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Triage by Emergency Medical Dispatchers

Introduction

Emergency medical services (EMS) systems throughout the industrialized world have adopted method of predispatch screening of emergency aid calls in order that highly trained personnel on advanced life support (ALS) units are used for true emergencies and remain available for further advanced medical emergency calls (1-9). Tiered emergency medical dispatch is a system of rapid telephone assessment by trained and medically controlled emergency dispatchers who use their assessment to direct the appropriate EMS response units to the emergency situation (7-9).

In urban areas of the United States, it has been estimated that up to 30% of requests for emergency medical ambulance aid are for non-emergency conditions (10). Generalized "lights-and-sirens" responses by EMS units to *all* medical aid calls places both the public and respondents at risk as units speed through crowded streets (11-12). Furthermore, use of advanced emergency services for trivial problems overtaxed emergency prehospital response teams and demoralizes members of response units that are trained to manage true emergencies (2).

There are number of reasons for public misuse of EMS resources, including lack of accessible primary care, need for transportation, and lack of knowledge of what constitutes a true medical emergency (10).

Emergency medical dispatchers are responsible for management of telephone calls coming to the EMS system from the public. Clawson and Dernocoeur have separated the dispatcher's task of acting on incoming medical aid calls into distinct segment which include: initial telephone input; triage; radio dispatch; logistics coordination; resource networking; and life-saving by administration of telephone instructions (13). The ability of emergency dispatchers to give medical instructions (including for cardiopulmonary resuscitation) by telephone has been described (14-18). In 1985, Slovis et al showed that dispatchers using a newly implemented priority dispatch system could shorten average response times from 14.2 minutes to 10.4 minutes for 30% of patients deemed most urgent (2). In the same study, it was noted that, because of dispatch error, 0.3% of calls were dispatched as least severe but subsequently were found to be of the most urgent medical nature (2). Recently, published abstracts seem to support the observation that an emergency dispatcher can sort ALS calls with "acceptable" accuracy (19-21).

This study attempts to answer the question of the accuracy of pre-dispatch triage of EMS resources by medically trained and controlled emergency dispatchers working in an urban EMS system.

Methods

The setting for this study was Long Beach, California, a multi-ethnic, densely populated area of urban Los Angeles County with a population of 429,433. The Long Beach EMS system, at the time of this investigation, was a two-tier system with all EMS dispatching resulting in a full ALS response and calls considered non-emergency (approximately 8%) referred to non-EMS resources.

Prehospital medical care in Long Beach is delivered by the Long Beach Fire Department, which at the time of this study (June, 1987) employed fifteen civilian dispatchers with a computer-based 9-1-1 emergency call system. The dispatchers were responsible only to the fire department dispatch center. An average of 97 daily medical aid calls were handled by the Long Beach Fire Alarm Office. The basic life support (BLS) dispatch-to-scene time was 3.4+/-1.5 minutes and average ALS dispatch-to-scene time was 3.4+/-1.8 minutes. During the study, seven Long Beach Fire Department ALS paramedic units responded to all EMS 9-1-1 calls. One base-hospital provided medical control and was contacted by radio for field orders except in those situations requiring urgent endotracheal intubation or defibrillation.

Prior to and during this study, dispatchers were allowed to arrange alternate transportation, without a formal EMS response, when a call was determined to be a non-emergency. Before the study, the formal dispatch triage criteria were used to make determination of a non-emergency response.

To educate dispatchers in emergency medical dispatch techniques, the Long Beach EMS Medical Director, Base-Hospital Medical Director, and Prehospital Care Coordinator (paramedic liaison nurse) were trained as emergency medical dispatch instructors through the Emergency Medical Dispatch Training Program developed by Clawson (22). This training program for dispatchers consisted of 25 hours of instruction in the use of 32 system-based protocols designed to elicit telephone information rapidly to make a decision on dispatch priority. The Emergency Medical Dispatcher Program (EMDP) includes prearrival instructions by the dispatcher to the caller. This instruction was included for dispatchers, but the study focused on the success of dispatching appropriate units to the emergency scene.

