Three Hundred Decisions a Day: A Case Study of Local Crisis Management

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ABSTRACT

This paper is a case study of an emergency medical dispatch system that describes its operations and difficulties Emergency Management in Andalusia is the responsibility of the Internal Affairs Authority that operates in each province a Coordination Center that receives Emergency Calls and in cases where there is a medical emergency, passes the information to the Emergency Coordination Centers. The 112 Centers gather all the information generated in emergency situations and supposedly coordinate the response of the several emergency services (Police, and Fire Departments) that operate their own coordination centers. If necessary they send a medical request to the 112 Center that, acting as a hub, sends to EPES the information about the medical incident.

Keywords

Medical coordination, emergency medical systems, real time dispatch systems.

INTRODUCTION AND BACKGROUND

This is a practitioner case study of an emergency medical dispatch system serving the area of Andalusia, Spain. In Andalusia the Emergency Medical System is in charge of EPES (a public company owned by the Regional Health Authority). In each province there is a medical coordination centre that receives medical emergency calls and assigns every call a priority and delivers a medical resource according to the priority and the location of the incident. We wish to describe the system, its accomplishments and difficulties and propose a number of possible options to improve the current performance. The observations reported here are based on long term participant-observation as a responder in this system.

SYSTEM DESCRIPTION AND KEY ELEMENTS

The Emergency Medical Service (EMS) in Andalusia is operated by EPES, the Spanish acronym for Public Company for Health Emergencies of Andalusia, (www.epes.es). Regarding Emergency Calls, EPES is in charge of the following:

Direct Management of 36 Mobile Intensive Care Ambulances (MICA) and 5 Medical Helicopters in the main Andalusian cities for response of High Priority Emergency Calls (Heart Attacks, Strokes, Accidents, Acute Intoxications …)

Coordination: There are eight Coordination Centres (one in each Andalusian province), for High, Medium and Low Priority Emergency Calls. In these centres calls to the "061" emergency number are received and categorized. These centres are staffed with Emergency Physicians acting as Medical Coordinators, medical dispatchers and computer technicians. For medical emergencies you can use the 061 telephone number, available 24/7. The Cadiz province 061 centre managed 495.247 emergency calls in 2009 while in Andalusia a total of 3.414.939 calls were received in the eight coordination centres.

Dispatching of Resources: According to the prior categorization, from these centres we can deploy a helicopter or a MICA (staffed with an emergency doctor, an emergency nurse and an EMT (Emergency Medical Technician) for High Priority Calls, an Urgencies Ambulance (staffed with a General Practitioner (GP), a nurse

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and a driver) for Medium Priority Calls or we can send advise to the GP to visit a patient after his or her shift in the Health Centre in case of a Low Priority Call. Also we can dispatch Transport Ambulances (staffed with a driver) to transport to hospitals and health centres low priority patients who cannot travel by themselves.

Besides the EMS, EPES is also in charge of Coordination and Dispatching MICAs and ambulances for inter-hospital transport of patients and answering medical phone calls from patients regarding drug dosages, hospital and health centres attending hours etc. Besides the approximately 500,000 calls a year, on any day the expected range can be from a typical peak of 600 to a typical low of 400. This is handled by two medical coordinators on duty (only one on the night shift) and several medical dispatchers (5 in the morning, 4 in the evening and 3 at night). On the average in one day we have 2500 calls, of which 1600 are incoming. From those calls, 500 request a medical resource so a medical coordinator has to listen to them and decide what to do.

There are other elements in the Emergency Management Response System:

In Andalusia, Emergency Management is run by the Internal Affairs Andalusia Department through eight coordination centres. You can activate these centres by calling the "112" Emergency Number. These centres do not deploy any resources. They receive the calls, process them and send the information to the different emergency services implied in the response. This communication is done through an internal net.

The Fire Department (a consortium that includes most of the local fire departments of the province) has its own Emergency Number; 081, and its own Coordination Centre. There, the fire and rescue related calls are received and then the resources are deployed by calling the local fire stations.

