# Situational Awareness in Emergency Medical Dispatch

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## Introduction

Situational awareness (SA, also called situation awareness) is the ability to take in relevant information about an event in order to understand it and take effective action. Maintaining effective SA as an emergency medical dispatcher (EMD) may be more difficult than in other, similarly complex roles because of the remote nature of an emergency call for help.

This study provides insight on one remote SA situation by reporting on a simulation study in which CPR instructions were provided over the phone to laypeople, whose behavior was observed by researchers as they performed the instructed actions, or didn't.

## Objective

The primary objectives of this study were to identify (a) whether callers were performing the actions instructed by the EMDs, (b) whether EMDs took any specific actions to ensure that they were aware of the actual situation on scene and the caller's actions, and (c) whether there were any common or predictable types of disconnect between the instructed and performed actions.

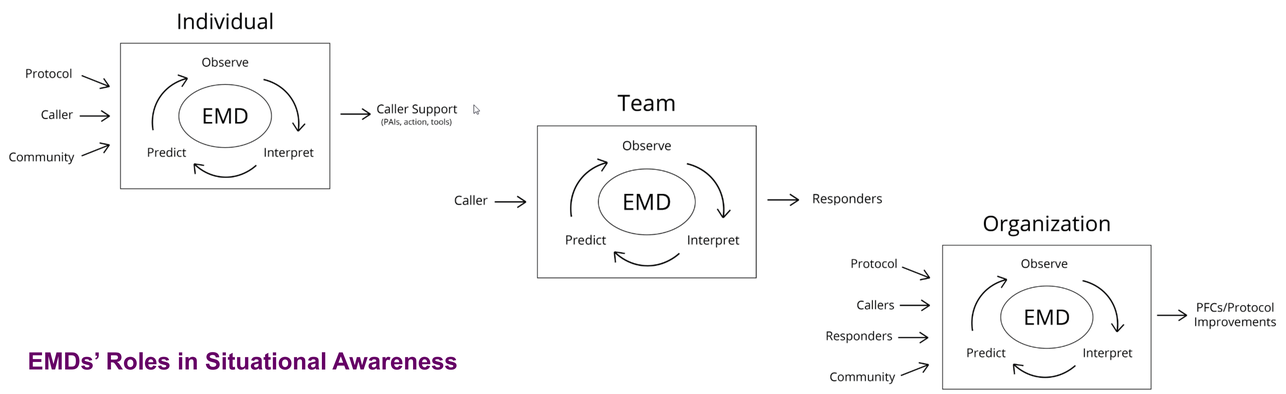
## Materials and Methods

Layperson participants were provided with CPR instructions over the phone by certified EMDs, and an automated recording CPR mannikin recorded the depth and rate of the chest compressions provided.

Simultaneously, participants were observed as they listened to, interpreted, and acted upon the instructions provided by the EMDs. As EMDs provided instructions, observers took detailed notes on the participants' (callers') behaviors, whether and where they stopped following or lagged behind instructed actions, and what the EMDs did (if anything) to maintain their own awareness of the actions being completed or not completed by the caller participants.

