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Clinical paper

A centralized system for providing dispatcher assisted CPR instructions to 9-1-1 callers at multiple municipal public safety answering points☆

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Abstract

Background: Dispatcher CPR instruction increases the odds of survival. However, many communities do not provide this lifesaving intervention, often citing the barriers of limited personnel, funding, and liability.

Objective: Describe the implementation of a novel centralized dispatcher CPR instruction program that serves seven public safety answering points (PSAPs).

Methods: Seven municipal PSAPs that did not previously provide dispatcher instructions implemented our program. Using a 30-min self-directed video, 84 PSAP dispatchers were trained to utilize a two-question protocol to identify and transfer suspected out-of-hospital cardiac arrest (OHCA) cases to a central communication center. At this central communication center, a trained communicator delivered CPR instructions to the caller. The 26 central communicators were trained with a 2-h in-person didactic session followed by a 2-h practice session. We collected and analyzed data from recordings of communicator-to-caller interactions.

Results: 169 calls were transferred to the central communication center. Of those, 106 needed CPR instructions and 56 of those callers performed chest compressions (53%). The county-wide EMS documented bystander CPR rate was 20% the prior year. The 63 remaining transferred calls were non-OHCA calls. Of the calls where CPR was needed and performed, 11 victims survived to hospital discharge (20%); the countywide survival rate was 12%.

Conclusions: Using a central communication center for instructions allowed us to train and maintain a smaller group of communicators, leading to less cost and more experience for those communicators, while limiting the burden on PSAP dispatchers.

Keywords: Dispatch, Cardiac arrest, CPR, Instructions

Introduction

Out-of-hospital cardiac arrest is a significant public health problem in the United States, with approximately 350,000 people affected annually.[1] Unfortunately, survival to hospital discharge rates remain low, at just over 10% nationally.[1] Research has shown when dispatchers provide CPR instructions the victim's chance of survival can double, or even triple.[2–5] Training 9-1-1 dispatchers to give callers step-by-step CPR instructions is one of the most promising community-based interventions for increasing bystander CPR rates.[6] Evidence supporting dispatcher CPR is so strong that in 2012, the

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American Heart Association issued a Science Advisory for policy-makers recommending that every community offer CPR instructions to 9-1-1 callers.[7]

This statement recommends that communities provide dispatcher CPR instructions using evidence-based best practice protocols and support them with both quality improvement and continuing education programs. In some communities, this recommendation is accomplished through the use of commercial dispatch systems such as the Medical Priority Dispatch System (Priority Dispatch Corp, Salt Lake City, UT). Others choose to use locally developed systems for instructing callers in CPR. The most notable of these community-developed systems is the one used in Seattle, Washington, where significant research on dispatcher CPR has been conducted.[8–12] Still other communities do not offer any pre-arrival instructions. The reasons for this have not been studied, but anecdotally, agencies express concerns over cost, manpower, and liability.

Prior to starting our program, only three of the 12 municipal public safety answering points (PSAPs) (i.e., call centers that receive requests for emergency aid from the community using a specially designated phone number, 9-1-1) in the county provided dispatcher CPR instructions. Our program was initiated to give every citizen access to dispatcher CPR instructions. Seven of the municipalities that did not offer dispatcher CPR instructions chose to initiate our program. We leveraged the county's central communication center to bring dispatcher CPR instructions to the non-covered PSAPs rather than trying to implement the service in each of the PSAPs individually. The objective of this paper is to describe the implementation of this centralized dispatcher CPR instruction program serving seven PSAPs in a single county.

Methods

We conducted a prospective before and after study in Milwaukee County, Wisconsin. Milwaukee County has a population of approximately 950,000 and covers 241 square miles.[13] The EMS system operates under a single set of county-wide protocols, with care provided by 13 distinct fire departments that cover 19 municipalities. All municipalities offer a tiered response system with AED equipped first responder fire fighters. All patients are evaluated by a paramedic-level fire fighter and then transported by either an advanced or basic level ambulance depending on patient needs. The 13 fire departments are dispatched by 12 PSAPs. Annually the EMS system responds to over 54,000 requests for aid through the 9-1-1 system, with approximately 800 of those involving patients who are in cardiac arrest.[14] The entire county participates in the Cardiac Arrest Registry to Enhance Survival (CARES) so EMS data is collected for every EMS documented out-of-hospital cardiac arrest (OHCA). For those OHCA that are transported, survival data is obtained from the treating facility.[15] Our project was approved by the Institutional Review Board at the Medical College of Wisconsin with a waiver of consent.

Our project began in January 2015. At that time, three of the 12 PSAPs in the county offered pre-arrival instructions. Of these three PSAPs, prearrival instructions were provided using a commercial Emergency Medical Dispatch product at two centers, while the third used locally developed instructions. Our program targeted the remaining nine PSAPs that did not provide scripted CPR instructions. One of the nine chose to partner with the PSAP that was providing pre-arrival instructions using locally developed protocols before we approached them about our project.

