Circulation

AHA POLICY STATEMENT

Telecommunicator Cardiopulmonary Resuscitation

A Policy Statement From the American Heart Association

Endorsed by the Association of Public-Safety Communications Officials International

ABSTRACT: Every year in the United States, >350 000 people have sudden cardiac arrest outside of a hospital environment. Sudden cardiac arrest is the unexpected loss of heart function, breathing, and consciousness and is commonly the result of an electric disturbance in the heart. Unfortunately, only ≈1 in 10 victims survives this dramatic event. Early access to 9-1-1 and early cardiopulmonary resuscitation (CPR) are the first 2 links in the chain of survival for out-of-hospital cardiac arrest. Although 9-1-1 is frequently accessed, in the majority of cases, individuals with out-of-hospital cardiac arrest do not receive lay rescuer CPR and wait for the arrival of professional emergency rescuers. Telecommunicators are the true first responders and a critical link in the cardiac arrest chain of survival. In partnership with the 9-1-1 caller, telecommunicators have the first opportunity to identify a patient in cardiac arrest and provide initial care by delivering CPR instructions while quickly dispatching emergency medical services. The telecommunicator and the caller form a unique team in which the expertise of the telecommunicator is provided just in time to a willing caller, transforming the caller into a lay rescuer delivering CPR. The telecommunicator CPR (T-CPR) process, also previously described as dispatch CPR, dispatch-assisted CPR, or telephone CPR, represents an important opportunity to improve survival from sudden cardiac arrest. Conversely, failure to provide T-CPR in this manner results in preventable harm. This statement describes the public health impact of out-of-hospital cardiac arrest, provides guidance and resources to construct and maintain a T-CPR program, outlines the minimal acceptable standards for timely and high-quality delivery of T-CPR instructions, and identifies strategies to overcome common implementation barriers to T-CPR.

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Out-of-hospital cardiac arrest (OHCA) describes the sudden, unexpected loss of heart function, breathing, and consciousness and is commonly the result of an electric disturbance in the heart. Each year, an estimated 350 000 people have cardiac arrest in the United States in out-of-hospital environments.[1] Successful resuscitation of cardiac arrest victims requires the time-sensitive, expert care described by each of the links in the chain of survival: early access to emergency medical services (EMS), early lay rescuer cardiopulmonary resuscitation (CPR), early defibrillation, early advanced care, and postresuscitation care to facilitate rehabilitation and recovery.[2] The first 2 links in the chain, early access to EMS and lay rescuer CPR, provide the foundation for subsequent treatment and are critical for successful resuscitation.[3]

Telecommunicators (including call takers and dispatchers) are the initial public safety interface with the lay public in a medical emergency. Consequently, telecommunicators have a formative role in the foundational links of early arrest recognition and early CPR. As the true first responder, the telecommunicator must partner with the caller to quickly identify the person experiencing cardiac arrest and, in turn, provide telecommunicator CPR (T-CPR) instructions and rapidly dispatch the appropriate medical response. T-CPR, previously described as dispatch CPR, dispatch-assisted CPR, or telephone CPR, leverages the skill of the telecommunicator to engage the caller, identify the cardiac arrest, and coach effective CPR. T-CPR then provides a meaningful opportunity to improve survival from OHCA. Through these actions, the telecommunicator can make the difference between life and death.

Given the important public health implications of T-CPR, every emergency communications center should strive to achieve timely T-CPR instructions in all calls in which an individual with OHCA is identified. To achieve this goal, the center should support the education and training of telecommunicators in T-CPR and the continuous quality improvement (QI) of T-CPR implementation. Thousands of additional lives can be saved each year worldwide if we can achieve this goal; conversely, not meeting this goal represents a preventable harm in that potential survivors of OHCA are lost.

PUBLIC HEALTH IMPLICATIONS OF T-CPR

Early lay rescuer CPR is associated, on average, with an ≈2-fold increase in the chances of survival after OHCA.[3] Collectively, lay rescuer CPR can increase heart resuscitation and brain recovery and thus is associated with positive functional survival, better long-term prognosis, and favorable cost-effectiveness.[4–6] Yet, fewer than half of patients who have an arrest in the United States receive lay rescuer CPR.[7] This reality persists despite half a century of efforts to educate and train the public.[8]

In the past 5 decades, there has been heterogeneous progress in the provision of lay rescuer CPR. Rigorous investigations indicate that the likelihood of lay rescuer CPR varies markedly, depending on the community or the emergency system.[7,9] For example, lay rescuer CPR in the CARES registry (*Cardiac Arrest Registry to Enhance Survival*) ranged from 10% to 60%, depending on the county.[7] Moreover, the provision of lay rescuer CPR may vary within a given community on the basis of neighborhood.[10,11] The disparity across and within communities, especially among minorities, highlights high-yield opportunities to improve lay rescuer CPR and thereby save lives.

A spectrum of training and delivery strategies exist to achieve early lay rescuer CPR. These strategies use a range of educational methodologies and technologies and include traditional community or workplace training, school-based student training, targeted training for families of high-risk individuals, social media smartphone applications, and T-CPR.[12–16] These strategies are complementary, and no single approach should be considered a stand-alone endeavor. Rather, a community needs to leverage each of these opportunities to increase CPR awareness and the potential for action.[17]

T-CPR: A Strategy to Increase Lay Rescuer CPR

A program of T-CPR is especially appealing because it offers a safe, cost-efficient, and effective approach to substantially increase community lay rescuer CPR.[18] Near-universal use of 9-1-1 (or equivalent emergency numbers outside the United States) ensures activation of an emergency communication center for virtually all treated cardiac arrest events, providing a far-reaching opportunity to affect care for OHCA. Program implementation of T-CPR has consistently increased lay rescuer CPR, often doubling the proportion of patients experiencing arrest who receive early CPR.[19–21] Even in communities where T-CPR is a standard practice, directed QI efforts involving T-CPR can increase lay rescuer CPR, indicating that T-CPR requires ongoing evaluation and support to achieve optimal lifesaving benefit.[22,23]

