

Research in EMS Dispatch

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Comparison of the Medical Priority Dispatch System to an Out-of-hospital Patient Acuity Score

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Abstract

Background: Although the Medical Priority Dispatch System (MPDS) is widely used by emergency medical services (EMS) dispatchers to determine dispatch priority, there is little evidence that it reflects patient acuity. The Canadian Triage and Acuity Scale (CTAS) is a standard patient acuity scale widely used by Canadian emergency departments and EMS systems to prioritize patient care requirements.

Objectives: To determine the relationship between MPDS dispatch priority and out-of-hospital CTAS.

Methods: All emergency calls on a large urban EMS communications database for a one-year period were obtained. Duplicate calls, non-emergency transfers, and canceled calls were excluded. Sensitivity and specificity to detect high-acuity illness, as well as positive predictive value (PPV) and negative predictive value (NPV), were calculated for all protocols.

Results: Of 157,882 calls, 102,582 met inclusion criteria. The overall sensitivity of MPDS was 68.2% (95% confidence interval [CI] = 67.8% to 68.5%), with a specificity of 66.2% (95% CI = 65.7% to 66.7%). The most sensitive protocol for detecting high acuity of illness was the breathing-problem protocol, with a sensitivity of 100.0% (95% CI = 99.9% to 100.0%), whereas the most specific protocol was the one for psychiatric problems, with a specificity of 98.1% (95% CI = 97.5% to 98.7%). The cardiac-arrest protocol had the highest PPV (82.6%, 95% CI = 80.3% to 84.3%), whereas the convulsions protocol had the highest NPV (85.9%, 95% CI = 84.5% to 87.2%). The best-performing protocol overall was the cardiac-arrest protocol, and the protocol with the overall poorest performance was the one for unknown problems. Sixteen of the 32 protocols performed no better than chance alone at identifying high-acuity patients.

Conclusions: The Medical Priority Dispatch System exhibits at least moderate sensitivity and specificity for detecting high acuity of illness or injury. This performance analysis may be used to identify target protocols for future improvements.

ACADEMIC EMERGENCY MEDICINE 2006; 13:954-960 © 2006 by the Society for Academic Emergency Medicine

Keywords: emergency medical services, emergency medical service communication systems, triage

The Medical Priority Dispatch System (MPDS, Priority Dispatch Corporation, Version 11.1, Salt Lake City, UT) consists of 33 protocols that are widely used by more than 2,300 emergency medical services (EMS) agencies (Greg Scott, Priority Dispatch

Corporation, personal communication, 2005) to interrogate 9-1-1 callers, provide prearrival instructions, determine incident priority, and assign appropriate resources to the call. However, a recent systematic review found that there was very little high-quality literature on criteria-based dispatch protocols. Only two articles in this review concluded that dispatch protocols improved patient outcome (in one case, by increasing rates of bystander cardiopulmonary resuscitation).^{1,2} Although MPDS has been reported to decrease advanced life support (ALS) ambulance utilization,³ it is unclear whether scripted interrogation protocols can accurately identify acuity of illness or injury.^{4,5} A recent conference on development of the need to define medical necessity in EMS highlighted the need to develop outcome-based benchmarks for dispatch protocols.⁶

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Received January 4, 2006; revision received April 6, 2006; accepted April 10, 2006.

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MPDS Priority	Responder Type and Target Response Time
Echo	Mandatory Advanced Life Support (ALS) response, firefighter tiered response; 8 min, 59 s
Delta	ALS response if possible, tiered response, 8:59
Charlie	ALS response if possible, 8:59
Bravo	BLS response, 10:59
Alpha	BLS response, 20:59

