

OPERATIONS

Dispatch Protocols and Cardiac Arrest

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The Trip Report: OHCA Survival: Is It Improving Or Not?

You take a medical control call for a crew that's been been working on a cardiac arrest for 35 minutes. The patient was down for about 10 minutes prior to EMS arrival. A bystander began CPR about four minutes after the arrest. You wonder whether anything could have been done differently upon initial dispatch.

How does all of that work, anyway? Do different dispatch systems make a difference to cardiac arrest survival?

Literature Review

Emergency medical dispatch has a relatively brief history. The Medical Priority Dispatch System (MPDS), the 1977 brainchild of Utah physician Jeff Clawson, MD, gave the EMS community one of its first formal dispatch systems. The title of *emergency medical dispatcher* was conferred for the first time in 1979. In 1983 Utah became the first state to establish a certificate program for emergency medical dispatchers, and the first computerized version of these protocols was put into place in 1986.¹

The MPDS is a computer dispatch system that assigns a priority level to each call based on a series of questions designed to triage the caller's complaint. Response levels are alpha (lowest), bravo, charlie, delta, and echo (highest). MPDS is used in the majority of the United States. A version of the MPDS, the Advanced Medical Priority Dispatch System (AMPDS), is used in the United Kingdom and Ireland.

The other giant in the field, Criteria Based Dispatch (CBD), was developed by Washington's King County EMS in 1990. Whereas MPDS uses a protocol-based dispatch formula, CBD utilizes a tiered approach. CBD guidelines allow dispatchers to determine the level of response required (i.e., advanced or basic life support), followed by the time urgency (urgent or nonurgent). Criteria includes "specific signs, symptoms, and mechanism of injury or circumstances that indicate the level of urgency of a medical condition."²

Offshoots of this system are found throughout Scandinavia and Europe. The Danish Index for Emergency Care, for instance, uses a five-tiered system of severity:

- A: Life-threatening or potentially life-threatening conditions requiring immediate response ("blue lights and sirens");
- B: Urgent but not life-threatening condition;
- C: Nonurgent condition that requires an ambulance;
- D: Nonurgent condition requiring supine patient transport; and
- E: Condition requiring other service or advice/instruction, including taxi transportation (no ambulances are dispatched for emergency level E calls).³

Both MPDS and CBD have been independently compared against a non-systems-based approach to assess for reductions in the number of ALS-categorized calls. A 2000 study compared a chief complaint-based triage system against MPDS.⁴ This was a prospective observational study in which the patients served as their own controls, first in the chief complaint-based triage system and subsequently in MPDS. The original system determined the need for ALS or BLS by chief complaint alone. Following implementation of the MPDS protocol, there was a statistically significant decrease in unnecessary ALS dispatches.

Similarly, following implementation of the CBD system in King County, a study was conducted to evaluate whether the number of ALS dispatches for cerebrovascular accidents (age 50 or more) and febrile seizures (age 6 or less) decreased. The frequency with which the responding BLS units requested an ALS unit on scene decreased. While this study did not

further investigate the outcomes of these patients, it did note an overall increase in efficiency (defined as “the appropriate unit at the scene for the patient”).²

Effects on Outcomes

While the individual efficiencies and tests of dispatch systems are interesting, even more so is the effect each system has on actual patient outcomes.

A large amount of outcomes data has been published with regard to dispatch and out-of-hospital cardiac arrest (OHCA). The most recent statistics from the American Heart Association report a survival rate of 12% for this time-sensitive diagnosis.⁵ Dispatcher-assisted CPR has been shown to be nearly as effective at helping its victims as trained bystander CPR.⁶ Furthermore, the dispatcher’s experience level and quick recognition of cardiac arrest has been shown to correlate with improved OHCA outcomes.^{7,8}

Studies in both the United States and Europe have looked at OHCA identification and patient outcome. In a 2004 study implementation of the AMPDS for the London Ambulance Service led to a 200% increase in accurate identification of cardiac arrests. Protocol compliance correlated similarly.⁹

A study conducted in Richmond, Va., and Oslo, Norway, sought to compare the CBD and MPDS with regard to OHCA. This one-year observational study compared multiple categorical variables, including recognition of cardiac arrest, time to ambulance dispatch, and time to chest compression delivery.¹⁰ Most variables showed no difference between the two systems, but ambulance dispatch was noted to be faster in MPDS. Interestingly, there was a delay of approximately four minutes to chest compressions in both systems. While this study provided some good data points, it did not definitively prove one system’s efficiency over the other, especially in regard to what most would consider the most important component: initiation of bystander chest compressions.

Both Denmark and Sweden have adopted CBD-based systems of their own—the Danish and Swedish Index for Emergency Care, respectively. Both systems are based on the Norwegian Index for Emergency Care, which in turn is adapted from CBD. The slight advantage the Danish hold is an electronic link between the dispatch and a network of

public AEDs. A study conducted by Danish physician Thea Møller, MD, et al., found no statistical significance between the two CBD-based systems with regard to recognition of cardiac arrest. The cases that were not initially recognized as OHCA still received relatively alarming diagnoses (breathlessness, etc.) so as to initiate early dispatch of advanced resources regardless.¹¹

Recommendations and Measures

Clear limitations exist among all these studies, including the differences between countries, EMS systems, populations, and possibly comorbidities. Most of these differences are well highlighted in the Møller study.

The background of the dispatchers can slightly differ: Danish dispatchers were either registered nurses or paramedics, whereas Swedish dispatchers were either paramedics or persons without a formal medical background. Additionally, dispatch systems have cropped up at various points over the last few decades: The Swedish system has been in place since 1997, the Danish system only since 2011. Countries such as Denmark have the potential to activate AEDs in the field—a possible confounder in poor communication of CPR instructions to the bystander.

Ultimately these studies leave us with one common denominator: Each system appears able to accurately recognize OHCA, at least in those cases that are unmistakably cardiac arrest. The implementation of protocol-based dispatch systems has enabled this, though performance measurement is the way forward.

In response to this, the AHA published recommendations for the “timely and high-quality delivery” of telephone CPR (T-CPR) instructions by telecommunicators.¹² As dispatchers are often the first to identify cardiac arrest, the AHA provides focused program recommendations and measures. Program recommendations include 1) commitment to implementation of T-CPR, 2) provision of continuing education for dispatchers, 3) quality improvement for all confirmed cardiac arrest calls, 4) communication with the EMS agency, 5) establishment of a designated communications center medical director for issuance of dispatch protocols, and 6) a recognition program for identifying outstanding staff.

Performance goals include 1) 75% correctly identified cases of OHCA by telecommunicator, 2) 95% correctly identified cases of OHCA by telecommunicator that were deemed recognizable, 3) 75% call-taker-recognized OHCA cases receiving T-CPR, 4) less than 120 seconds between 9-1-1 call and recognition of OHCA, and 5) less than 180 seconds between 9-1-1 call and delivery of first T-CPR-directed compressions. Further, the National Highway Traffic Safety Administration has created CPR LifeLinks, a national initiative for the implementation and evaluation of T-CPR and high-performance CPR on a local level.¹³

More recent papers address the impact various dispatch-assisted CPR protocols have on bystander CPR and subsequent outcomes. Continued studies in this realm, adjusted for the aforementioned confounders and variables, would be of great utility.

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