T-CPR: Improving Survival After OHCA

Compared with no lay rescuer CPR, T-CPR is associated with a greater likelihood of survival after OHCA.[24] Multiple investigations from heterogeneous populations and emergency systems have found better survival related to T-CPR.[19–21,24] The benefit may depend in part on the content and timing of the T-CPR and its instruction.[25] Evidence indicates that T-CPR instruction involving chest compressions only compared with

compression plus rescue breathing achieves better long-term survival among adults with OHCA.[26] The survival advantage is associated with timely implementation such that rapid arrest identification and early hands-on compressions provide the best odds of benefit.[19] Other characteristics of the telecommunicator instruction and coaching such as telecommunicator word choices that direct as opposed to request action or coach compression rate (100–120 compressions per minute) and depth (2–2.4 in or 5–6 cm) may also influence the quality of lay rescuer CPR and ultimately the likelihood of survival.[27–29]

T-CPR Program Improvement

Given the evidence supporting T-CPR to increase lay rescuer CPR and improve OHCA outcome, T-CPR has been endorsed by the 2010 and 2018 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations and the 2015 American Heart Association (AHA) guidelines update for CPR and emergency cardiovascular care.[2,30–32] As was the case with ST-segment–elevation myocardial infarction care, clinical progress is often best supported by programmatic and case-specific benchmarks that help drive performance.[33,34] A prior consensus-on-science review defined the general domains to evaluate and improve T-CPR performance involving arrest recognition and CPR coaching.[16] Subsequent investigation has helped establish discrete performance metrics that can inform best practices.[35] This information was used by the writing group and introduced to stakeholders to generate standards for T-CPR performance and advance the goal of providing every patient with OHCA with early CPR.[36] The next sections describe these T-CPR best-practices benchmarks, how they were derived, and how they can be accomplished.

OPERATIONAL CONSIDERATIONS FOR IMPLEMENTATION OF A T-CPR PROGRAM

Operational Definitions for Emergency Calls for Service (ie, 9-1-1 Calls)

The public safety answering point (PSAP) is the place where a call for service is received. These can be designated as primary (ie, call received directly from lay public initiating the 9-1-1 call) or secondary (ie, call transferred from the primary PSAP) as is the case when the primary PSAP does not handle calls for EMS.

The agency having jurisdiction (AHJ) is the designation for the terminal PSAP responsible for dispatching emergency medical response to the lay public call for assistance.

The call taker is the telecommunicator responsible for receiving the emergency call for service from the lay public or primary PSAP to inform the dispatcher, identify an OHCA, and deliver T-CPR instructions as appropriate.

Dispatcher is the telecommunicator responsible for activating an EMS response to a call for service. Although this responsibility is distinct from those of the call taker, in many jurisdictions, a single telecommunicator handles both call taking and dispatching.

The lay rescuer is the person or people at the scene of the 9-1-1 call for service who initiate CPR before the arrival of professional rescuers. Also referred to as bystanders in other literature, these lay rescuers may or may not have previous CPR training.

QI refers to the systematic and continuous actions that lead to measurable improvement in healthcare services and the health status of targeted patient groups.[2]

Call-Taking Process

As the first point of contact in the 9-1-1 system, telecommunicators have an early opportunity to recognize when patients are in cardiac arrest, an act that provides the basis to improve survival >3-fold.[37] Emergency medical dispatch (EMD) protocols provide a systematic process for triaging calls and should pose 2 key questions as early in calls as possible: Is the patient conscious? And is the patient breathing normally? If the answer to both of these scripted triage questions is "no," then telecommunicators should dispatch the appropriate EMS response and start CPR instructions without delay. This "no, no, go!" process for identifying OHCA has the potential to identify 92% of OHCAs when the telecommunicator has the opportunity to assess consciousness and breathing (eg, not a dropped call, third-party call)[35] and to triple rates of lay rescuer CPR.[24]

Ideally, callers would provide clear, concise "yes" and "no" answers to these questions. However, callers often do not, and T-CPR training should identify common barriers to assessing patient consciousness and breathing status and should provide strategies that telecommunicators can use to overcome those barriers. For example, some callers will be overcome with emotion at the unexpected situation of witnessing an OHCA or may be unfamiliar with a term such as consciousness. In these instances, supporting telecommunicators to be assertive when dealing with emotional callers and arming them with tactics to overcome common delay scenarios (eg, individuals experiencing OHCA with open eyes or initial seizure-like movement) are essential. Up to 40% of individuals experiencing OHCA experience agonal gasping, a brainstem reflex that can occur for minutes after the onset of OHCA. This abnormal breathing pattern

can confuse callers and telecommunicators, thereby creating another barrier to identifying cardiac arrest. However, well-trained telecommunicators who are aware of the phenomenon can overcome this barrier.[38,39]

EMD protocols should also provide scripting for continuous T-CPR coaching, prescribe conditions under which to seek an automated external defibrillator (ie, when multiple rescuers are available to prevent the interruption of CPR that can occur with a single rescuer), and provide support for automated external defibrillator use. In these ways, protocols can help guide care from call receipt to the moment professional rescuers assume care. Although important, protocols are but 1 piece in the effort to optimize T-CPR. Optimal implementation via well-trained telecommunicators supported by a QI process and continuing education is also required.

Barriers to Completing CPR Instructions

Despite having well-trained and motivated telecommunicators, it may not always be possible to implement CPR instructions. Factors associated with the inability to successfully complete CPR instructions include the following: failure to recognize cardiac arrest (the most common reason), inability to initiate CPR instructions, and instructions being declined by callers.[40]

It is not always possible to initiate CPR instructions. A common reason for this is the caller reporting that CPR is already in progress. We mentioned that recognizing cardiac arrest over the phone can sometimes be difficult and delayed. An additional limitation to providing CPR is that the patient needs to be moved to a safe location and positioned face up on a hard surface. Callers do not always have the ability or physical strength to do this. For a variety of reasons, callers occasionally hang up and do not answer the phone when called back. Finally, telecommunicators may face confusion resulting from a reported advance directive by the patient not to initiate resuscitative efforts.

Callers occasionally decline CPR instructions even when they are offered. Not infrequently, CPR instructions are declined when callers have the conviction that the victim is already irreversibly dead. The perceived physical inability to initiate CPR is occasionally reported, and less frequently, the caller is in too much emotional distress to successfully follow instructions. In addition, some callers contact 9-1-1 from a remote location and are physically too far away from the victim to be the ones initiating CPR. Finally, initiation of CPR by another lay rescuer and arrival of first responders during the call are other factors associated with a caller's inability to initiate CPR when instructed to do so.

