation with a time saving of 23 seconds compared to standard CPR.

Handley's study in 2004 compared 1-person standard CPR, 2-person standard CPR, 1-person OTH compressions and ventilations, and 2-person straddle (STR) CPR in which one rescuer ventilates from the head and the second rescuer interposes chest compression while straddling the upper thighs of the victim.[9] Nineteen volunteers were recruited from the crew training staff of Virgin Atlantic Airways, all of whom were current in their BLS training. They were given an opportunity to refresh their CPR skills using a manikin, and then taught OTH and STR CPR. Correct hand position was determined in all groups by sliding two fingers up the rib margin to the xiphisternum, placing the middle finger there with the index finger on the sternum itself, and then sliding the other hand down the sternum to this finger. The OTH and STR CPR positions used by Handley are shown in Figures 6 and 7. The volunteers were instructed to give CPR at a 15:2 ratio, rate of 100/minute, and depth of 4-5 cm. It should be noted that ventilations were performed but their quality was not assessed in this trial. See Table 2 for the results.

Figure 6 (Handley)
Over-the-head Chest Compression

Figure 7 (Handley)
Straddle Chest Compression

Table 2 Performance Parameters for Each of the Four Techniques of Chest Compression (Handley)

	1-person Standard CPR	1-person OTH CPR	Standard Compared to OTH CPR	2-person Standard CPR	2-person STR CPR	Standard Compared to STR CPR
Average compression rate/minute	82.1	81.7	NS	84.6	84.2	NS
Number of compressions in 1 minute	45.1	44.6	NS	57.5	57.2	NS
Average compression depth (mm)	37.6	34.8	P=0.01	36.1	37.9	NS
Incorrect compression depth	49.5%	62.2%	P=0.04	61.6%	56.1%	NS
Average duty cycle	40.8%	44.5%	P=0.0045	40.8%	41.0%	NS
Incorrect hand position	7.7%	30.4%	P=0.0025	10.6%	11.5%	NS
Average hands-off time/cycle (seconds)	10.3	10.3	NS	6.2	6.3	NS

NS = not statistically significant

In all comparisons, there were considerable differences in the quality of chest compression technique between individuals. Those that performed badly in one method of CPR tended to perform less well than average in the other methods. It can be noted from Table 2 that the average compression rate, compression depth and duty cycle were all below recommendations in the current Guidelines:[3]

- Rate of 100 compressions/minute
- Depth of $\geq$38 mm
- Duty cycle (time in compression versus relaxation) 50%

For the 2-person testing there were no statistically significant differences for any of the parameters between the standard and STR CPR methods. However, with 1-person CPR poorer performance was seen with OTH CPR related to average compression depth and compressions of incorrect depth. Against this, the average duty cycle was significantly higher for OTH CPR. The clearest difference between the 1-person methods was seen for hand position on the chest, with 30.4% of compressions being incorrectly placed for OTH CPR compared with 7.7% for standard CPR. The vast majority of the incorrect hand placements during 1-person CPR with either technique was too low. This is a common but potentially serious error in view of the risk of internal organ damage if pressure is applied to the epigastrium. It was concluded that the quality of chest compression during the STR CPR method, performed as part of 2-person CPR, appears to be as good as that during standard 2-person CPR. But additional training in hand placement may be necessary before OTH CPR can be considered a safe technique for 1-rescuer CPR.

Perkins tested 20 BLS instructors who had not been previously trained in OTH CPR.[10] Instructions for OTH CPR were given to place the hands in the midline of the chest over the middle of the lower half of the sternum, consistent with guidelines for standard CPR. Ventilations were provided using a mouth-to-mask technique. The authors state that according to current Guidelines, an adequate seal between the face and mask is achieved best with the rescuer positioned at the top of the victim's head.[3] There was no difference in inflation rate and

average ventilation volumes between the standard CPR and OTH CPR using a 1-rescuer technique over the 3-minute test period. No difference was found in compression rate (standard CPR 107.4/minute versus OTH CPR 107.2/minute), average compression depth (38.5 mm versus 38.1 mm) and duty cycle (44.1% versus 44.0%). Interestingly, hand position was incorrect more frequently in the standard CPR group compared to the OTH group ($P<0.001$). The authors suggest that it is probably more difficult for rescuers to reach sufficiently far caudally to place compressions "too low" when kneeling at the head of the victim. The total number of compressions performed during OTH CPR was 6.4% greater than in standard CPR. This could be accounted for by the 0.5 second reduction in the interval between sets of compressions due to a lesser need to change body position between compressions and ventilations with OTH CPR. The principal finding of this study is that there is no substantial difference in the quality of CPR performed (both ventilations via face mask and also compressions) on a manikin when undertaken from the OTH position compared to standard CPR. This was the first study to address rescuer position specifically when undertaking mouth-to-mask ventilation.

In the most recent study, Hupfl tests out the hypothesis that OTH CPR provides a better overall quality of BLS for professional single rescuers compared with standard CPR.[11] His group suggest that one rescuer may be left alone while the second rescuer runs to get the AED. If this one rescuer is to provide ventilations by a bag-valve-mask device, performing this skill from the side of the victim is nearly impossible. If one delivers bag-valve-mask ventilation from the victim's head, as is usually taught, too much time is spent switching to the side of the victim to deliver the compressions if a standard CPR technique is used. So, wouldn't it be better if both compressions and bag-valve-mask ventilations could be effectively delivered from the head of the victim? See Figures 8 and 9.