Canadian Triage and Acuity Scale (CTAS) Level Definitions

Time to Physician Assessment by CTAS Level	Definition
1: Immediate	Resuscitation Conditions that are threats to life or limb (or imminent risk of deterioration) requiring immediate aggressive interventions.
2: ≤ 15 min	Emergent Conditions that are a potential threat to life, limb, or function, requiring rapid medical intervention or delegated acts.
3: ≤ 30 min	Urgent Conditions that could potentially progress to a serious problem requiring emergency intervention. May be associated with significant discomfort or affecting ability to function at work or activities of daily living.
4: ≤ 1 hr	Less urgent (Semiurgent) Conditions that related to patient age, distress, or potential for deterioration or complications that would benefit from intervention or reassurance within 1–2 hrs.
5: ≤ 2 hrs	Nonurgent Conditions that may be acute but nonurgent, as well as conditions that may be part of a chronic problem, with or without evidence of deterioration. The investigation or interventions for some of these illnesses or injuries could be delayed or even referred to other areas of the hospital or health care system.

Adapted from Beveridge R, Clarke B, Janes L, et al. Implementation Guidelines for the Canadian ED Triage & Acuity Scale (CTAS). Available at: <http://www.caep.ca/002.policies/002-02.CTAS/CTAS-guidelines.htm>. Accessed Oct 18, 2004.

		CTAS				
		1	2	3	4	5
MPDS	Echo	True Positives			False Positives	
	Delta					
	Charlie					
	Bravo	False Negatives			True Negatives	
	Alpha					

Conclusion

Conclusion: The Medical Priority Dispatch System exhibits at least moderate sensitivity and specificity for detecting high acuity of illness or injury. This performance analysis may be used to identify target protocols for future improvements.

