

Resuscitation Quality Improvement® Annotated Bibliography

Achieving and maintaining proficiency in any skill—such as speaking a foreign language, playing a musical instrument or competing in a favorite sport—requires regular practice and assessment of the skill. The old adage that “practice makes perfect” is no less true in Resuscitation Quality Improvement (RQI®) than in any other human activity. The more often resuscitation knowledge and skills are used and evaluated, the better the performance is, which can lead to better patient outcomes.

The following bibliography provides an overview of the current science on how more frequent training and assessment of resuscitation skills can lead to better performance and, ideally, better patient outcomes. This body of knowledge was used to guide the development of the **American Heart Association (AHA) RQI Program**, a comprehensive system that integrates training and clinical events with debriefing.

Cardiopulmonary Resuscitation Quality: Improving Cardiac Resuscitation Outcomes Both Inside and Outside the Hospital

A Consensus Statement From the American Heart Association

Meaney et al. *Circulation*. 2013;128:417-435

Conclusion

Through better measurement, training and systems-improvement processes of CPR quality, we can have a significant impact on survival from cardiac arrest and eliminate the gap between current and optimal outcomes.

Importance of This Conclusion

The **AHA RQI Program** is designed to improve CPR quality throughout the healthcare enterprise by providing convenient and regular training and assessment and analytics to help confirm competency and identify areas for CPR continuous quality improvement.

Key Points

- Poor-quality CPR should be considered a preventable harm.
- Details of CPR performance metrics are included in the Consensus Statement.
- High-quality CPR is the primary component in influencing survival from cardiac arrest, but there is considerable variation in monitoring, implementation and quality improvement.
- High-quality CPR should be recognized as the foundation on which all other resuscitative efforts are built.
- Every EMS system, hospital and other professional rescuer program should have an ongoing CPR continuous quality improvement program that provides feedback to the director, managers and providers.

Part 16: Education, Implementation, and Teams

2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

Bhanji et al. *Circulation*. 2010;122(suppl 3):S920-S933

Conclusion

- Substantial hands-on practice is needed to meet psychomotor skill performance objectives.
- All courses should incorporate adult learning principles and create relevant training scenarios that are applicable to the learners' real-world environments, such as having hospital-based learners practice CPR on a bed instead of on the floor.
- Successful course completion should be based on the learner's competency in the course objectives rather than on the learner's attendance in a course or program for a specific time period.
- Key skills and course content should be repeated with deliberate practice that builds mastery.
- Assessment of learners' competency should promote learning. Learning objectives must be clear and measurable and serve as the basis of evaluation.
- Using a CPR feedback device during training improves learning and retention.

Importance of This Conclusion

The **AHA RQI Program** incorporates evidence-based education, including more frequent assessment and reinforcement of skills by using real-time feedback and subsequent debriefing to help participants maintain competency in CPR.

Key Points

- There is substantial evidence that basic and advanced life support skills decay rapidly after initial training.
- There is a clear need to have more frequent assessment and reinforcement of skills and strong evidence to support the recommendation to use real-time feedback during that training.
- Reflecting the emerging trends of continuous maintenance of competence and continuing professional development in the healthcare professions, there is increasing support for competency-based approach to resuscitation education rather than a time-based certification standard.

Low-Dose, High-Frequency CPR Training Improves Skill Retention of In-Hospital Pediatric Providers

Sutton et al. *Pediatrics*. 2011;128:e145-e151

Conclusion

Low-dose, high-frequency training sessions (or "booster" sessions) more than doubled providers' retention of high-quality CPR skills.

Importance of This Conclusion

Other studies have demonstrated that the quality of CPR is directly related to survival outcomes. The **AHA RQI Program** offers the same type of low-dose, high-frequency CPR training as used in this study to improve performance to a level that has, separately, been associated with better outcomes during actual resuscitation events.

Key Points

- Not only have varying rates of skill acquisition been documented after traditional AHA training classes, but also universally poor skill performance of providers 3 to 6 months after CPR training has been established.
- The percentage of healthcare providers performing excellent CPR more than doubled (from 26% to 65%) when healthcare providers were retrained 3 times over 6 months by using an automated manikin system with real-time feedback.
- Skills sessions were completed during the participants' normal working hours in patient care areas.

Effects of Monthly Practice on Nursing Students' CPR Psychomotor Skill Performance

Oermann et al. *Resuscitation*. 2011;82:447-453

Conclusion

Brief, monthly practice sessions helped providers retain CPR psychomotor skills and improved these skills over baseline.

Importance of This Conclusion

The **AHA RQI Program** provides the means to practice and assess CPR psychomotor skills in short sessions intended to help participants achieve and maintain skills.