The remaining eight PSAPs were approached and asked if they would be willing to use a centralized dispatch service to offer CPR instructions. All eight agreed to participate, but one asked that their personnel be trained to give the instructions themselves rather than using the centralized system. The other seven agreed to train their dispatchers to identify probable cardiac arrest cases using the two-question system recommended by the American Heart Association[7,16] and utilized the central county communication center to give CPR instructions to their callers.

Training for PSAP dispatchers

We developed a PSAP dispatcher protocol that used a two-question system for identifying a victim who was likely in cardiac arrest. The first question PSAP dispatchers asked was "Is the patient awake?" The second question was "Is the patient breathing normally?" If the answer to both questions was "no", then dispatchers sent the appropriate EMS units to the scene and transferred the caller to the centralized communication center for CPR instructions. A 30-min voiceover slide training video was used to train the PSAP dispatchers. The video was tailored to each PSAP based on the process they used for physically transferring the calls. The training emphasized not asking the caller if they wanted to do CPR or to be transferred, but to simply tell the caller they were being transferred to the "dispatcher's partner". Another emphasis was on quickly determining if the victim was likely in cardiac arrest by asking a limited number of questions. For example, dispatchers were taught that it is better to have a caller perform compressions on a patient who is unlikely to survive (e.g., dead-on-arrival) than to spend time asking questions to establish that a patient is beyond saving (e.g., cold to the touch, decomposing).

PSAP leaders were encouraged to review call recordings to identify potentially missed transfers for quality improvement purposes. To facilitate review each PSAP received monthly reports of all EMS-treated cardiac arrests in their municipality and whether a corresponding 9-1-1 call had been transferred for CPR instructions. The reports to the PSAPs also included patient outcome to provide dispatchers with feedback on a case in which they played a critical role. A brief PSAP refresher training video was developed to be viewed by dispatchers for continuing education in an attempt to decrease the number of patients who may have been missed for transfer.

Training for central communication center communicators

The communicators who gave callers CPR instructions needed more in-depth training. Each communicator had to participate in the American Heart Association's Basic Life Support for Healthcare Providers Course. They also participated in a 4-hour in-person course on giving telephone CPR instructions. The course included two hours of didactic lectures that contained many real-world dispatcher recordings, as well as two hours of practice where each attendee role-played as both a 9-1-1 caller and a dispatcher. When students served in the role of a 9-1-1 caller, they used a CPR mannequin to follow the instructions provided by the dispatcher. These practice sessions allowed communicators to feel what it was like to provide and follow CPR instructions, as well as to become familiar with the script. After each practice call, the entire class discussed areas for improvement, areas of excellence, and unexpected events.

Quality improvement reviews were performed for each call where CPR instructions were provided. A trained evaluator reviewed the recording of each call and completed a structured review. The reviewer identified areas for improvement as well as excellence. The review was shared with the communicator who participated in the call.

The reviewer also identified general issues that could be shared with all communicators to improve overall performance. We entered the findings of the quality improvement reviews into a database and communicated general issues found through a continuing education program which included bi-monthly newsletters. The newsletters had program updates, call statistics, tips and tricks, and a practice exercise that asked questions about the script or had participants review and critique recordings of communicators' interactions with callers. All of the described protocols and training materials are available at http://www.mcw.edu/dispatcherassistedcpr.

Analysis

We abstracted and analyzed data collected during the quality improvement process as well as for the CARES Registry using descriptive statistics.

Results

Seven municipal PSAPs in Milwaukee County agreed to have their dispatchers identify potential cardiac arrests and transfer the caller to the county's central communication center to receive CPR instructions. In total, 84 PSAP dispatchers were trained to identify potential cardiac arrest victims. The central communication center had 26 communicators trained to provide CPR instructions. This represented all of the telecommunicators at each agency. A single quality improvement and continuing education provider was trained and funded for 0.5 full time equivalent.

We approached, obtained agreements, provided training, and initiated the call transfer process for each PSAP in a rolling fashion from July 2015 until April 2016. All PSAPs were transferring calls as of April 2016. Between April 2016 and December 2016, 169 callers were transferred to the central communication center for CPR instructions. Of those, 106 needed and received CPR instructions. Fifty-six (53%) of those callers performed compressions before EMS arrival, an increase over the 2015 county-wide EMS documented bystander CPR rate of 20%.

The 63 transferred calls where the victim was identified during the call review as not being in cardiac arrest were for a variety of ailments ranging from severe to mild. This high rate of non-cardiac arrest transfers was not anticipated at the start of the program. However, it was felt that this over-triage was much more acceptable than under-triage, so we provided no interventions to the PSAP dispatchers to attempt to minimize this. A script was created for the communicators giving instructions that addressed non-cardiac arrest calls. The communicators at the central communication center were also encouraged to rely on active listening and to repeat the two-question evaluation if there was any concern that the victim was not in cardiac arrest.