There are four different Police Services in Andalusia: the Local Police, in charge of traffic and low profile crimes in the urban areas the National Police, in charge of high profile crimes such as murders and drug dealing in urban areas the Civil Guard "(Guardia Civil"), in charge of security on roads and highways; and the police functions in rural areas. You can find also the Andalusia Regional Police, a small group responsible for environmental crimes, illegal games and minors. Those services have their own coordination centres and National Police and Civil Guard also can be activated by the public calling their respective Emergency Numbers, 092 for the Police and 062 for the Civil Guard.

SYSTEM OPERATION

When a medical emergency occurs, the public can activate the EMS in different ways. Usually they call directly the 061 (Medical Emergency number) or the 112 (Universal Emergency Number). In case the injury is in the context of a fire or an accident, the emergency service a such as Police or Fire-fighters that receive the first call sends the alarm, via intranet, to the 112 coordination centre and this sends a request to the EPES Medical Coordination Centre. In case the 112 number receives a "pure" Medical emergency call they transfer the phone call to our system.

When someone from the general public calls the 061 number, the dispatcher (a telemarketing dispatcher that has received specific training on emergency medical issues and on our computer system) asks the caller (who most of the time is very anxious and demanding) about the location of the incident. After this information is gathered, the dispatcher must ask the caller a set of questions according to the main problem (e.g. chest pain, car accident, loss of consciousness, etc). Depending on the answers picked by the dispatcher the system, without any prior medical supervision, will assign a priority to each call and the dispatcher will deploy the resource (especially in Priority One calls where time is critical). There is a Resources Plan that indicates which resource must be deployed depending on priority and location, which even indicates the order of deployment in case the first assigned resource is busy. When all the planned resources are busy or unavailable the dispatcher must inform the Coordinator so he or she can decide on a plan of action. After sending the resource the dispatcher sends the information to the Medical Coordinator's computer so he can learn which resource has been mobilized and why. The Medical Coordinator on duty can modify the result of the system decision if he finds any reason to do it. In some cases, the system does not deliver a priority and asks the dispatcher to send the information to the Coordinator so he must decide. He can ask the dispatchers to ask new questions to the caller before making the final decision. In those cases where the data comes through the 112 intranet or when the caller is a health professional the information is transferred to the coordinator without being processed by the system. In the major cities you can find a MICA and one or two Urgency Ambulances that can cover the mist critical emergencies when the MICA is busy. On the coast, the cities are closer and if necessary we can displace an ambulance from a nearby city .In the northern area, a mountainous territory, the towns are rather distant and in case of emergency, (luckily there are fewer emergencies in these towns), ambulances will take more time to reach another city. In these cases the Medical Helicopter is often deployed.

Once the resource is chosen, a dispatcher by phone (or very rarely, by radio) activates a resource: delivers the information (first the location and then the medical information) to the crew. Simultaneously, the data are sent to the GPS of the ambulance. In some cases the crew can ask the dispatchers to re-call the patients to give more information on the location so they can arrive as soon as possible. The crews must inform EPES via GPS, of every stage of the incident: activation, arrival, patient loading, hospital admittance, and reactivation. All this information is saved in the system, besides all the recorded conversations and written instructions related to each call. At the location, the doctor has three options: to transport the patient to the hospital in the MICA, to ask the centre, with mild patients, for a transport ambulance so the MICA can be reactivated sooner, or finally, in case nothing serious is discovered, the patient can stay at home (Figure 1).