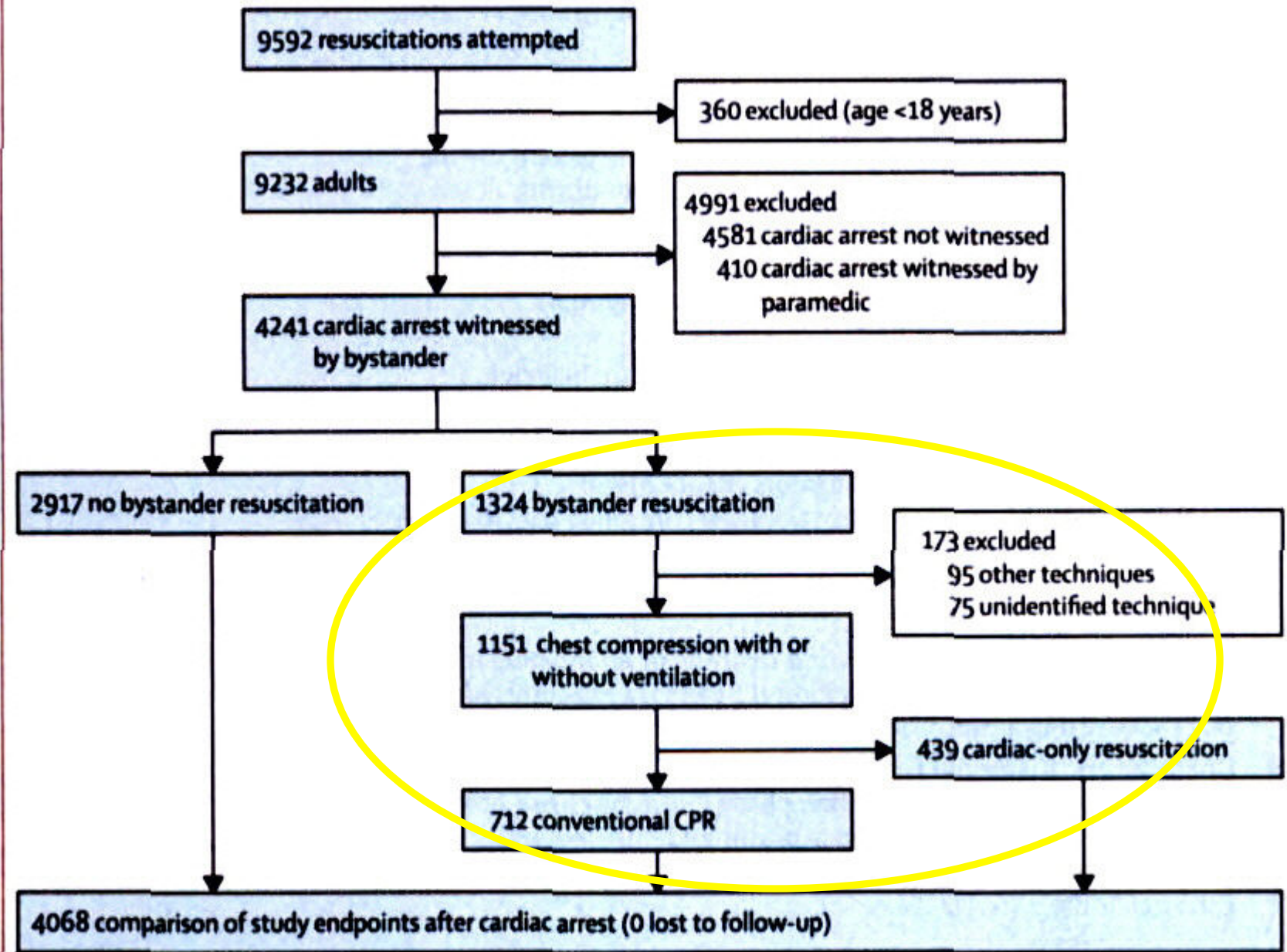
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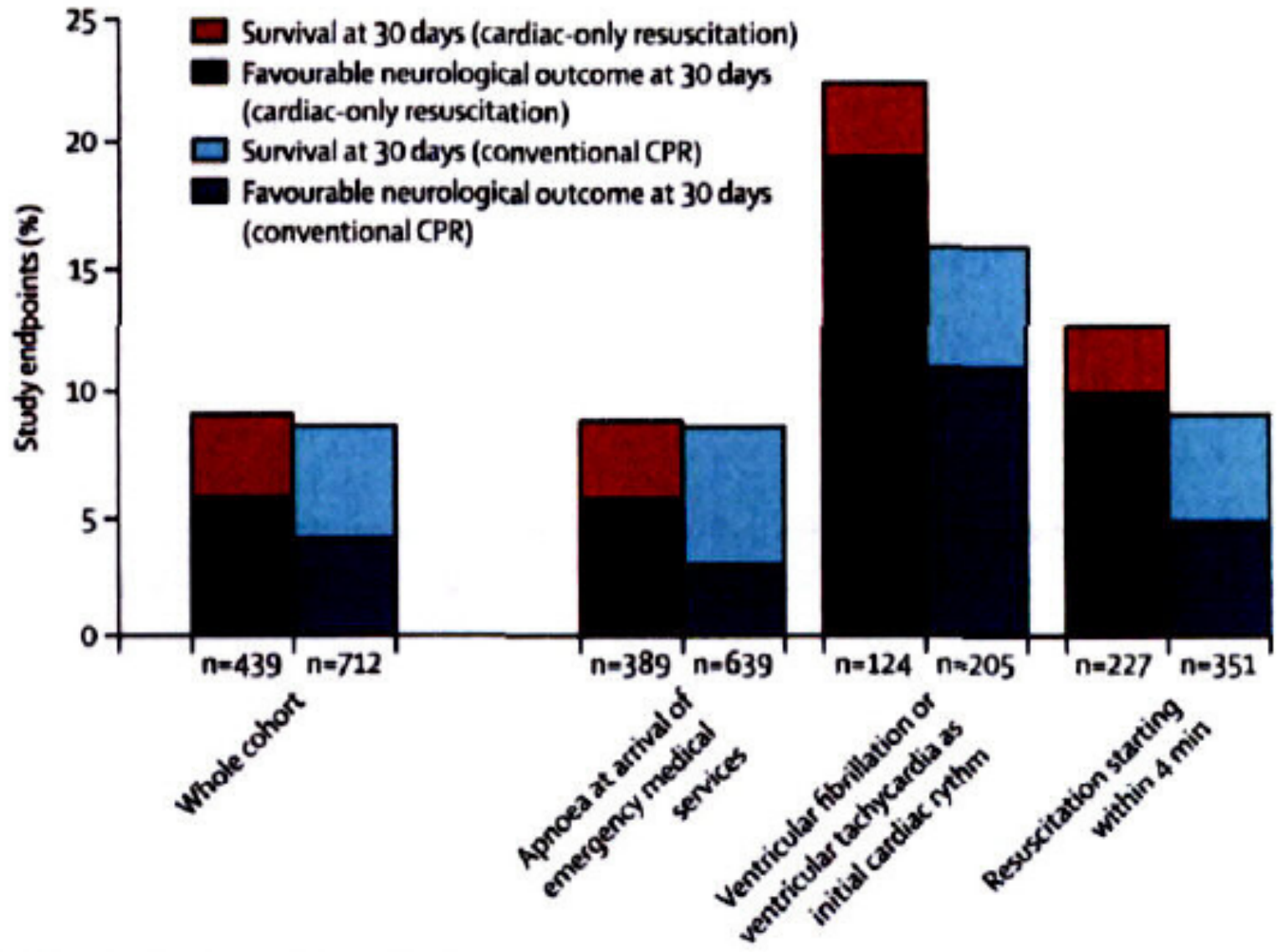
Cardiopulmonary resuscitation by bystanders with chest compression only (SOS-KANTO): an observational study

