

Emergency Dispatch: Quo Vadis? (Where are you going?)

Jan de Nooij, MD

Regional Ambulance Service
Hollands Midden

Correspondence:
Jan de Nooij, MD
EMS and EMD Hollands Midden,
Postbus 121
2300 AC Leiden, The Netherlands
jdenooij@ravhm.nl

Emergency Dispatch is a process of making split-second decisions that concern the immediate health and safety of others, including situations of life and death. This process requires a proper dispatch environment, emergency infrastructure, and process management. Recent scientific research offers insights that can and should be applied and implemented in the field of Emergency Dispatch. Since a Public Safety Access Point (PSAP) is expected by the public to be a high-reliability organization, it has to be engineered as such; both humans and machines are quintessential components in achieving this reliability.

Scientific research relevant to high-reliability organizations is usually conducted in sectors yielding substantial influence on societies, such as the energy industry. These principles and mechanisms are entirely applicable to Emergency Dispatch¹. A high-reliability organization is an organization that has succeeded in avoiding catastrophes in an environment where normal accidents can be expected due to risk factors and complexity². Emergency Dispatch is a complex and time-critical process in which the trained Emergency Dispatcher (ED) collaborates with the caller to establish an accurate chief complaint, level of priority, and key information relevant to the situation. This information is used to dispatch appropriate emergency units and, if necessary, provide applicable pre-arrival care or self-help instructions. Each step in this process has its own complexity and pitfalls that can potentially lead to an undesired or even catastrophic outcome. In Emergency Dispatch we must do everything we can to avoid catastrophes when we know they can and will happen due to the nature and complexity of the problems we have to deal with. This is why the lessons learned from other industries like the energy, chemical, or airline industries should be applied to Emergency Dispatch.

To facilitate a smooth triage process in a dispatch environment where communication is limited to the phone, a wide variety of technologies are utilized. Although the rise of mobile internet access, smartphones, and Automatic Crash Notification systems increases the number of channels through which callers can reach a PSAP, the actual method of these communication channels doesn't change; the caller and ED engage in an information exchange, typically verbal, but also potentially either partially or entirely digital, including text or social media messages (with or without a picture). What also hasn't changed is the ED's role, which entails quickly determining the actual situation of the victim or patient on scene, based on the information provided by the caller, and deciding which emergency units should respond to the incident and how.

Furthermore, looking at the rapid rate of technological developments occurring in the public safety industry, it is increasingly important to investigate the interaction between man (with his limitations) and machine in this specific environment. Research has shown that approximately 70 to 80 percent of all air traffic accidents, for example, are caused, wholly or in part, by human error. And more than half of all human-error-related accidents are the result of erroneous situational awareness³. Therefore, further research explaining the possibilities and constraints related to optimizing EDs' situational awareness is among the most imperative challenges for researchers and policy makers.

Situational awareness is the product of information processing in the brain of the caller that is amplified, filtered, arranged, analyzed, and enriched by the ED through a technical infrastructure. Consequently, the manner in which the hu-

man brain responds to and interprets information from its surrounding environment is essential to determining an accurate chief complaint and creating optimal situational awareness for the caller, ED, triage nurse, and/or units en-route.

In contrast to the relatively easily mapped-out technical infrastructure, the human brain is a black box. Scientific investigations into the way this black box, i.e., the human brain, functions in a dispatch environment will be of critical importance in the coming years. Factors originating from the human brain determine how effectively a PSAP can utilize its technical infrastructure to successfully handle critical emergency calls.

To make reliable statements regarding the influence of human factors on Emergency Dispatch, it's important to assess the quality of the instruments used by the ED in order to isolate the technical infrastructure's influence. In Emergency Dispatch, one of the most vital quality indicators can be traced back to the sensitivity and specificity of the triage methodology. Sensitivity relates to the triage system's ability to identify an accurate chief complaint, and specificity to the ability of the triage system to identify the cases where no EMS response is needed. These two variables are affected by all aspects of an infrastructure. Yet compared to the "white box" of technical infrastructure, the human factors are a gray box⁴ or even black box, of which we know only partially the internal structure. Since we know how the technical infrastructure works, we might subtract its effect on the outcome of triage, to be left with the effect of human factors on the final result of the triage process. In that way, sensitivity and specificity might be indicators to isolate human factors and to measure effects of changing these on the outcome. If, for example, in an experimental setting, we do not change the technical infrastructure of a dispatch center, but we change the way we listen to a caller from a telephone to a headset, and we see a rise in sensitivity for a certain chief complaint, this indicates a human factors effect. Hypothetically, we could decide to implement a new standard operating procedure for always using the headset because it helps the ED to concentrate on the caller's verbal information.

Because sensitivity and specificity hold true for all triage methods, regardless if a call requires medical, fire, or police professionals, it will become ever more important to make knowledge available to all public safety sectors. For many years, research on the sensitivity and specificity of triage by telephone has been conducted from a (para)medical approach. Positive results of these studies call for the need to conduct replication studies to explore the possibility of generalizing these results to fire and police issues⁵.

Research related to Emergency Medical Dispatch (EMD) has demonstrated the importance of a correct degree of sensitivity and specificity of triage systems, in combination with communication, critical telephone advice, and Emergency Medical Service allocation, to the survival chances of cardiac arrest patients^{6,7}. Critical emergency calls that require assistance by fire or police professionals are similar,

and these EMD-related findings should be studied in fire and police environments so that these results can be generalized to the other disciplines.

To facilitate human factors and Emergency Dispatch quality research, international cooperation is necessary. Indeed, the processes fundamental to the most vital elements of Emergency Dispatch, the human factors, are in essence universal and, thus, not subject to political borders. This offers the possibility to make statistically relevant predictions, based on enormous amounts of data, which can lead to changes in current work methods and technological infrastructures. Additionally, these research findings can result in the development of new triage methods that circumvent the limitations inherent to triage by telephone.

To achieve this, collaborative structures independent from institutional, financial, or political interests, and that allow for pure science, will have to be arranged, acknowledging that Emergency Dispatch is the first and, thus, the most crucial link in handling emergency calls that enter a PSAP.

In effect, this answers the question, "Emergency Dispatch: Quo Vadis?" The time is at hand to cooperate internationally amongst PSAPs, scientists, and policy makers to create conditions aimed at defining the influence of human factors and technical infrastructures on Emergency Dispatch organizations as high reliability organizations so that continual improvement can be sustained.

References

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