Figure 8 (Hupfl)
Over-the-head CPR Position
for Ventilations

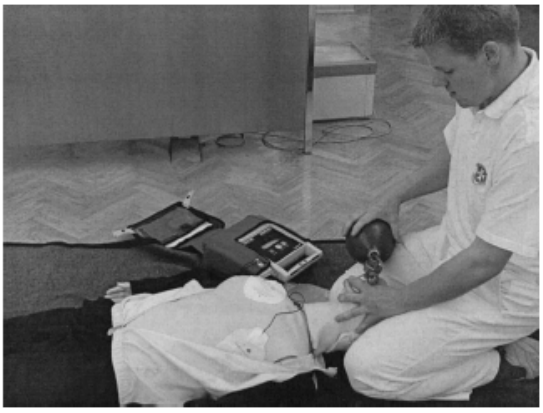

Figure 9 (Hupfl)
Over-the-head CPR Position
for Chest Compressions

In Hupfl's study the subjects were Emergency Medical Technicians in Vienna, Austria, who were current in their BLS training, skilled in use of a bag-valve-mask device, and had also practiced OTH CPR on a regular basis. For standard CPR on the manikin, ventilations were provided in a mouth-to-mouth manner (delivers 16% oxygen) from the side of the victim, while with OTH CPR a bag-valve-mask device (delivers 100% oxygen) was used at the head. The correct hand position was found in the lower part of the sternum, and an audio prompting device

was used to cue compressions at a rate of 100/minute. The ratio of ventilations to compressions was 2:15. Hupfl obtained complete data from 62 subjects, the highest number of volunteers in any study to date. OTH CPR was superior to standard CPR in the quality of ventilation; there were significantly more adequate and correct inflations in the OTH CPR group, which was almost exclusively caused by more frequent correctly applied tidal volume and not-too-rapid insufflations; see Table 3. The quality of chest compressions did not differ between the two study groups: neither rate, mechanical performance, nor correct 2:15 ratio were different. See Table 4. Most of the chest compressions classified as incorrect were caused by too shallow of compression depth and not the wrong hand position.

Table 3 Efficacy of OTH CPR versus Standard CPR for Ventilation (Hupfl)

	OTH CPR	Standard CPR	P-value
Number of inflations	11.9	12.0	0.54
Correct ventilations	43.4%	35.8%	0.002
Correct tidal volume (400-800 ml)	43.9%	35.8%	<0.001
Correct duration of ventilation	96.6%	96.5%	0.96
Time required for 2 inflations (seconds)	5.5	6.0	0.07

Table 4 Efficacy of OTH CPR versus Standard CPR for Chest Compressions (Hupfl)

	OTH CPR	Standard CPR	P-value
Correct ratio of compression:ventilation	85.5%	78.1%	0.40
Number of compressions	98.6	98.6	0.98
Correct chest compressions	68.1%	67.4%	0.44
Rate of compressions 80-120/minute	96.8%	98.4%	0.62
Compressions/minute	49.5	49.5	0.98

In summary, it appears that one-person OTH CPR may be an effective alternative to standard CPR when the victim is in a small, confined space. Since all studies had the subjects practice OTH CPR prior to evaluating their performance, it is advisable to include training in OTH CPR if this alternative technique is recommended in your hospital. Special emphasis should be placed on finding the correct hand position on the sternum. OTH CPR offers equally effective compressions and superior ventilation compared to standard BLS if the rescuer is competent in using a resuscitation mask and/or a bag-valve-mask device.

Stay Tuned

Tune in to the next issue of Code Communications for a discussion of performing CPR when the patient is on a pressure relieving mattress, is pregnant, is in a Halo fixation system, and has a tracheal stoma.

References

1 Zavotsky, K.E., & Cohen, D.M. "Code silver": An EMTALA compliant response to ill or injured nonpatients on hospital property. *Journal of Emergency Nursing* 2003;29:46-48.

2 Adams, B.D. Cardiac arrest of nonpatients within hospital public areas. *American Journal of Cardiology* 2005;95:1370-1371.

3 American Heart Association. 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* 2005;112:IV-1-IV-211.

4 Frequently asked questions about the Emergency Medical Treatment and Active Labor Act (EMTALA). Retrieved November 12, 2007 from the Emtala web site: http://www.emtala.com/faq.htm

5 Robinson, K. HCFA's 250-yard rule for patients requiring assistance outside: EMS' or the hospital's responsibility. *Journal of Emergency Nursing* 2001;27:264-266.

6 NRCPR Project Information: Inclusion/Exclusion Criteria (version 6). Retrieved November 12, 2007 from NRCPR web site: http://www.nrcpr.org/nrcpr_criteria.html#inclusion

7 Maier, C. et al. Over-the-head CPR: Description of a technique and evaluation of conformity with guidelines 2000 of ERC and AHA. *Resuscitation* 2002:55:89 (Abstract).

8 Wolcke, B.B., Gliwitsky, B., Kohlmann, T., & Holcombe, P.A. Overhead-CPR versus standard-CPR in a two rescuer-ALS scenario. *Resuscitation* 2002;55:116 (Abstract).

9 Handley, A.J. & Handley, J.A. Performing chest compressions in a confined space. *Resuscitation* 2004;61:55-61.

10 Perkins, G.D., Stephenson, B.T.F., Smith, C.M., & Gao, F. A comparison between over-the-head and standard cardiopulmonary resuscitation. *Resuscitation* 2004;61:155-161.

11 Hupfl, M. et al. Over-the head cardiopulmonary resuscitation improves efficacy in Basic Life Support performed by professional medical personnel with a single rescuer: A simulation study. *Anesthesia and Analgesia* 2005;101:200-205.