SOS-KANTO study group

**Ken Nagao; Kimio Kikushima; Tetsuya Sakamoto;
Kazuhide Koseki; et al**

The Lancet; Mar 17-Mar 23, 2007; 369, 9565





Does Emergency Medical Dispatch Priority Predict Delphi Process-Derived Levels of Prehospital Intervention?

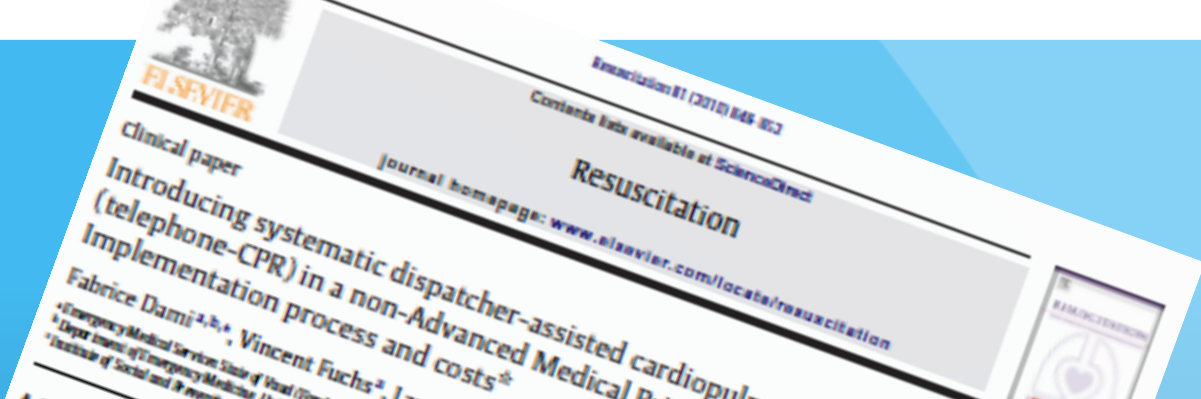
Karl A. Sporer, MD, FACEP, FACP,^{1,2} Alan M. Craig, MSc,³ Nicholas T. Johnson, MD, FACEP,^{1,2} and Clement C. Yeh, MD^{1,2}

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Does Emergency Medical Dispatch Priority Predict Delphi Process-Derived Levels of Prehospital Intervention?