Using the EMDP, callers are entered into a specific protocol after answering standard questions that establish location and callback information as well as determination of chief complaint, age, level of consciousness, and breathing of the victim. In any situation in which the victim is not breathing or the state of consciousness and breathing not verified, a maximum EMS response is dispatched (22).

Using the Clawson Medical Priority Dispatch System, a four-tier plan was selected for this study (Table 1) (22). A conservative approach to dispatcher triage was stressed to minimize under-triage. If doubt existed as to level of priority, the dispatcher was instructed to go to the higher level of response.

After all dispatchers were trained by the formal Emergency Medical Dispatcher Program, they used a flip-card file protocol system for each incoming call to help make a determination of which one of the four dispatch categories would be most appropriate for the EMS response. Each incoming call received a dispatch priority by the dispatcher, and this priority was recorded on a standard form which was kept with run documentation. As a backup, each call was audio-taped for review by medical control. During the study, actual field patient management was provided by the single ALS response system. Since patient field care was unchanged, the study did not require review by a committee on human experimentation.

Using consecutive calls, EMS response records were matched to the dispatch priority assigned during the run and were reviewed for appropriateness of the dispatch priority assigned by the dispatcher to the run (Table 1). For example, if a run was assigned level "Alpha" (full ALS response) and ALS intervention was required in the actual field setting, it was determined that the level of dispatch was

"appropriate."

Determination of the level of EMS intervention required in the field was based on predefined criteria. In Los Angeles County, prehospital runs requiring ALS evaluation were identified in local EMS policies and procedures (Table 2) (23). Further, in California, procedures for paramedics and BLS personnel were defined under the State Health and Safety Code (24). These criteria were used to define an ALS run for purposes of this study. The BLS level dispatches were separated into two categories. The BLS "Bravo" category included runs that possibly would require ALS upgrade after arrival of a BLS unit at the scene and evaluation of the patient, and BLS "Charlie" category runs were those with a low probability for need of ALS upgrade. "Non-emergency" runs did not require direct EMS intervention by either ALS or BLS personnel.

Dispatch priorities were matched to all runs and appropriateness of triage determined by considering the level of care actually required. Patient hospital records were reviewed when question existed as to level of care required in the field and by patient condition. Audio tapes of calls were reviewed on all runs that were dispatched for less than the level of care actually required in the field setting. Outcome information for runs rated as non-emergency and not receiving an EMS response was obtained by telephone call-back and interview of the patient or a family member.

Individual dispatchers were assigned confidential identification numbers for coding data during the study, and the physician reviewing dispatches and runs was blinded as to the dispatcher making the triage decision. When an audio tape review was required, the identity of the dispatcher became apparent. This did not affect objectivity or blinding of the study because at the time of audio tape review, the appropriateness of the dispatch decision already had been determined. Dispatchers also were blinded as to the results of their individual triage decisions. Although the dispatcher could monitor radio communication between the paramedic unit and the base-hospital, and determine the severity of the condition of the patient in the field, their dispatch triage decision already had been made and recorded before the radio communications took place. The on-duty alarm office supervisor was responsible for ensuring that data were recorded appropriately and accurately.

Data were analyzed for percent of total calls sorted into each category. The percent of ALS runs actually occurring in each sorted category was determined and standard deviations as well as 95% confidence intervals calculated using a statistical software program (Solo Statistical System, version 3.0, distributed by BMDP Statistical Software, Inc., Los Angeles, California). Using the need for ALS field intervention as an ordinal variable of interest within the four unmatched triage groups, a Kruskal-Wallis Test was used to compare the triage groups.

