American Heart Association | American Stroke Association

Dispatcher-Directed CPR: An All-Ages Strategy to Improve Cardiac Arrest Survival

Thomas Rea, MD, MPH

Out-of-hospital cardiac arrest is often an unexpected and tragic event. One minute a person is an active participant and the next they are lifeless. Such an event is especially unsettling when it occurs in a young person. There are precious few minutes to restore life following arrest. The circumstances require a coordinated, time-sensitive response that delivers cardiopulmonary support via "CPR".[1] CPR has traditionally included chest compressions alternating with rescue breathing. More recently, evidence from randomized trials has indicated that chest compression alone—"hands-only CPR"—performed by laypersons can provide survival benefit similar to that of conventional CPR among adults who suffer witnessed arrest.[2,3]

Given the time-sensitive nature of resuscitation, the best chances of survival occur when treatment can be delivered soon after arrest. As a consequence, the goal is to start CPR as soon as possible after arrest. The goal has produced large public health efforts to train laypersons in CPR. These training efforts have produced tangible success and yet bystander (layperson) CPR typically occurs in only a minority of victims of out-of-hospital cardiac arrest.[4] This current status quo is not acceptable, and there is a growing appreciation that we need to implement additional strategies to increase bystander CPR.

The emergency medical dispatcher is theoretically well placed to address the challenge. The dispatcher will often be the first professional contact in an arrest. The dispatcher can elicit key information to identify the arrest patient and engage the bystander to provide CPR. Dispatchers prioritize two questions: 1) is the patient conscious? and 2) is the patient breathing normally? The term "normally" is important because it helps distinguish those arrest patients with agonal "breathing"—persons who have suffered cardiac arrest and have reflexive gasping that can be confused with physiologic breathing.[5] If the patient is not conscious and not breathing normally, then the dispatcher engages the caller to begin CPR. The strategy is best characterized as "dispatcher-directed" as opposed to "dispatcher-assisted" as the emergency dispatcher takes a leadership role and guides the caller to provide care. The appreciation that the dispatcher can be a critical link has produced a consensus statement and evidence-based metrics that can be used to optimize dispatch involvement in early layperson CPR.[6,7] Evidence from diverse settings indicates that this strategy can be successful and improve survival following cardiac arrest.[8,9]

Although such a strategy holds great promise, the approach—like many in resuscitation—is derived largely from experience and evidence of adult cardiac arrest resuscitation. Whether a particular strategy will translate effectively among children is typically left for bright, dedicated persons to develop consensus from the adult experience.[10,11] Pediatric arrest involves distinct circumstances and pathophysiology that may require different approaches or therapies. It is with this appreciation that we welcome the publication by Goto et al in this volume of the *Journal of the American Heart Association*.[12] The investigators conducted a cohort investigation of pediatric cardiac arrest occurring in Japan between 2008 and 2010 using the Japanese national registry to evaluate the role of dispatcher-directed CPR and type-specific CPR (compression alone or compression plus rescue breathing) among pediatric arrest victims.

The study provides useful results, several of which are worthy of particular comment. The investigators observed a temporal increase in layperson CPR during the 3-year study period that was attributable to dispatcher-directed CPR. Perhaps most striking, bystander CPR occurred in more than half of pediatric arrests, with most bystander CPR attributed

The opinions expressed in this article are not necessarily those of the editors or of the American Heart Association.

From the Division of Emergency Medical Services Public Health, Seattle & King County, WA.

Correspondence to: Thomas Rea, MD, MPH, Division of Emergency Medical Services Public Health, 401 5th Ave, Suite 1200, Seattle, WA 98104. E-mail: rea123@u.washington.edu

J Am Heart Assoc. 2014;3:e000942 doi: 10.1161/JAHA.114.000942.

to dispatcher assistance as opposed to bystander CPR without dispatcher assistance. Although one could debate whether the method of ascertainment and classification may have contributed to the large majority classified as dispatcher-assisted, the dispatcher was clearly involved in many cases that received bystander CPR. Collectively, these observations indicate that the dispatcher has a pivotal role in identifying pediatric arrest patients and engaging bystanders to provide CPR. Thus dispatchers and their respective communities have a high-traction opportunity to increase early CPR for all arrest victims—adult or pediatric.