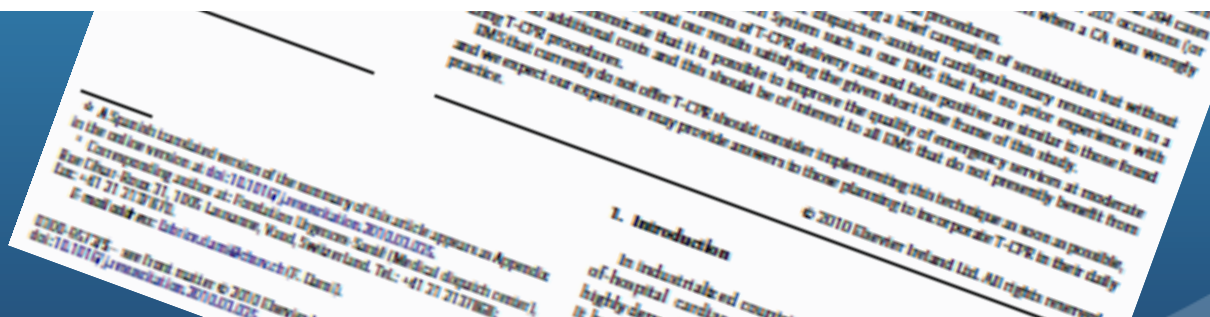
Conclusions: The MPDS is moderately sensitive for the Delphi process derived ALS, ALS-Stat, and ALS-Critical intervention levels, but non-specific. A low MPDS priority is predictive of no prehospital intervention. A high priority, however, is of little predictive value for ALS, ALS-Stat, or ALS-Critical interventions.

Sporer KA, Craig AM, Johnson NJ, Yeh CC: Does Emergency Medical Dispatch priority predict Delphi process-derived levels of prehospital intervention? *Prehosp Disaster Med* 2010;25(4):309–317.



Introducing systematic dispatcher-assisted cardiopulmonary resuscitation (telephone-CPR) in a non-Advanced Medical Priority Dispatch System (AMPDS): Implementation process and costs

Conclusions: This study demonstrates it is possible, using a brief campaign of sensitization but without any specific training, to implement systematic dispatcher-assisted cardiopulmonary resuscitation in a non-Advanced Medical Priority Dispatch System



REASONS 9-1-1 IS CALLED FOR CARDIAC ARREST CASES IN WHICH NO RESUSCITATION IS ATTEMPTED

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PREHOSPITAL EMERGENCY CARE 2009;13:335–340

EVIDENCE-BASED OPTIMIZATION OF URBAN FIREFIGHTER FIRST RESPONSE TO EMERGENCY MEDICAL SERVICES 9-1-1 INCIDENTS

Alan M. Craig, MScPl, P. Richard Verbeek, MD, Brian Schwartz, MD

Conclusion: This model provides a robust generalized methodology allowing EMS systems to optimize FFR lights-and-siren responses to emergency medical calls. Further validation is warranted to assess the model's generality.

PREHOSPITAL EMERGENCY CARE 2010;14:109–117

UTILIZATION OF EMERGENCY MEDICAL SERVICES IN A LARGE URBAN AREA: DESCRIPTION OF CALL TYPES AND TEMPORAL TRENDS

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ABSTRACT

Background. Emergency medical services (EMS) systems are used by the public for a range of medically related problems. **Objective.** To understand and analyze the patterns of EMS utilization and trends over time in a large urban EMS system so that we may better direct efforts toward improving those services. **Methods.** The 63 call type designations from all New York City (NYC) 9-1-1 EMS calls between 1999 and 2007 were obtained and grouped into 10 broad and 30 specific medical categories. Aggregated numbers of total EMS calls and individual categories were divided by NYC resident population estimates to determine utilization rates. Temporal trends were evaluated for statistical significance with Spearman's rho (ρ). **Results.** There were 9,916,904 EMS calls between 1999 and 2007, with an average of 1,101,878 calls/year. Utilization rates increased from 129.5 to 141.9 calls/1,000 residents/year over the study period (average annual rise of 1.16%). Among all medical/surgical call types (excluding trauma), there was an average annual increase of 1.8%/year. The most substantial increases were among "psychiatric/drug related" (+5.6%/year), "generalized illness" (+3.2%/year), and "environmental related" calls (+2.9%/year). The largest decrease was among "respiratory" calls (-1.2%/year), specifically for "asthma" (-5.0%/year). For trauma call types, there was an annual average decrease of 0.4%/year, with the cate-

gory of "violence related" calls having the greatest decline (-3.3%/year). **Conclusion.** There was an increase in overall EMS utilization rates, though not all call types rose uniformly. Rather, a number of significant trends were identified reflecting either changing medical needs or changing patterns of EMS utilization in NYC's population. **Key words:** emergency medical services; public health; epidemiology; trends; population; utilization; urban