Based on our review of all EMS documented cardiac arrests, we estimate that 109 out-of-hospital calls were missed for transfer by the PSAPs. While it is impossible to verify that these victims were in cardiac arrest at the time of the 9-1-1 call, it potentially represents a 51% miss rate. To address this issue, we created refresher training videos for the PSAP dispatchers. Over the course of the project, the rate of missed cardiac arrests appeared to decrease (May 44%; December 29%).

Of the 56 victims who received dispatcher assisted chest compressions, 11 survived to hospital discharge, for a 20% survival rate. Prior to project implementation, the countywide cardiac arrest survival rate for 2015 was 12%. Although in many of the communities, response times were short, there was still time for the callers to be transferred to the central communication center and for the victim to receive compressions before EMS arrived. The typical victim received hundreds of compressions prior to first responders reaching the victim.

Discussion

We found that the approach of using a centralized communication center to provide dispatcher CPR instructions for multiple municipal PSAPs is feasible. Providing dispatcher CPR instructions in our community was associated with an increase in the number of OHCA victims who received bystander compressions and an increase in the number of victims who survived. These results replicate those of other communities.[9,17]

The primary benefit of using a centralized communication center to provide instructions is that it decreases training and maintenance costs. We trained 84 municipal PSAP dispatchers for approximately 30 min to identify potential cardiac arrest victims and 26 central communication center communicators for four hours to provide the actual CPR instructions. Further, the quality improvement efforts were also centralized, likely contributing to decreased costs. Another benefit is that the practice of giving CPR instructions was concentrated over a smaller number of people. This higher call volume for the communicators led to a higher level of experience than if the CPR instructions were provided by the 84 municipal PSAP dispatchers. It has previously been shown that a dispatch center needs to have a sufficient number of callers who need CPR instructions to maintain proficiency.[18]

This system initially only addressed CPR, even though there are many medical emergencies that could benefit from timely bystander actions. Even with the focused attempt to transfer only potential cardiac arrest cases, other medical emergencies were transferred. This necessitated expanding the script to address victims who were not in cardiac arrest, this included providing a script for conscious choking and bleeding control. We did not have access to the recordings of the PSAP dispatchers' interactions with callers, and thus could not determine the exact reasons for non-OHCA transfers. However, based on anecdotal comments, some calls were transferred due to PSAP dispatchers wanting to provide further assistance to callers, rather than a failure of the two-question system for identifying cardiac arrest.

While this program was successful for those calls that were transferred, it is of concern that 109 cases of EMS documented cardiac arrest were not transferred to our CPR instruction line. While this is disappointing, this program did bring CPR instructions to nearly half of our cardiac arrest victims. We did not have access to the PSAP recordings, and thus did not have the opportunity to explore the reasons for these misses. We do not know what the callers stated as their reasons for calling 9-1-1, making it impossible to determine how to improve the transfer process. Also, the various PSAPs had different levels of commitment to this program. While it was recommended the PSAPs review their call taker interactions, we could not mandate it. We also had one PSAP that allowed their dispatchers to transfer calls after asking permission from the caller, even though this is not a recommended practice. If this program is to be replicated, it is recommended to have PSAPs commit to a formal quality improvement process. Since this program was initiated, a law has been passed in the state of Wisconsin requiring that CPR instructions be offered to all 9-1-1 callers, by direct instruction or transfer, and that all PSAPs provide quality improvement reviews for both those giving instructions and those transferring calls. This law may address some of these issues. It is important to note that a 50% detection rate is similar to what was found in

a previous study of the Advanced Medical Priority Dispatch System.[19] Another study had a 71% detection rate using the same two question identification system we did, but this was after excluding many calls where the dispatcher would not have had the opportunity to identify cardiac arrest (e.g. caller not in the same location as victim).[20]

Limitations

This study is limited by the data that were available. As described above, we did not have access to all of the PSAP call taker interaction recordings to investigate potentially missed cardiac arrest cases. Therefore, we have limited data on those cases that were not transferred but were considered a cardiac arrest on EMS arrival. Further, our past bystander CPR data were only available as aggregated county-wide data, and included the three large municipalities that used other dispatch systems. This greatly limited our analyses, making it impossible for us to show that this program resulted in improved survival to hospital discharge.

Conclusion

Implementing a centralized dispatcher CPR program was associated with a higher percentage of OHCA victims receiving bystander CPR. Using a central communication center for instructions allowed us to train and maintain a smaller group of communicators, leading to less cost and more experience for those communicators, while limiting the burden on PSAP dispatchers. This suggests that a centralized dispatcher CPR model is a feasible alternative for agencies that may not otherwise be able to offer dispatcher CPR instructions.

Conflicts of interest

The authors have no relevant conflicts of interest to report.

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