QI METRICS FOR T-CPR PROGRAMS

Methods

Contributors to this advocacy statement were selected for their expertise in disciplines relevant to T-CPR and its successful implementation. Their selection was restricted to North America, although multiple international organizations and experts were contacted during the public comment period to solicit input. The writing group was constituted in accordance with relevant AHA policies on diversity and inclusiveness, and each member of the group was required to report and comply with AHA policy on conflicts of interest and their management.

A series of telephone conferences occurred between June 3, 2017, and August 13, 2017, to organize the task forces and generate content. Task forces composed of at least 2 writing group members were assigned to address specific topics reflective of their expertise. The chair of the writing group facilitated each call, reviewing each portion of the proposed quality measures with all members until the writing group reached consensus.

A 90-day public comment period followed the publication of the writing group guidance on the internet on August 20, 2017.[41] During the period, a coordinated campaign involving multiple media outlets was used to draw public attention to the guidance and ensure thorough community consultation. In addition, >200 international experts and 50 stakeholder organizations were contacted directly by writing group members on behalf of the AHA to broaden awareness among those with potential interest in these performance standards.

After the public comment period, the writing group qualitatively and quantitatively analyzed the public comments for overarching themes and specific suggestions to improve the proposed quality measures. Beginning on November 17, 2017, the writing group again engaged in a series of telephone conferences to consider the public comments and further refine the guidance until all members reached consensus. The resulting final-draft quality measures, along with an accompanying operational toolbox, was published online[41] on April 19, 2017 (Figure 1).

The writing group was then reconstituted and used these published quality measures as the foundational document to draft this advocacy statement. In a manner similar to that described previously, the writing group formed task forces on February 1, 2018, that were based on expertise to draft specific sections. The resulting draft of this statement was circulated to the writing group, and a series of telephone conferences were conducted by the chair to review the statement until consensus was reached on its content. The revised consensus advocacy statement was submitted for independent peer review and endorsed by the Association of Public-Safety Communications Officials International. The AHA Emergency

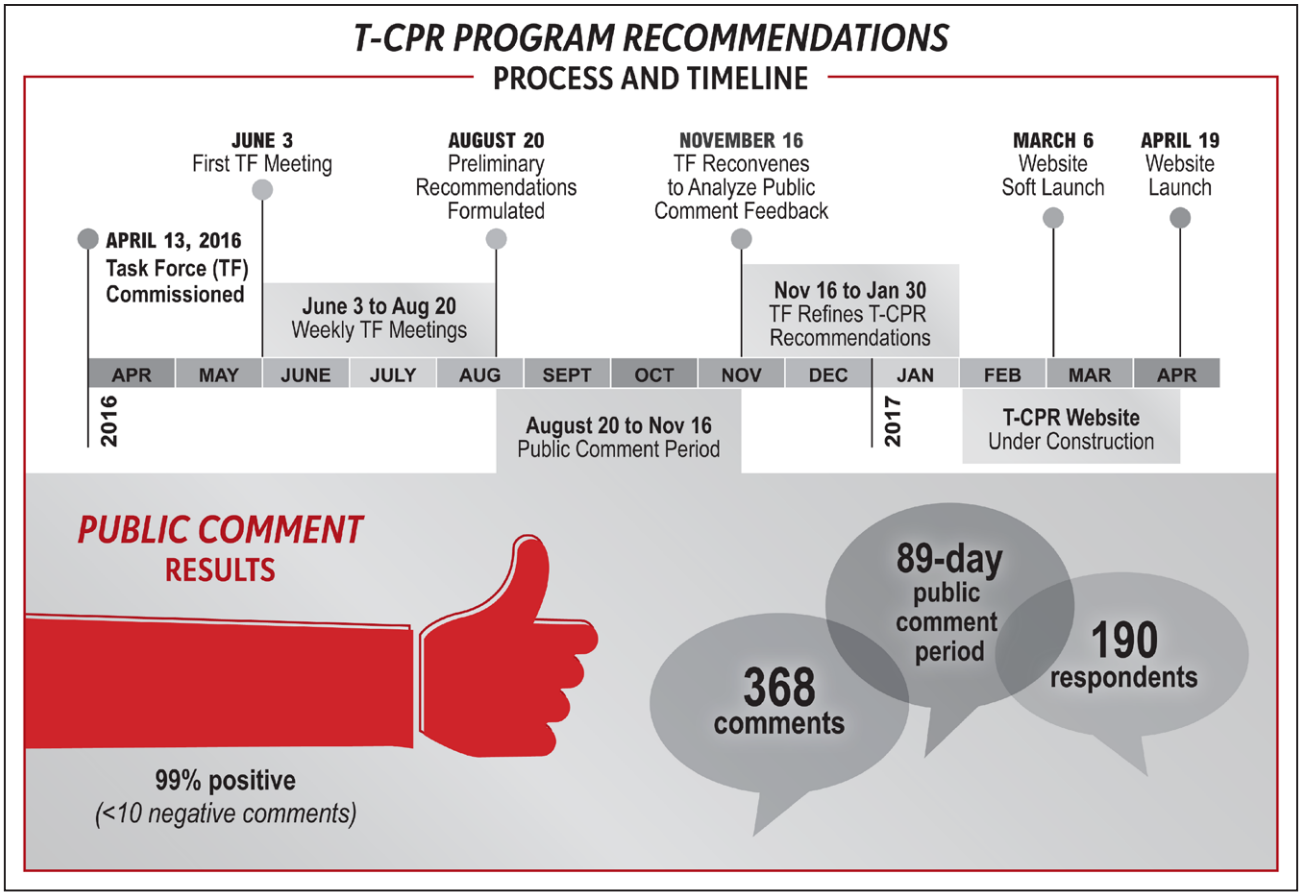

Figure 1. Telecommunicator cardiopulmonary resuscitation (T-CPR) program performance process and timeline, 2016 to 2017.
TF indicates task force.

Cardiovascular Care Committee and the AHA Science Advisory and Coordinating Committee approved this final version of the statement for publication as it appears here.