## Observed EMD and Caller Behaviors and Effects on CPR Performance

| Observed Behaviors | Specific Effects on CPR Performance | Corrective Action(s) to Reestablish SA |
|---|---|---|
| *EMD Behaviors* | | |
| EMDs moved through instructions too quickly | • Callers lost, not able to keep up with instructions, had to ask for repetitions and clarifications, often ended up with poor rate, depth, and/or position because of missed information | • EMD clarification (e.g., "Have you done it?" or "Are your hands on the chest now?") after each instruction<br>• One instruction presented at a time, with pausing |
| EMDs experienced fatigue from counting out loud | • EMDs stopped counting out loud in some cases; in every one of these cases, the caller immediately stopped performing CPR | • Always instruct to "keep going" if the EMD is going to stop counting or if any other interruption (such as switching to radio) occurs<br>• Instruct caller that "You must keep doing this until I tell you to stop" |
| *Caller Behaviors* | | |
| Caller waited until instructions complete before starting any action | • Listening to complete instruction set (hand placement, depth and rate instructions, etc.) before starting any action meant they had to memorize it all rather than doing one action at a time | • EMD clarification (e.g., "Have you done it?" or "Are your hands on the chest now?")* after each instruction |
| Caller failed to use speaker phone function | • Phone held against the ear or placed on the ground (which kept them from hearing the instructions); caller attempted CPR one-handed while holding phone or had trouble hearing instructions and performing actions simultaneously | • Instruct caller to put the phone on speaker and place it on the floor beside the patient<br>• Instruct caller to call back if the call is lost (happened sometimes when caller attempted to switch to speaker) |
| Caller unclear when to start counting and what number sequence to use | • Caller attempted to count with unlimited number sequence (1-2-3-4-5-6 etc.) instead of 1-2-3-4 repetition, which led to attempt to keep count (and sometimes stopping to check the count) | • Instruct caller that the count will be "1-2-3-4, 1-2-3-4" |
| Caller counted to him/herself instead of out loud | • EMD unable to follow the count and does not know whether the rate is correct; cannot provide speed-up or slow-down instructions | • Instruct caller to "count out loud with me" |
| Caller unclear whether the EMD was still there | • Caller stopped to ask, "Are you still there," or simply stopped performing CPR as soon as the EMD completed instructions | • Provide an audible metronome (whether spoken by EMD or as a sound/beep)<br>• Reassure occasionally (e.g., "You're doing great, keep going!") |
| Caller lacked understanding of certain terms | • Callers got left behind in instruction sequence because of unfamiliar words (e.g., "breastbone" was unclear to many) | • Test all instructions with laypeople to ensure nontechnical language and their understanding of instructions |
| Caller bent his/her arms or pressed on the side of the chest | • Callers sometimes performed a "push-up" motion, lowering themselves to the patient rather than compressing the chest; some pressed from the side of the chest | • Include an instruction to "lock the elbows and press straight down, with your shoulders directly above the patient's chest" |
| Caller unclear about "twice per second" | • Callers were confused about how fast "twice per second" is | • Instead of "twice per second," instruct callers to "pump the chest on my count of 1-2-3-4" (with correct rate used while giving this instruction) |
| Caller unclear about what counted as one chest compression | • Some callers thought that "twice per second" meant pressing down and then up in one second ("down" and "up" as separate actions) | • Instructions should clearly indicate that the caller will compress the chest once for each counted number |




**EMDs' Roles in Situational Awareness**

## Discussion

Emergency dispatching is precisely the type of high-risk, time-constrained, high-stress situation in which SA is particularly important, and particularly difficult to maintain. This study showed that dispatcher-directed CPR is a complex activity to manage over the phone, requiring high levels of SA. EMDs can use specific "corrective" actions to reestablish their connection with, and understanding of, what is really happening (or not happening) on scene—whether the caller is performing the instructed actions as directed. Some of these corrective actions are built into the protocol; others will be included in future versions. This study also suggests that EMDs provide critical SA at all levels of the system.

At the **individual** level, the EMD interacts with incoming data, interprets that data, and takes action to help an individual caller or address an individual presenting situation. Having a protocol can significantly increase EMD SA by directing attention to the most relevant information to be gathered.

The EMD also acts as a creator of SA for the **team**—including the others in the communication center, the field responders (paramedics, firefighters, etc.), and final care providers such as hospital physicians. In emergency dispatch, if the EMD does not gather, interpret, and transmit the information from the only person who is actually on the scene and in possession of SA information—the caller—the entire team's SA decreases, and risk goes up.

Finally, the EMD acts as a gatherer and transmitter of information for the larger **organization** or system. This was clear in the study when the EMDs' evaluation of their own performance led to insights about how to change the protocol system. In this role, EMDs act as the "ears on the ground," the professionals in constant contact with callers who can provide information to the larger organization about the working of the system.

## Conclusion

Dispatcher-directed CPR—when the EMD provides instructions over the phone to a caller or bystander, who then performs CPR on the patient—provides a particularly relevant opportunity to study SA in emergency dispatching. EMDs fall into the same group as pilots and surgeons, utilizing protocols to manage the amount and speed of information coming in, interpreting the information thus gathered, and applying instructions to ensure correct actions are taken.

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