PREHOSPITAL EMERGENCY CARE 2011;15:371-380

INTRODUCTION

The 9-1-1 emergency medical services (EMS) system in New York City (NYC) is used by the public for a range of medically related problems. The types and number of calls may reflect the wide range of medical issues in an urban population that result in acute emergencies, as well as how a population utilizes its emergency 9-1-1 system. Using a multiyear database comprising nearly 10 million calls from the NYC 9-1-1 system, we explored whether the number of EMS calls has changed in relation to the size of the population. We also evaluated temporal trends related to specific types of calls to assess whether overall changes in EMS utilization may be attributed to changes in the frequency and distribution of specific medical complaints.



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Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical Paper

How many emergency dispatches occurred per cardiac arrest?☆

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ARTICLE INFO

Article history:

Received 2 February 2010

Received in revised form 12 June 2010

Accepted 17 June 2010

Keywords:

Out-of-hospital cardiac arrest

Ambulances/utilization

Emergencies/classification

Emergency Medical Dispatch

Emergency Medical Service

Communication Systems/Standards

Emergency Medical Services/Standards

Emergency Medical Services/Utilization

Risk assessment

Triage

ABSTRACT

Background: The Medical Priority Dispatch System (MPDS) is an emergency medical dispatch (EMD) system that is widely used to prioritize 9-1-1 calls and optimize resource allocation. Calls are assigned an MPDS determinant, which includes a number (1–32) representing chief complaint and priority (Alpha through Echo) representing acuity.

Objective: This study evaluates the number of emergency dispatches per cardiac arrest (NOD-CA) in cardiac arrest and non-cardiac arrest MPDS determinants.

Methods: All patients assigned a determinant by MPDS from January 1, 2008 to June 30, 2009 in a large metropolitan area were included. Prehospital electronic patient care records were linked with dispatch data. For each MPDS determinant, the number of calls for which the paramedic impression was listed as “Cardiac Arrest – Non-Traumatic” was tabulated. The NOD-CA was calculated for each cardiac arrest and non-cardiac arrest MPDS determinant. Non-MPDS calls with cardiac arrests were analyzed separately.

Results: A total of 101,642 patients were included. Among them, 555 had “Cardiac Arrest – Non-Traumatic” listed as the paramedic impression. The Cardiac/Respiratory Arrest/Death protocol had the highest number of cardiac arrests (285), followed by Breathing Problems (99) and Unconscious/Fainting (76). Overall, 183 dispatched occurred for each cardiac arrest, 131 of which resulted in a lights and sirens response. The NOD-CA was 7 in the Cardiac Arrest/Death protocol, 122 in Breathing Problems, and 104 in Unconscious/Fainting. 31 Cardiac arrests occurred in non-MPDS dispatch categories ($N=62,989$), most of which were calls for medical assistance from police or fire units.

Conclusions: MPDS was designed to detect cardiac arrest with high sensitivity, leading to a significant degree of mistriage. The number of dispatches for each cardiac arrest may be a useful way to quantify the degree of mistriage and optimize EMS dispatch. This large descriptive study revealed a low NOD-CA in most cardiac arrest MPDS determinants. We demonstrated significant variability in the NOD-CA among non-cardiac arrest MPDS determinants, and few cardiac arrests in non-MPDS dispatch categories.