OPERATIONAL COMMITMENTS FOR A SUCCESSFUL T-CPR PROGRAM

Structure and process are required to create an outcome. We recognize that the organization of PSAPs varies from region to region and, in many cases, from community to community. We believe that there are foundational elements that will be consistent from center to center, even if there is variation in methods of implementation. We believe the following 6 initiatives will contribute to a high-functioning program, address barriers to implementation, reduce variability, and ultimately increase long-term survival after OHCA.

1. Commit to T-CPR

The emergency communications center leadership and staff must commit to the provision of a high-quality, effective T-CPR program that includes measurement and performance goals. Community and communication center leaders must fully support the program. The director of the center must provide leadership and hold staff accountable for both implementation and ongoing success.

2. Provide Initial and Ongoing Education in T-CPR for All Telecommunicators

Communications center professionals are confronted with a wide variety of emergencies and callers under stress. Effective T-CPR depends on well-prepared professionals trained to elicit information quickly, interpret that information, and provide direction. All emergency telecommunicators should receive formal T-CPR instruction and annual refreshers thereafter. Initial education can often be accomplished in <4 hours and continuing education in <2 hours. Continuing education needs may be adjusted according to the individual needs of the telecommunicator, the community, and the AHJ.

3. Conduct Effective and Continuous QI

The most challenging and most important driver of quality is auditing and measuring performance. All OHCA calls identified by the telecommunicator should

be reviewed both for adherence to protocols and for measurement of key time intervals. Furthermore, calls that go unidentified by the telecommunicator but are later identified as cardiac arrest by first responders should also be reviewed. Possible reasons for delays or failures should be identified. Data should be aggregated at least annually to identify trends and commonalities. A QI process should be established with clear, objective data sets, and specific individuals should be identified who are accountable for conducting reviews. Effective QI results in a blame-free effort to identify barriers, inform training needs, and improve overall survival.

4. Connect to an EMS Agency

Effective T-CPR requires a systems approach with commitment from call takers, dispatchers, and responders. EMS responders are an essential and integral part of QI. EMS agencies can provide vital feedback on missed opportunities, especially failures to identify cardiac arrest. EMS run reports provide data essential to QI review when combined with call audio. Connection to EMS providers will also provide positive feedback on successful resuscitations that will inevitably include telecommunicators.

5. Designate a Medical Director

Physician oversight authority is essential both to issue dispatch protocols for T-CPR and to ensure that protocols are locally relevant and consistent with guidelines as they evolve. The medical director should review QI reports and can help set priorities for ongoing education. Ideally, the roles of EMS medical director and dispatch center medical director are combined.

6. Recognize Outstanding Performance

QI activities should also reveal those individuals who perform at an exceptional level, both in recognition of arrest and in delivery of instruction. Centers are encouraged to celebrate successful resuscitation efforts and recognize those individuals who "do everything right" every time. Performance should be judged on its own and not necessarily as a function of individual outcomes.

T-CPR PERFORMANCE MEASURES

The goal of T-CPR performance measures is to ensure that every call to 9-1-1 for OHCA reaches an AHJ that can rapidly identify the need for and then provide T-CPR instructions. The performance commitments accomplish this goal by maximizing the number of OHCAs accurately identified and minimizing the time from 9-1-1 call to first T-CPR compression.

1. Percentage of Total OHCA Cases Correctly Identified by PSAP

- Definition: Telecommunicator-recognized OHCAs/total OHCAs (confirmed by EMS impression) ×100
- Numerator: QI reviewed and EMS confirmed OHCAs with recognition noted
- Denominator: Number of EMS-confirmed OHCAs
- Performance goal: 75%

2. Percentage of OHCA Cases Correctly Identified by PSAP That Were Recognizable

- Definition: Telecommunicator-recognized OHCAs/number of cases deemed identifiable×100
- Numerator: QI reviewed and EMS confirmed OHCAs with recognition noted
- Denominator: EMS confirmed OHCAs deemed identifiable through QI
- Performance goal: 95%
- Exclusions from denominator
  - Third-party call
  - Hang up
  - Hysteria
  - CPR in progress
  - Language barrier
  - Other circumstances supervisor deems "unidentifiable"

The combination of the first 2 quality measures rewards telecommunicators for being as sensitive as possible at identifying OHCA (number 1) while allowing for real-world circumstances to inform reasonable expectations (number 2). The combined use of these 2 commitments prevents individual AHJs from "gaming" the system by being overly exclusionary while maximizing the number of true-positive OHCA identifications that receive T-CPR (Figure 2).

3. Percentage of Telecommunicator-Recognized OHCAs Receiving T-CPR

- Definition: Number of telecommunicator-recognized OHCA cases receiving telecommunicator-directed T-CPR/number of telecommunicator-recognized OHCA cases×100
- Numerator: Number of QI-reviewed, EMS-confirmed OHCAs with recognition noted when telecommunicator-directed T-CPR is performed
- Denominator: Number of QI-reviewed, EMS-confirmed OHCAs with recognition noted
- Performance goal: 75%
- Exclusions from denominator
  - CPR is already in progress by lay rescuer