The investigation also highlights the potential to not only increase bystander CPR, but to increase effective bystander CPR for pediatric arrest victims. Dispatcher-directed CPR was associated with greater odds of survival and survival with favorable functional status compared with those who did not receive bystander CPR. Thus "just-in-time" dispatcher CPR enables the bystander to provide CPR that is comparably effective to bystander CPR that does not require dispatcher direction, suggesting that programs of community CPR training and dispatcher CPR instruction are complementary and can each provide survival benefit.

The investigators also observe that the beneficial outcome associated with bystander CPR regardless of dispatcher involvement is specific to conventional CPR that includes both chest compression and rescue breathing. These results support the current international consensus recommendations[10] and American Heart Association Guidelines[11] involving CPR for pediatric victims of cardiac arrest—where the CPR preference is compression plus rescue breathing when possible. Given the distinction between adult and pediatric arrest pathophysiology, the potential added benefit of rescue breathing for pediatrics seems logical.

As with all observational studies, one needs to exercise caution when concluding causal relationships. The investigation by Goto is no different. Although the authors describe in detail how bystander CPR status is determined, additional or different information may be derived if dispatch recordings are reviewed to ascertain the circumstances and details of the arrest.[13] As the authors acknowledge, confounding may be responsible for the findings. There is evidence that indicates survival varies regionally across Japan and the current investigation did not account for regional differences.[14] It may be that systems that provide dispatcher-directed CPR also provide better Emergency Medical Services (EMS) and hospital care. Because there is little information about the specifics of EMS or hospital care, the beneficial association of dispatcher-directed CPR may not be causal but rather just a marker for a system that provides better Emergency Medical Services (EMS) and hospital care.

Finally, an overarching reflection is that the study again underscores the benefits of a national registry. The Japanese initiative continues to be a productive tool for scientific discovery and programmatic improvement. This type of inclusive registry provides for a true population-based assessment of care and outcome for a condition affecting public health. This registry documents and likely is responsible at least in part for the continuous improvement in outcomes that has been observed in out-of-hospital cardiac arrest. Evidence from the registry indicates that the number of survivors has doubled over a 5-year period, translating to thousands of additional lives saved each year in Japan.[15] Such a population-based and comprehensive registry should be the standard in North America and Europe (among others) if we are to advance public health in a progressive manner. There is increasing momentum to achieve such national registries given the success of the Japanese experience.

Pediatric victims of out-of-hospital cardiac arrest can benefit from early bystander CPR, and dispatcher-directed CPR should be an integral part of a comprehensive strategy to treat children and adults who suffer cardiac arrest. The findings from Goto et al. help establish dispatcher-directed CPR as an all-ages strategy to improve out-of-hospital cardiac arrest survival.

Sources of Funding

The editorial was supported by grants from the Laerdal Foundation and the Medtronic Foundation.

Disclosures

None.

References

1. Field JM, Hazinski MF, Sayre MR, Chameides L, Schexnayder SM, Hemphill R, Samson RA, Kattwinkel J, Berg RA, Bhanji F, Cave DM, Jauch EC, Kudenchuk PJ, Neumar RW, Peberdy MA, Perlman JM, Sinz E, Travers AH, Berg MD, Billi JE, Eigel B, Hickey RW, Kleinman ME, Link MS, Morrison LJ, O'Connor RE, Shuster M, Callaway CW, Cucchiara B, Ferguson JD, Rea TD, Vanden Hoek TL. Part 1: executive summary: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2010;122(suppl 3):S640–S656.
2. Svensson L, Bohm K, Castrèn M, Pettersson H, Engerström L, Herlitz J, Rosenqvist M. Compression-only CPR or standard CPR in out-of-hospital cardiac arrest. *N Engl J Med*. 2010;363:434–442.
3. Rea TD, Fahrenbruch C, Culley L, Donohoe RT, Hambly C, Innes J, Bloomingdale M, Subido C, Romines S, Eisenberg MS. CPR with chest compression alone or with rescue breathing. *N Engl J Med*. 2010;363:423–433.
4. Sasson C, Rogers MA, Dahl J, Kellermann AL. Predictors of survival from out-of-hospital cardiac arrest: a systematic review and meta-analysis. *Circ Cardiovasc Qual Outcomes*. 2010;3:63–81.
5. Bobrow BJ, Zuercher M, Ewy GA, Clark L, Chikani V, Donahue D, Sanders AB, Hilwig RW, Berg RA, Kern KB. Gasping during cardiac arrest in humans is frequent and associated with improved survival. *Circulation*. 2008;118:2550–2554.
6. Lerner EB, Rea TD, Bobrow BJ, Acker JE III, Berg RA, Brooks SC, Cone DC, Gay M, Gent LM, Mears G, Nadkarni VM, O'Connor RE, Potts J, Sayre MR, Swor RA, Travers AH; American Heart Association Emergency Cardiovascular Care Committee; Council on Cardiopulmonary, Critical Care, Perioperative and

