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LOS ANGELES FIRE DEPARTMENT

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FIRE CHIEF

February 27, 2017

BOARD OF FIRE COMMISSIONERS
FILE NO. 17-032

TO: Board of Fire Commissioners

FROM: Ralph M. Terrazas, Fire Chief

SUBJECT: LAFD TIERED DISPATCH SYSTEM

FINAL ACTION:					
	Approved		Approved w/Corrections		Withdrawn
	Denied		Received & Filed		Other

SUMMARY
This Board Report summarizes the impact of the LAFD Tiered Dispatch System (TDS).

RECOMMENDATION
That the Board:
Receive and file.

DISCUSSION
High-volume 911 dispatch centers strive for prompt call-answering, low call-processing times for time-critical emergencies, efficient initial dispatch of the most appropriate EMS resources, and successful recruitment of bystanders into performing life-saving interventions prior to EMS arrival. Call processing time, which refers to the elapsed time from 911-call receipt to when field resources are dispatched, may be facilitated by the use of scripted questions that allow the 911 call taker to quickly identify a patient's location, call-back phone number, nature of the emergency, and status of consciousness and breathing.

From 1989 to 2014, the Los Angeles Fire Department (LAFD) used the Medical Priority Dispatch System® (MPDS), a commercial product that guides 911 call takers using a series of scripted questions to help them identify a dispatch determinant, dispatch resources, and provide pre-arrival instructions to the caller. Decades of local experience with this system has shown delays in call-processing time and total EMS response time, which has been attributed to the system's structure requiring a lengthy caller interrogation prior to dispatching resources. In December 2014, under the leadership Dr. Marc Eckstein, the LAFD implemented a new homegrown dispatch system of

scripted questions and emergency instructions. This new system, called the Los Angeles Tiered-Dispatch System (LA-TDS), emphasizes a rapid, streamlined set of questions to identify the nature of the emergency; promotes early recognition and rapid dispatch for select time-critical emergencies; facilitates a better rapport with callers; and guides the call takers to provide effective emergency instructions to prompt callers to provide life-saving care before EMS first responders arrive on scene.

Since its implementation over two years ago, the department has studied several metrics to evaluate the impact of TDS on patient care and operational efficiency. Several of these results have been published in medical peer-reviewed journals.

1. Impact of TDS on Call Processing Time for Time-Critical Emergencies

Incidents which involved field-confirmed time-critical emergencies were identified through review of electronic patient care reports. These included:

- Out-of-hospital cardiac arrest where field resuscitation was attempted;
- Respiratory Arrest, Respiratory Failure, or Airway Obstruction;
- Acute airway emergencies which required paramedic administration of epinephrine (e.g. severe allergic reactions or asthma exacerbations);
- Active seizures which resulted in paramedic administration of intravenous medications to stop the seizures)
- Major trauma with evidence of hypotension/shock.

We compared incidents dispatched during the first three quarters of 2014 using the MPDS system with the first three quarters of 2015, using LAFD TDS. Call processing time (CPT) was defined as the elapsed time in seconds from 911 call receipt at Metropolitan Fire Communications (MFC) to the time when first responding units were dispatched.

Time-critical incidents using MPDS had a mean call-processing time of 84.4 seconds, compared with a mean CPT of 68.5 seconds using LAFD TDS. This was a relative CPT decrease of 20%, which was statistically significant.

Because of these faster call-processing times using LAFD TDS, there was also a significant decrease in time to arrival of first responders on scene for these most critical patients.

2. Impact of LAFD TDS on Dispatcher-Assisted CPR (DA-CPR)

Bystander CPR is one of the most important factors associated with survival from out-of-hospital cardiac arrest. One of the most important determinants of the success of any dispatch system is the rate of recognition of cardiac arrest by call-takers and the rate of provision of Dispatcher-Assisted CPR (DA-CPR). Even if the callers have no training in CPR, an effective dispatch system seamlessly instructs the callers to provide (compression-only) CPR, which is intended to keep the patient's heart and brain alive until an AED arrives on scene.

One of the challenges with improving survival from out-of-hospital cardiac arrest is recognition of the patient who has suffered sudden death in the field, since these patients often have agonal, or gasping respirations. In fact, the presence of such agonal respirations is highly predictive of the patient being in a shockable heart rhythm, which is most associated with survival. Unfortunately, agonal or gasping respirations are easily confused with adequate breathing by callers and call-takers, often resulting in the delay in provision of potentially life-saving CPR instructions.