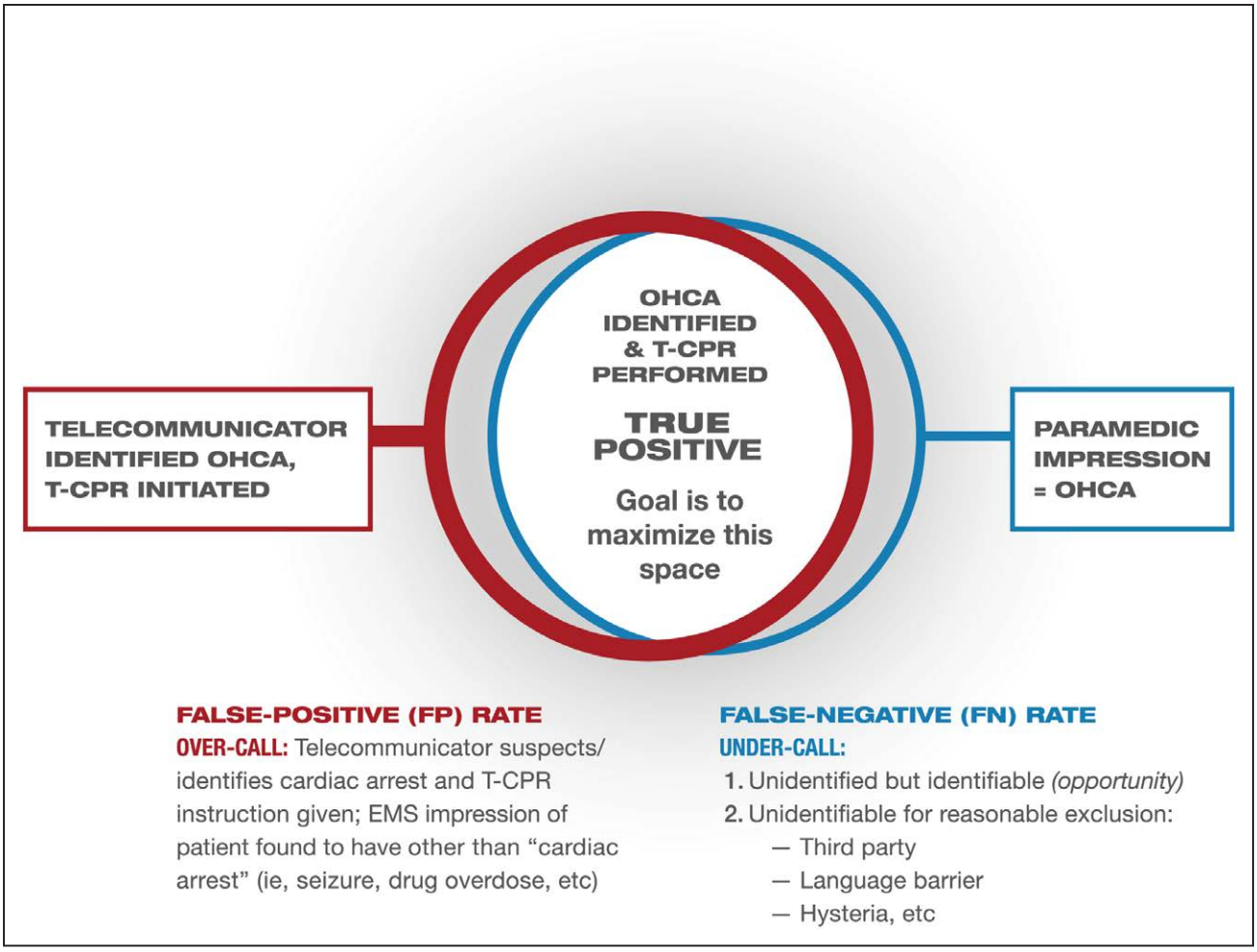

Figure 2. Composition of emergency medical services (EMS) calls for service that require quality assurance.
OHCA indicates out-of-hospital cardiac arrest; and T-CPR, telecommunicator cardiopulmonary resuscitation.

- Caller is unable to physically perform CPR (eg, call being made from a different location than the OHCA)
- Caller is unable to get the patient into the appropriate position for CPR (eg, cannot move patient from bed to floor)
- Caller refuses to perform T-CPR
- For safety, T-CPR instructions are not given (eg, traumatic cause, disaster scenario)
- Caller hangs up
- Other circumstances the supervisor deems valid for why T-CPR could not be performed

4. Median Time Between 9-1-1 Call and OHCA Recognition

- Definition: Median amount of time in seconds between 9-1-1 call connection and OHCA recognition
- Benchmark: <90 Seconds from AHJ receiving the call to telecommunicator recognition of OHCA (Figure 3)

5. Median Time Between 9-1-1 Call and First T-CPR–Directed Compression

- Definition: Median amount of time in seconds between 9-1-1 call connection and first CPR compression directed by telecommunicator
- Benchmark: <150 Seconds from AHJ receiving call to first CPR compression directed by telecommunicator (Figure 3)

The AHA acknowledges the following:

- During the interval between AHJ receiving the transferred 9-1-1 and OHCA recognition, the call taker is also aware of the need to dispatch an appropriate medical response as rapidly as possible. In the triage script suggested above, an answer of "no" by the caller to either of the first questions ("Is the patient conscious?" or "Is the patient breathing normally?" [see the Call-Taking Process section in Operational Considerations for Implementation of a T-CPR Program]) should prompt immediate dispatch of resources appropriate to treat the highest-priority call within the EMS system. Examples of other high-priority complaints identified by using