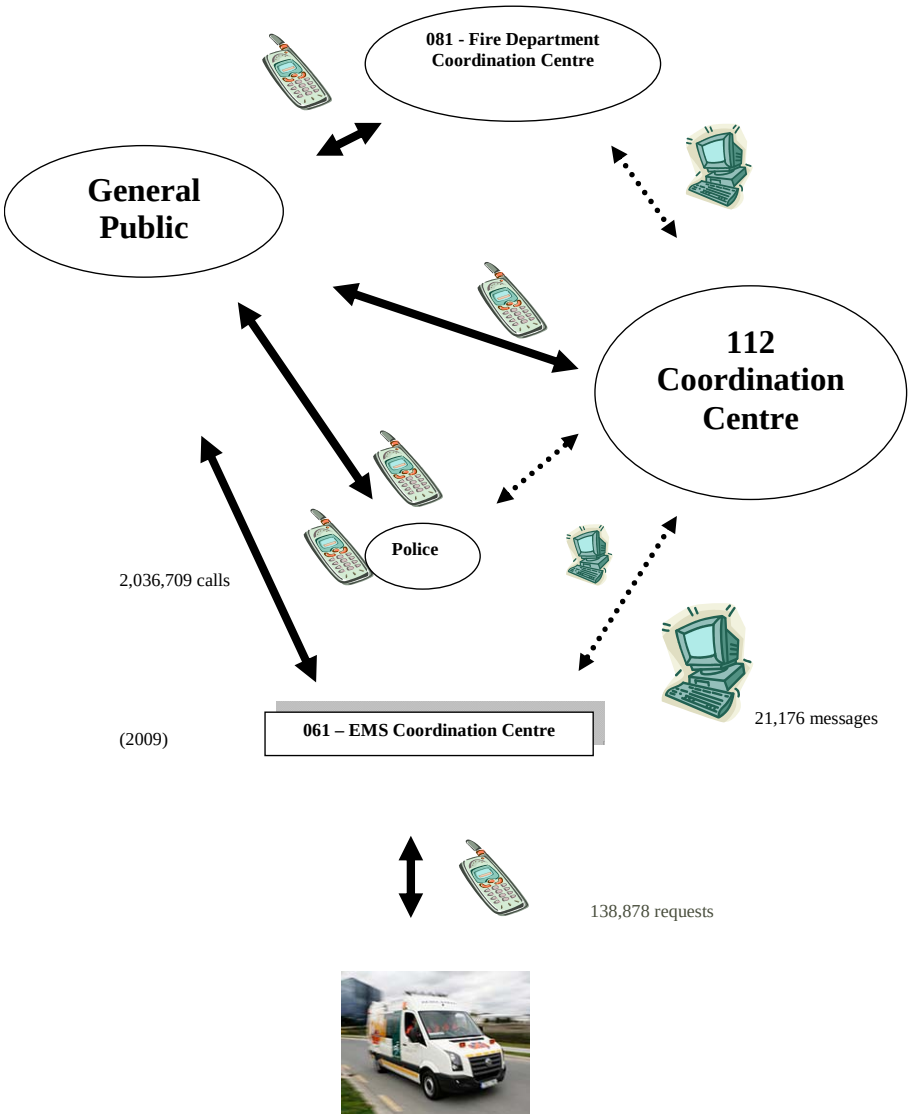

Figure 1: Information Flow Chart

SYSTEM ANALYSIS

From the EMS point of view, the critical point is to choose the right resource for each and every one of the three hundred cases a day we usually manage. Once this decision has been taken our main task is to mobilize it as fast and accurately as possible. As human and material resources are scarce, and a surge is not always predictable, the only way to improve our performance is to optimize our only but extremely valuable resource: information. At the Coordination centre we deal with two main kinds of data: the ingoing and the outgoing

information. During special events (Moto Grand Prix in Jerez, Carnivals in Cadiz), specific resource plans are designed and implemented so the surge in the requests can be handled.

Incoming Information

Callers: Although the 061 and 112 numbers are advertised in media and pamphlets, most callers do not know the actual structure of the emergency service and ignore that, e.g. when phoning the112 for a medical emergency they are transferred to our system and the location and medical questionnaire must be asked again. Also most of the callers do not know we deal with all the calls for the county and some of them believe they are calling a service from their very same town or village. Of course, when a risk to the life of the patients is perceived or recognized the callers are very anxious, quick and often bad-mannered and the process of gathering information can become very difficult. They often assume that the doctor that is taking the call is part of the actual ambulance crew.

Emergency Centre: The information transmitted through the intranet is delivered as little messages (”Car accident, Two cars involved, Three injured”) that, most of the time, give us accurate information about the incident. As there is no medical professional in the 112 centre we must trust the little medical information provided (usually they do not inform us about active bleeding or if has someone has lost consciousness) Sometimes the call taker does not ask for the caller’s phone number so we cannot phone them and ask some more s medically focused questions so that we can make a better assignment of resources.