The LAFD Dispatch Quality Improvement Unit (DQIU) measured the rate of call taker recognition of cardiac arrest in 2012 and found it to be only 32%. In other words, our call takers failed to identify 2 out of every 3 cardiac arrests. Careful analysis determined that this was largely due to the failure of the MPDS Dispatch Software in use at the time to emphasize early recognition of agonal breathing.

One of the major premises of the LAFD TDS was early recognition of cardiac arrest and rapid provision of DA-CPR. The MPDS Software had call takers ask callers if the patient was breathing. Callers would reply in the affirmative when they were with a patient in cardiac arrest because agonal breathing was confused with normal breathing.

All LAFD Dispatchers were trained on TDS with continual emphasis on this key concept. The scripted question that call takers must ask while using LAFD TDS is whether the patient is breathing *normally,* as opposed to whether they are simply breathing. In fact, one of the tenets of the LAFD TDS is called "No-No-Go". If the patient is not awake, cannot be awakened, and is not breathing normally, then call takers must immediately dispatch resources and provide emergency instructions for CPR.

LAFD TDS now boasts a greater than 90% rate of call-taker recognition of cardiac arrests. Provision of DA-CPR has increased from 43% under MPDS in 2014 to 57% under TDS in 2015, which was statistically significant. In addition, emergency resources were dispatched 20 seconds faster (76 sec vs. 56 sec), which is a relative decrease of 20%. Time to provision of DA-CPR was 50 sec faster (232 sec vs. 182 sec), both of which were statistically significant.

Given the diversity of the population in Los Angeles, we also examined the prevalence of provision of DA-CPR to limited English proficiency (LEP) callers. The rate of DA-CPR to LEP callers under MPDS was only 28%, while it was 69% using LAFD TDS, resulting in life-saving CPR instructions given to the majority of 911 callers regardless of their English proficiency.

3. Quality Improvement

The LAFD has a robust QI program in place for its dispatch system. The Dispatch Quality Improvement Unit (DQIU) reviews all field-confirmed cardiac arrests, does random reviews of all dispatchers, and conducts focused reviews of dispatchers noted to not be performing above a certain level. Non-punitive, education based feedback and ongoing dispatcher training is provided by DQIU and by our Dispatch Manager to

ensure that the LAFD continues to provide the highest quality dispatch system, which is the foundation of our emergency response system.

4. Dispatch system impact on operational efficiency

An important component of the impact of any dispatch system is its ability to send the right resources. If advanced life support (ALS) resources are sent to calls that only require basic life support (BLS), this over-triage can tie up scarce ALS resources unnecessarily, resulting in delays of paramedics to time-critical patients. The converse, sending only BLS resources to ALS patients, can adversely impact patient care. The rate of over-triage using MPDS (first three quarters of 2014) was 40%, while the rate of over-triage using LAFD TDS (first three quarters of 2015) was only 34%. The rate of critical under-triage using MPDS was 0.2%, while under TDS it decreased to 0.1%.

Since TDS was implemented, several major algorithm changes have been implemented. These algorithm refinements try to only send the fewest, most appropriate resources to an incident. This is particularly critical as the LAFD EMS call load has seen unprecedented increases over the past two years.

When the LAFD was using MPDS in the first three quarters of 2014 we dispatched 512,180 resources to 271,710 incidents, which was 1.89 resources/incident. During the first three quarters of 2015, using TDS, the LAFD dispatched 515,083 resources to 291,800 incidents, which was 1.77 resources/incident. While the EMS call load increased by 7.4% during this time, the number of dispatched resources only increased by 0.6%. *In other words, had TDS, along with the new dispatch algorithms, not been implemented, the LAFD would have dispatched an additional 36,419 resources during the first three quarters of 2015.* This is a remarkable statistic which underscores the success of TDS in terms of operational efficiency.

FISCAL IMPACT
The LAFD TDS was implemented in a cost-neutral fashion. The budget that was originally intended to pay for the license for MPDS software and to upgrade the MPDS platform was used to form the workgroup to develop TDS.

CONCLUSION
The LAFD Tiered Dispatch System has been extremely successful. It has empowered our dispatchers to process time-critical 911 calls faster, significantly improved the rate of recognition of cardiac arrest and the provision of dispatcher-assisted CPR, and greatly improved operational efficiency. Ongoing efforts continue to improve and refine its impact on our community and our resources.

Board Report prepared by Marc Eckstein, MD, MPH, Medical Director, Commander, Emergency Medical Services Bureau.