Results

A total of 1,080 (82.4%) of 1,312 consecutive original calls reviewed actually resulted in patient care. Of the original calls, 188 (14.3%) were false alarms, and 44 (3.4%) refused medical evaluation either in the field or at the receiving hospital. Of the 1,080 runs with patient evaluation, 35 (3.2%) were not included in the study. Of these 35 calls, nine were excluded due to caller panic or a third party caller with insufficient information for triage, and in 10 of the calls, language barriers resulted in inadequate communication by telephone. Language incompatibility is not uncommon in the Long Beach area where the predominant non-English languages are Spanish, Cambodian, Laotian, and Vietnamese. Seven of the consecutive calls could not be used in the study because the dispatcher failed to follow study criteria for the use of the triage protocols. Four calls were excluded because complete medical documentation was not available, and five non-emergency triage cases could not be reviewed because call-back telephone numbers and addresses were public business or pay telephones. Therefore, a final total of 1,045 (96.8%) of the 1.080 patient evaluation calls were included in the study.

Table 3 is a summary of the data. Of the 777 ALS-dispatched runs, 65.3% were found to meet criteria for ALS field assessment or intervention. The frequency of use of selected ALS skills was (some

patients received more that one skill intervention) venous access 37%, medication administration 25%, cardiac monitor 33%, and endotracheal intubation 2%. These skills were used in 45.7% of the ALS-dispatched runs.

None of the non-emergency calls that underwent triage were found to meet requirements for field ALS intervention. If all runs sorted as BLS or non-emergency are considered, the under-triage rate for runs requiring ALS intervention was 3.4% (9 of 268). The overall under-triage rate for ALS intervention, considering total runs, was 0.9% (9 of 1,045). Those BLS triage calls that required an ALS level of care are listed in Table 4. Review of under-triage cases indicated that all were adult patients, and five of the nine total cases presented with an altered level of consciousness.

To test each triage category group for significance as a separate population, the individual group means of runs determined to meet criteria for ALS intervention were used as the variable tested and using the Kruskal-Wallis Test, the groups were found to be significantly different ($p < .001$).

Discussion

In this study, dispatchers were able to establish priorities for medical aid calls into four response categories with acceptable under-triage rates for runs requiring ALS intervention and high selectivity for non-emergency runs. The 74.4% ALS triage rate was greater than expected, and probably reflected the conservative nature of the training which the dispatchers received. The philosophy of erring more toward over-triage was intended to limit risk of delay in providing paramedic service when an urgent ALS situation presented.

Tape and run review of a patient with a stab wound to the abdomen sorted as Category BRAVO (Table 4) revealed that the call was represented to the dispatcher by a third-party caller as a woman with superficial facial injuries. Significant trauma was not reported despite the dispatcher using appropriate gathering technique. Complicating the triage, was a caller that probably was intoxicated. A point that can be sorted as only needing BLS care will require ALS intervention (3.4% in this study). This problem can be managed by having a system of ALS upgrade or backup for calls sorted as non-ALS. This would allow BLS personnel to summon an ALS unit after their arrival and evaluation of the emergency situation. For upgrade systems to be effective, BLS providers must recognize those situations that require ALS intervention. The assessment capabilities of BLS providers in the multiple-tier EMS setting, is an area that needs further study and evaluation.

A limitation of this study is the number of runs that were dispatched, but turned out to be false alarms (188), or patients who refused treatment (44). Although false alarms and patients refusing treatment are a reality in any EMS system, these types of runs accounted for 17.7% of the original consecutive calls evaluated. Because of the design of this study, it is not known if these calls had an effect on the validity of final conclusions.

Dispatchers in this study were responsible only (dedicated) to the Fire Department. The importance of dedicated versus non-dedicated dispatchers for EMS has been pointed out previously (25). A dispatch alarm office that is responsible to the primary EMS service provider should facilitate implementation of close medical control and continuous quality improvement programs In this study, five runs that were sorted as needing only BLS intervention actually required ALS intervention because of altered level of consciousness. With this realization, helping dispatcher better recognize altered level of consciousness through their telephone interview process could decrease the ALS under-triage rate significantly.