Emergency Services: There is no direct information exchange among different emergency services and all the information is transferred via intranet and always passing through the 112 hub. The dispatchers also lack medical training, even at the basic level, and cannot provide the medical information we need. It is also a legal main issue whether we can ask a non- medical professional to decide if someone is able to move their neck or not.

Outgoing Information

Medical Resources: We usually have to call 112 centers and ask for extra information to be able to make the allocation of the resources under our control. Since the medical decisions are taken by the professional at the location our critical issue in this phase is the location coordinates. Of course, the knowledge of the stage of the care (e.g. loading the patient, at the hospital, etc) and information about the resources (e.g. if any of the vehicles have broken down, need new supplies or service) it is also very relevant to us. This information is communicated via GPS to the system by the crews so we know at every moment the availability and status of each resource.

PROPOSED IMPROVEMENTS

The fragmentation of information among emergency services is not unique to this community in Spain. For instance, a recent paper on emergency services in Amsterdam stated, “the (technical) integration of ERR systems in the Netherlands was not unproblematic... we will make clear that the organization of the safety response in Amsterdam is rather fragmented” (Boersma, Groenewegen and Wagenaar, 2010). The improvements we suggest are focused on optimizing the gathering, management and delivery of accurate information.

Callers

Our main problem seems to be all the information and knowledge the callers and patients do not have about our EMS. We need to make the total system more transparent to the user. They must receive information not only about the numbers that can call but also about the structure and operation of the system. Hopefully, after this understanding is assumed gathering data about the location and the medical issues of the incident will become easier because they will be involved in giving us relevant, accurate and easy to understand instructions instead of making the wrong assumptions about what will best serve those injured. Information campaigns in schools, associations and neighborhoods, must be delivered so they can learn what to expect when asking for help from the Emergency System and, even more importantly, what we expect from them. It would also help if we allowed people with mobile phones capable of texting to be able to fill out a preset template that could be downloaded to their phone and which could be sent back automatically. That template could also be a guide to audio callers who could fill in audio to a recording device before an operator comes online.

Emergency Management Centre

Of course, the optimal situation is to reduce the complexity and redundancy of this awkward system, with multiple call reception centers where information is often asked twice. Although the optimal situation, a single coordination centre where all the calls are received and from where all the resources are mobilized, is a desirable goal, we probably need to focus on incremental changes to improve the situation. One of our critical issues is the gathering and management of medical information by the 112 coordination centre. A simple and very effective solution is to implement a basic medical data set standardized for each patient so the dispatchers can gather this information in every case, which would allow us to make better and timelier decisions.

Emergency Services

The problem with the rest of the emergency services is the adding of the two above solutions to the other service centers. Some employees (and even some officers) do not know the procedures of our centre and the limits of our resources. Also they usually are the first receivers of the information and usually the medical issues are neglected until we can do the call-backs and get the necessary information for the medical decision, and the deployment is delayed (often with deleterious consequences). For these services Information campaigns and Basic Medical Data should also be implemented

Medical Resources

The critical issue is to improve the communication between the centre and our resources. Enhanced GPS where crews can receive as much information as possible (e.g. currently they cannot send a signal telling us the ambulance is broken down) and the possibility of locating all the resources on a map from the centre will be significant improvements. Of course, this capability must spread to the ambulances that deliver Urgent care and Non emergency Transport, that are not currently managed by EPES.

Medical Coordination Centre

Our proposal on this point refers to two attributes of the information we manage: speed and accuracy. A study should be done comparing the accuracy and speed of the decisions made by the system and those decisions made by the doctors. In both cases we must compare how long it takes to make the decision and how accurate it was. We understand accuracy as the difference between the priority assigned by the system or the coordinator and the real severity. For this comparison we also need to improve our follow up of the cases admitted to the hospital so we can be informed of the final diagnosis and severity of the patients. Ongoing evaluation of this type cannot help but lead to uncovering further factors that need to be corrected We have been fortunate in not having in many years to cope with any major disaster but our current system is not likely to have the flexibility to deal well with any major perturbation or change in the scale of medical emergencies.

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Reference

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