Resuscitation. Emergency medical service dispatch cardiopulmonary resuscitation prearrival instructions to improve survival from out-of-hospital cardiac arrest: a scientific statement from the American Heart Association. *Circulation*. 2012;125:648–655.

7. Lewis M, Stubbs BA, Eisenberg MS. Dispatcher-assisted cardiopulmonary resuscitation: time to identify cardiac arrest and deliver chest compression instructions. *Circulation*. 2013;128:1522–1530.
8. Rea TD, Eisenberg MS, Culley LL, Becker L. Dispatcher-assisted cardiopulmonary resuscitation and survival in cardiac arrest. *Circulation*. 2001;104:2513–2516.
9. Song KJ, Shin SD, Park CB, Kim JY, Kim do K, Kim CH, Ha SY, Eng Hock Ong M, Bobrow BJ, McNally B. Dispatcher-assisted bystander cardiopulmonary resuscitation in a metropolitan city: a before-after population-based study. *Resuscitation*. 2014;85:34–41.
10. Kleinman ME, de Caen AR, Chameides L, Atkins DL, Berg RA, Berg MD, Bhanji F, Biarent D, Bingham R, Coovadia AH, Hazinski MF, Hickey RW, Nadkarni VM, Reis AG, Rodriguez-Nunez A, Tibballs J, Zaritsky AL, Zideman D; Pediatric Basic and Advanced Life Support Chapter Collaborators. Part 10: pediatric basic and advanced life support: 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. *Circulation*. 2010;122(suppl 2):S466–S515.
11. Berg MD, Schexnayder SM, Chameides L, Terry M, Donoghue A, Hickey RW, Berg RA, Sutton RM, Hazinski MF. Part 13: pediatric basic life support: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2010;18(suppl 3):S862–S875. Review. PubMed PMID: 20956229
12. Goto Y, Maeda T, Goto Y. Impact of dispatcher-assisted bystander cardiopulmonary resuscitation on neurological outcomes in children with out-of-hospital cardiac arrests: a prospective, nationwide, population-based cohort study. *J Am Heart Assoc*. 2014;3:e000499 doi: 10.1161/JAHA.113.000499.
13. Dameff C, Vadeboncoeur T, Tully J, Panczyk M, Dunham A, Murphy R, Stolz U, Chikani V, Spaite D, Bobrow B. A standardized template for measuring and reporting telephone pre-arrival cardiopulmonary resuscitation instructions. *Resuscitation*. 2014; (in press).
14. Okamoto Y, Iwami T, Kitamura T, Nitta M, Hiraide A, Morishima T, Kawamura T. Regional variation in survival following pediatric out-of-hospital cardiac arrest. *Circ J*. 2013;77:2596–2603.
15. Kitamura T, Iwami T, Kawamura T, Nitta M, Nagao K, Nonogi H, Yonemoto N, Kimura T; Japanese Circulation Society Resuscitation Science Study Group. Nationwide improvements in survival from out-of-hospital cardiac arrest in Japan. *Circulation*. 2012;126:2834–2843.

Key Words: Editorials • cardiopulmonary resuscitation