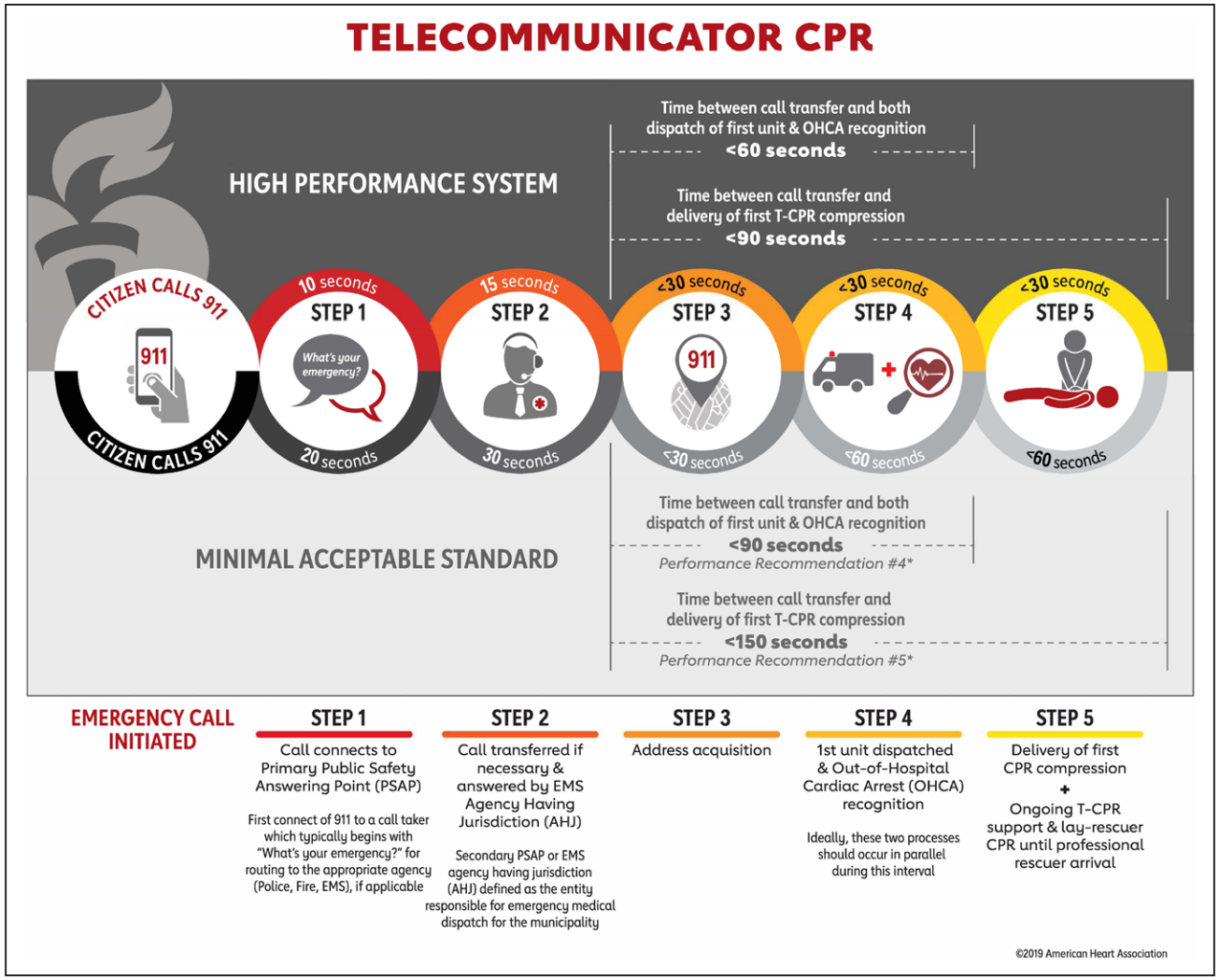

Figure 3. Telecommunicator cardiopulmonary resuscitation (T-CPR) time interval standards.
CPR indicastes cardiopulmonary resuscitation; EMS, emergency medical services, and OHCA, out-of-hospital cardiac arrest. *These recommended performance intervals should be as short as possible and are provided to demonstrate minimal acceptable performance.

the script other than a person with cardiac arrest include individuals with respiratory failure or shock and patients with altered mental status who are unconscious. Each of these patients would warrant EMS resources similar to a cardiac arrest to prevent further deterioration. Although those high-priority situations are specifically outside the scope of this statement, the writing group agrees that dispatching such EMS response should be done in parallel with recognition and should adhere to the same time-metric standard.

- Performance goals 4 and 5 may be challenging to meet in the short-term because of PSAP call transfer protocols or other structural barriers that may lie outside the authority of the AHJ responsible for EMS dispatch.
- Measurement of intervals before call transfer to the AHJ responsible for dispatching EMS should be included; however, when measurement is impractical, the minimum acceptable performance standard should apply. Standard 3 ensures that each identified person with OHCA receives T-CPR. The combination of standards 4 and 5 ensures that T-CPR is received as rapidly as possible.

BARRIERS TO T-CPR IMPLEMENTATION

Systemic Barriers

Systemic barriers can slow the implementation of T-CPR programs. These barriers include but are not limited to a PSAP charter or perceived scope of practice, organizational culture, fear of liability, public relations concerns, and budget constraints.[36] This advocacy statement outlines a framework for minimal acceptable standards for the delivery of high-quality T-CPR instructions by EMD personnel and includes strategies for mitigating barriers to achieving these standards. The implementation of this T-CPR guidance should be achieved as rapidly as possible; however, the AHA acknowledges that in

many municipalities, their adoption will be incremental as long-standing structural barriers are overcome.

Significant variability remains in the infrastructure available to 9-1-1 centers. Some communities have developed their own local process to manage emergency medical calls for service. Other communities have chosen to invest in licensed emergency dispatch technology. Although these technologies have the advantage of standardization and validation of processes though external comparison, they often lack the ability to customize or "locally contextualize" (ie, account for regional variation in language or descriptions of events). Such lack of localization (eg, the need to provide T-CPR in other languages) may occasionally delay the provision of T-CPR instructions.[42]

Another structural challenge occurs when different public safety agencies are responsible for different components of the EMS response to OHCA. For example, the primary PSAP could be administered by the police department, which transfers the call to the AHJ managed by the fire department, which dispatches physical resources controlled by a separate EMS authority. Such fragmentation of resources can often lead to challenges in coordinating timely response, measuring excellence, and sharing data unless formal agreements are in place to facilitate the OHCA system of care.[2] Data sharing is permitted by the Healthcare Insurance Portability and Accountability Act for involved agencies for the purposes of QI and is essential for an AHJ to evaluate T-CPR performance measures 1 and 2. Furthermore, all agencies within a jurisdiction should have data-sharing agreements so that rates and outcomes of OHCA can be tracked as a strategy to identify community-level opportunities for intervention.[10,11]

Commitment From Agency Leadership

Access to timely and high-quality T-CPR instructions is a critical component of an effective resuscitation system of care.[2] However, operationalizing these T-CPR performance standards often remains a challenge for local communities. Implementation guidance is available in the public domain from federal, state, and nonprofit sources. The variation among delivery of EMS resources across communities requires a commitment from local agency leadership to identify successful strategies for implementation. Local medical providers can champion and support adoption of the T-CPR performance metrics detailed here.

Most 9-1-1 centers have limited staff dedicated to QI activities. However, such activities as they relate to T-CPR can require little additional funding and have an enormous public health impact. AHJs can readily align quality-assurance activities within the training staff by evaluating a subset of OHCA calls. The 9-1-1 centers could define a sustainable fraction of calls to evaluate, over time improving in increments the quality of the care they deliver. However, smaller systems may need additional personnel to support these activities or may need to share resources with their larger local medical community.

Need for Physician Medical Direction

Formal medical direction and supervision of the AHJ for EMD are essential.[43] An active, engaged physician provides qualified oversight of an EMD at large, including T-CPR and other prearrival instructions, as well as QI practices related to these and other components of the system of care.[2] Through active involvement, the medical director can support and implement T-CPR and other public health programs by communicating their importance to elected public officials and to the larger community.