All dispatchers in this study were civilian employees of the Long Beach Fire Department. Although all of them had been introduced to basic emergency medical technician material, none had formal medical or paramedic training. When reviewing data from this study, it is important to realize that

these dispatchers were making medical triage decisions within seconds.

The priority for an EMS system is the delivery of rapid and effective prehospital care to the community. There is potential for more cost-effect urban EMS services when a multi-tier dispatch system that is safe and proven is used. Within the EMS system that was the subject of this investigation, it is estimated that during the time of this study, an average ALS "lights-and-siren" response cost was approximately [US] $145 more than a routine BLS response. During the year in which the study was conducted, 32,669 EMS medical aid calls resulted in dispatch of EMS units. The BLS as well as the ALS units responded to all of these runs. Considering results of this study, 18% of these runs could have been managed by BLS units only, could have saved the system approximately $853,000 annually. Furthermore, these BLS responses did not require a lights-and-siren response which would provide safer delivery of EMS services (11,12).

Conclusion

Emergency medical dispatchers, medically controlled and trained in a nationally recognized dispatcher triage system, were able to provide medical triage to incoming emergency medical 9-1-1 calls with minimal error for under-triage of ALS runs and high selectivity for non-emergency situations.

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Editorial Comment

Steven J. Rottman, MD, UCLA Hospitals and Clinics, Los Angeles, Calif., USA-There have been many papers written about the training of EMS dispatchers and the cost-effective, safe, and clinically appropriate use of first response personnel. Indeed, in his paper published here, Dr. Stratton has cited a great many of them. The issue does not appear to be whether or not dispatchers can be trained to screen incoming information and assign specific levels of EMS response personnel and equipment according to protocols based on that information. Instead, Dr. Stratton asks a very real clinical question: Does the level of response that the dispatchers decided to send on an EMS call correlate with the level of response judged necessary by the EMS personnel who actually arrived to care for the patient?

At first glance, the data reported here seem to indicate that dispatchers can, in fact, screen caller information and send the right EMS response to the right person. For example, of the 777 ALS-dispatched call, 507 (65%) met criteria for ALS-level care, when ALS care was measured by the use of such interventions as venous access, administration of medications, cardiac monitoring, and endotracheal intubation. But, the author reports that only 232 (45.7%) of these 507 ALS patients received one or more of these four interventions. What, then, constituted a justified ALS response to the remaining 275 patients who met criteria for ALS care? It would be interesting to know what the EMS team found on these patients which apparently confirmed their belief that they qualified for ALS-level care, but which nonetheless excluded them from receiving any typical ALS treatments. In addition, nearly one-third (270) of the cases that the dispatchers felt were ALS calls, did not, according to field records, need ALS intervention. With these two factors in mind, one reasonably could wonder whether the dispatcher criteria for an ALS dispatch could be tightened up significantly, since a total of 545 patients (275 + 270) either failed to convince field personnel that they merited an ALS response, or if they did, failed to receive the interventions which characterized ALS-level care.

We tread on dangerous ground when we use triage to determine the appropriate level of field care to an EMS patient, based on information which is reported to the dispatcher by a witness. There is a large body of literature on the perception of eye-witnesses, which indicates that there is an extraordinary amount of variability in how accurately the same event is reported by different

observers. In EMS dispatching, the difficulties are compounded by the fact that the witness often is involved personally with the victim, and hence, not optimally objective, the condition of the victim often is critical (at least for ALS calls), and other factors such as panic, language barriers, or insufficient information (as mentioned on Dr. Stratton's paper) come into play.

While I absolutely agree that we must strive to ensure proper utilization of our talented but limited EMS resources, Dr. Stratton's work illustrates how difficult it is for dispatchers to fine-tune lay information in their ALS responses. While a one-third over-dispatch for ALS personnel might seem to great, I would urge EMS systems not to make their criteria too stringent. In these uncontrolled, often unreliable field situations, the ALS safety net should be substantial enough to snare the great bulk of our patients who are falling.