Key Points

- Studies have documented that nurses and physicians, even when trained in CPR, often don't perform high-quality CPR.
- Ineffective initial training may cause poor CPR skills performance, but it is more likely the result of providers unable to retain these skills.
- Providers do not retain CPR skills for long without refreshers and practice.
- Practicing for a few minutes a month effectively maintained and improved CPR psychomotor skills.

Comparison of Two Instructional Modalities for Nursing Student CPR Skill Acquisition

Kardong-Edgren et al. *Resuscitation*. 2010;81:1019-1024

Conclusion

Students who completed the HeartCode® BLS Course and practiced with voice-assisted manikins (VAM) performed more compressions with adequate depth and ventilations with adequate volume than students who took instructor-led courses.

Importance of This Conclusion

The **AHA RQI Program** uses automated, self-directed learning tools similar to those used in this study, but with even more advanced feedback and debriefing elements.

Key Points

- Even physicians, nurses and paramedics who had CPR training did not perform CPR at optimal levels.
- Self-directed practice with an automated manikin system that provides continuous verbal feedback and high-quality debriefing (such as the VAMs used in the study) can improve CPR skills.
- Continuous practice with this system in a training program could improve retention of CPR skills.

Chest Compression Fraction Determines Survival in Patients With Out-of-Hospital Ventricular Fibrillation

Christenson et al. *Circulation*. 2009;120:1241-1247

Conclusion

Increasing chest compression fraction results in better survival for patients who experience a prehospital cardiac arrest caused by ventricular fibrillation or ventricular tachycardia.

Importance of This Conclusion

Higher chest compression fractions have been shown to contribute to improved patient survival. Performing high-quality CPR with minimal interruptions in compressions (maximizing chest compression fraction) is a learned skill. The **AHA RQI Program** offers regular skills training and assessment to help participants achieve and maintain optimal resuscitation performance, including maximal chest compression fraction.

Key Points

- This study observed that the relationship between chest compression fraction and survival was independent of other known predictors, suggesting that simple changes to resuscitation training and practices are likely to improve survival.
- In clinical practice, chest compression fraction is often low.
- Altering resuscitation training and practices to maximize chest compression fraction will likely result in a sustainable increase in patient survival.

“Putting It All Together” to Improve Resuscitation Quality

Sutton et al. *Emerg Med Clin North Am.* 2012;30:105-122

Conclusion

Improving training before, monitoring CPR quality during, and debriefing participants after resuscitation events has the potential to improve the quality of care delivered to cardiac arrest victims.

Importance of This Conclusion

The **AHA RQI Program** is designed to help participants achieve *and maintain* competency in resuscitation skills and improve their performance during resuscitation events.

Key Points

- Performance of resuscitation skills during in-hospital, out-of-hospital, and simulated cardiac arrests frequently does not meet established resuscitation guidelines.
- Completion of conventional BLS and ACLS courses does not necessarily translate into adequate performance of these resuscitation skills within a few months after training.
- Participation in programs that improve training quality *and retention* may lead to higher quality CPR performed during actual resuscitation events.

Improving In-Hospital Cardiac Arrest Process and Outcomes With Performance Debriefing

Edelson et al. *Arch Intern Med.* 2008;168:1063-1069

Conclusion

The use of real-time feedback with debriefing that incorporates clinical data from an actual resuscitation event is an effective tool to improve measurement of CPR quality and initial patient survival from in-hospital cardiac arrest.

Importance of This Conclusion

Actual clinical experience combined with performance assessment and debriefing is key to improving skills that can lead to better rates of return of spontaneous circulation. The **AHA RQI Program** allows the inclusion of real and simulated events as “training” events when participants have been appropriately assessed and debriefed.

Key Points

- Equipment to measure and record CPR performance during actual resuscitation events has the potential to change CPR training and improve patient outcomes.
- Combining CPR performance feedback with debriefing was associated with an increased rate of return of spontaneous circulation when compared with the use of performance feedback alone.

Debriefing Medical Teams: 12 Evidence-Based Best Practices and Tips

Salas et al. *Jt Comm J Qual Patient Saf.* 2008;34:518-527

Conclusion

Debriefings should be used continuously as an instructional tool for medical teams.

Importance of This Conclusion

Debriefing is important as a continuous learning tool. The **AHA RQI Program** offers a debriefing feature that integrates participants' results into employee training records.

Key Points

- Medical teams benefit from recurring debriefs as well as critical-incident debriefs.
- Team members should follow the debriefing guidelines and best practices to identify areas for improvement and create strategies for future events.
- A supportive learning environment is critical to the success of debriefings.