If an AHJ center does not have a physician medical director, it may consider partnering with other EMS agency medical directors to provide oversight functions. These opportunities often depend on jurisdictional boundaries and other logistical challenges in those communities. However, there is immense value in having unified medical oversight to ensure consistency and alignment across a resuscitation system of care that includes both the AHJ and the responding EMS agencies.

Despite these logistical challenges to providing T-CPR, the physical infrastructure (phone lines, AHJ personnel, cell towers) to accomplish this important public health initiative as part of a broader resuscitation system of care currently exists in almost every community. When the magnitude of OHCA, the potential impact of T-CPR, and the relative cost of providing T-CPR are considered, the economics rapidly become compelling. With T-CPR, telecommunicators have the potential to engage lifesaving care for every OHCA in the service area of the AHJ with minimal capital expense to the community itself. The cost-effectiveness of T-CPR programming compared with capital outlay to otherwise achieve similar reductions in time to first compression[22] (ie, EMS stations, ambulances, and EMS personnel to staff them) is overwhelmingly favorable.

Perception of Liability

In today's litigious climate, legal liability is a very real concern as municipalities provide or delegate authority for public services. As this concern relates to T-CPR, the writing group is unaware of any lawsuits filed against 9-1-1 centers in connection with T-CPR. The employment of a physician medical director can assist in assessing and mitigating any perceived liability. Conversely, the writing group believes that failing to provide T-CPR in cases of confirmed OHCA is a significantly

larger liability. The legal concerns for T-CPR instructions are summarized below.

Practicing Medicine Without a License

Closed-chest CPR was first described by Kouwenhoven et al[44] in 1960. Initially, CPR was a medical act to be performed only by licensed practitioners. It took several years for this lifesaving technique to be taught to nonmedical personnel as part of public health interventions to improve community response and survival for individuals with cardiac arrest. This newly acquired skill came with fears of reprisal and legal actions if it were to be performed either incorrectly or with the wrong indication, similar to contemporary concerns about the liability surrounding T-CPR. Most jurisdictions have adopted Good Samaritan laws that legally protect well-intended people who are offering assistance to others to the best of their ability.[45] With the oversight of a physician medical director, T-CPR simply provides CPR education "just in time," ensuring that responding lay rescuers have the scope to provide CPR in good faith, thereby strengthening the liability protection afforded by Good Samaritan laws. Furthermore, Duty to Act laws adopted in some jurisdictions could make it possible for someone to be found liable for failing to provide assistance to a person in distress.[46]

Providing CPR to People Not Experiencing OHCA

Providing CPR instructions to people believed to be in cardiac arrest (unconscious and not breathing normally) is supported by the 2015 International Liaison Committee on Resuscitation's treatment recommendations and the AHA.[2,16,47] When in doubt about the presence or absence of signs of life, it is recommended to err on the side of initiating CPR. Because T-CPR instructions do not always result in CPR being performed on the patient, it is estimated that <11% of victims erroneously believed to be in cardiac arrest will ultimately receive CPR.[48] Although rib fractures and sternal fractures have been observed in as many as 30% and 15%, respectively, of individuals experiencing cardiac arrest after prolonged CPR according to autopsy,[49–53] no such adverse events were reported in individuals not experiencing cardiac arrest who received lay rescuer CPR.[54,55] Life-threatening injuries potentially resulting from chest compressions are extremely rare and are present in <0.5% of OHCAs.[50] Given the risk of the alternative (almost certain death), the potential benefit to resuscitate individuals experiencing OHCA far outweighs the rare incidence of lasting harm from the performance of T-CPR.

Communicable Disease Transmission or Other Physical Risk to Lay Rescuers Performing CPR

Misconceptions still exist about the risk of contracting an infectious disease when providing CPR to a victim.[56] Historically, potential rescuers were concerned with tuberculosis and polio, whereas contemporary unease focuses on HIV and hepatitis B and C.[56,57] However, no transmission of HIV, hepatitis B, hepatitis C, or Creutzfeldt-Jakob disease has ever been reported from providing CPR to a patient or from using a manikin to learn CPR.[57] Furthermore, this fear of infectious disease transmission has been greatly alleviated by the removal of mouth-to-mouth breathing for lay responders, including T-CPR instructions.[30] The transmission of other pathogens is extremely rare. Only 15 cases of *Neisseria meningitidis*, 3 cases of enteric pathogens, 2 cases of labial herpes, 1 case of tuberculosis, and 1 potential case of severe acute respiratory syndrome have ever been linked to the provision of CPR.[57]

The physical effort required to provide CPR has been compared with walking in the sand or shoveling snow. Although rare cases of injury have been described in CPR providers, it is extremely safe to perform CPR.

Successful Implementation of a T-CPR Program

When the leadership of the AHJ, including the physician medical director and telecommunicators, collaboratively commits to implementing a T-CPR program, the results rapidly demonstrate the public health impact by saving lives. There are numerous examples of successful implementation regionally, nationally, and internationally. Individuals experiencing OHCA in Arizona who received T-CPR experienced a 64% increase in survival and a 56% increase in favorable neurological outcome at hospital discharge compared with those not receiving T-CPR.[24] In Japan, a continuous QI program successfully demonstrated that an AHJ could increase the delivery of T-CPR instructions and improve lay rescuer CPR rates with associated improvements in survival.[21] A nationwide study in Korea observed a doubling of survival attributable to implementation of T-CPR.[20] In each instance, a commitment from leadership to a formal T-CPR program and the incorporation of initial and ongoing training, medical direction, continuous QI, and coordination with responding EMS agencies were required to achieve this public health benefit. Those dispatch centers that effectively learn and assertively provide T-CPR instructions to lay rescuers can, over time, double the rate of lay rescuer CPR and double the rate of survival in a community.

RESOURCES FOR T-CPR IMPLEMENTATION

As municipalities seek to implement T-CPR programs to improve the public health, the cost-effectiveness of such programs is further enhanced by the availability of content and training materials in the public domain. These resources include position statements from the AHA[2,16] and other professional organizations.[43] These statements provide credibility and a policy framework

Table 1. Resources Available to Establish a T-CPR Program

Policy positions from stakeholder organizations
National Association of EMS Physicians: physician medical direction for emergency medical dispatch[43]
AHA scientific statement on dispatcher-assisted CPR[16]
AHA T-CPR website[36]
"Part 4: Systems of Care and Continuous Quality Improvement: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care"[2]
"2019 American Heart Association Focused Update on Systems of Care: Dispatcher-Assisted Cardiopulmonary Resuscitation and Cardiac Arrest Centers: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation"[2a]
Training/education of telecommunicators (didactic content including audio and visual examples)
"Part 5: Adult Basic Life Support and Cardiopulmonary Resuscitation Quality: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care"[58]
Save Hearts in Arizona Registry and Education: dispatchers and call-takers resources
Global Resuscitation Alliance: Resuscitation Academy eBook
CPR Lifelinks Toolkit
Telecommunicator call-taking resources (scripts, protocols, etc)
Save Hearts in Arizona Registry and Education: dispatchers and call-takers resources
Global Resuscitation Alliance: Resuscitation Academy eBook
CPR Lifelinks Toolkit
QI resources (checklists, forms, reporting metrics, etc)
"Part 4: Systems of Care and Continuous Quality Improvement: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care"[2]
AHA T-CPR website[36]
Save Hearts in Arizona Registry and Education: dispatchers and call-takers resources
Global Resuscitation Alliance: Resuscitation Academy eBook
CPR Lifelinks Toolkit
Resuscitation Academy T-CPR Toolkit

AHA indicates American Heart Association; CPR, cardiopulmonary resuscitation; EMS, emergency medical services; QI, quality improvement; and T-CPR, telecommunicator cardiopulmonary resuscitation.

to complement the necessary work by physician medical directors, AHJ leadership, and elected officials to craft a locally relevant program. Successful EMS response to any emergency, especially cardiac arrest, is rarely under the authority of a single agency, and such operational references from the National Fire Protection Association, Association of Public-Safety Communications Officials, and other national stakeholder organizations should be consulted.

Once the commitment to T-CPR is made by a municipality, data must be collected to measure the current performance of the resuscitation system of care.[2] Although this document provides guidance about the data and metrics sought, much of the logistical support for collecting these data is publicly available (Table 1).

Table 2. Topics to Consider in Initial Training

Anatomy and physiology of the circulatory and cardiovascular systems
Relationship between circulatory, respiratory, and nervous systems
Signs and symptoms of ACS
Signs of life recognition
Early recognition of the need for CPR (conscious/breathing normally)
Agonal respirations
Hypoxic seizures and sudden cardiac arrest
Pathophysiology of sudden cardiac death/cardiac arrest
Role of T-CPR in cardiac arrest survival
Importance of minimizing disruptions when T-CPR is in progress
Physiology behind performance of the instructions
Automated external defibrillators and their role in resuscitation
Adult, pediatric, infant, and neonatal CPR
Environmental concerns (eg, drowning, electrocution, trauma, strangulation)
Special patient populations (eg, pregnant; obese; complex medical needs, including stoma and home ventilator)
Do-not-resuscitate orders and relevant local laws

ACS indicates acute coronary syndrome; CPR, cardiopulmonary resuscitation; and T-CPR, telecommunicator cardiopulmonary resuscitation.

Standard operating procedures, forms, recording scripts, checklists, and the like are available and can be rapidly localized to the specific operational challenges encountered by the AHJ. Essential to this initial step is the involvement of representatives from the AHJ and other stakeholders to ensure engagement across the system of care. Collecting this foundational data will help to quantify the success of the program by demonstrating growth as operational benchmarks are achieved.

Once baseline T-CPR metrics are established, program development, including preliminary and ongoing training in cardiac arrest, CPR, and T-CPR, can occur. Unless telecommunicators hold EMS certification, 3 to 4 hours of initial T-CPR training is appropriate. Regardless of experience or background, all telecommunicators should receive 2 to 3 hours of annual continuing medical education specific to T-CPR and cardiac arrest to ensure that providers are up to date with contemporary guidelines. Relevant topics such as anatomy and physiology, systems of care, OHCA recognition, and agonal respirations, as well as practical training exercises for special situations encountered by telecommunicators, should be included in this training (Table 2). Such training should include opportunities for hands-on demonstration of psychomotor skills (ie, physical performance of CPR) and interaction with other stakeholders within the system of care. For some telecommunicators, interaction with critical incidents such as providing T-CPR for individuals experiencing cardiac arrest can been emotionally and psychologically difficult. Critical incident stress management resources, including employee assistance programs, peer support groups, and

chaplaincy, to provide insight and awareness to telecommunicators should be offered.

In addition to training, implementation of a T-CPR program includes ongoing QI. These QI tasks include direct observation and real-time feedback to telecommunicators, call review of each identified cardiac arrest call for service, and ongoing data collection to measure progress. Timeliness of these tasks is essential to maximize their impact for each telecommunicator performing T-CPR and for the system of care as a whole. Furthermore, each of these reviews represents a chance for the ongoing training that a T-CPR program requires. Reporting of metric benchmarks to T-CPR program stakeholders throughout the system of care provides accountability and opportunities to celebrate successes. Scripts for T-CPR, QI forms, checklists, and even video-recorded examples for scenario-based teaching are freely available from a number of public outlets (Table 1).

SUMMARY

Telecommunicators represent the initial public safety interface with the lay public in a medical emergency. A high-quality T-CPR program empowers telecommunicators to rapidly identify OHCA and provide just-in-time training for lay rescuer CPR. T-CPR programs should be available in every AHJ for EMD, and their performance should be measured and reported to facilitate improvement. Successful implementation of a T-CPR program represents a commitment from the community to save more lives from OHCA and strengthen the chain of survival.

ARTICLE INFORMATION

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

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This table represents the relationships of writing group members that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all members of the writing group are required to complete and submit. A relationship is considered to be "significant" if (a) the person receives $10 000 or more during any 12-month period, or 5% or more of the person's gross income; or (b) the person owns 5% or more of the voting stock or share of the entity, or owns $10 000 or more of the fair market value of the entity. A relationship is considered to be "modest" if it is less than "significant" under the preceding definition.

*Modest.

†Significant.

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