STATEWIDE SURVEY OF 911 COMMUNICATION CENTERS ON ACUTE STROKE AND MYOCARDIAL INFARCTION

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ABSTRACT

Objective. We conducted a statewide survey of communication centers regarding practices, training, and outreach for stroke and myocardial infarction (MI) and explored differences for those that were Emergency Medical Dispatch (EMD) certified or not. **Methods.** A survey was mailed to all 115 centers that dispatched for emergency medical services (EMS) in North Carolina. Seventy-four percent (85/115) returned the survey. **Results.** For 31% of centers, all telecommunicators were EMD-certified, 28% of centers had some personnel certified, and 41% had no personnel certified. Forty-four percent of centers used dispatch guides or algorithms to aid telecommunicators. If telecommunicators suspected a stroke, 47% of the centers provided prearrival instructions and if they suspected an MI, 49% provided prearrival instructions. In the past 2 years, 27% of the telecommunicators received stroke-specific training and 29% received MI-specific training. Stroke or MI training for telecommunicators was more common among the EMD centers (51% stroke; 51% MI) than among the non-EMD centers (5% stroke; 9% MI). Only one center conducted a community outreach program about stroke or MI in the last 6 months. **Conclusions.** Our results suggest that the development of statewide telecommunication training program to improve knowledge and care for suspected stroke or MI is needed in North Carolina. Dispatching for stroke and MI could be enhanced by requiring all communication centers to be EMD-certified and by creating consistent and standard dispatching practices across the state, using triage algorithms. Implementing these changes could improve rapid response and care for acute stroke and MI patients. **Key words:** cerebrovascular accident; myocardial infarction;

emergency medical services; emergency medical service communication systems; ambulances.

PREHOSPITAL EMERGENCY CARE 2007;11:186-191

INTRODUCTION

Timely access to medical care for acute stroke and myocardial infarction (MI) involves several steps: rapid recognition of the problem by the patient or bystander, contact with and access to medical care, rapid identification of the problem as an emergency, transportation to an emergency department, evaluation in the emergency department, and initiation of appropriate treatment.¹ This cascade of events involves a complex interaction between patients, bystanders, emergency response teams, and hospital personnel. A significant delay in any step results in limiting treatment options for patient care. Delays that occur between symptom onset and treatment can be categorized into prehospital and in-hospital components. The prehospital component can be further divided into three phases, according to Becker et al.² The first is the "appraisal delay," the time between recognizing symptoms to deciding that a person is ill. The second is the "illness delay," the time it takes to decide that professional care is required. The third is "utilization delay," the time it takes to arrive at the emergency department once professional care is sought. Failure to use emergency medical services (EMS) may increase the length of this third phase³

ACCURACY OF STROKE RECOGNITION BY EMERGENCY MEDICAL DISPATCHERS AND PARAMEDICS—SAN DIEGO EXPERIENCE

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ABSTRACT

Background. Prehospital personnel in Emergency Medical Service (EMS) systems have varying levels of accuracy in stroke recognition. Identifying the accuracy of emergency medical dispatcher using Medical Priority Dispatch Systems (MPDS) stroke protocol and paramedics may help understand the accuracy of stroke recognition in about 3000 emergency medical dispatch systems and prehospital systems world wide. **Objective.** Our aim was to assess the accuracy of stroke identification in emergency medical dispatchers (EMD) with high compliance to MPDS protocol and paramedics using Cincinnati Prehospital Stroke Scale (CSS). **Methods.** This was a retrospective observational study. Data was acquired from a computer assisted dispatch (CAD) system, a computerized paramedic record database and discharge diagnosis from billing records or stroke registry containing all stroke assessments of patients who presented to the participating study hospitals within 12 hours of symptom onset. We included patients 18 years or older, identified as having stroke by EMD and city agency paramedics. We excluded patients taken to hospitals not participating in the study, patients with a dispatch determinant of Stroke (card 28) not transported by City EMS agency (SDMSE) to participating hospitals, patients in the stroke registry not transported by SDMSE or patients with no final outcome data. A stroke neurologist or hospital discharge diagnosis of stroke (physician diagnosis) was used to determine the sensitivity and predictive values of EMD and paramedic recognition of stroke. **Results.** Of 882 patients with a dispatch determinant of stroke using MPDS Stroke protocol, 367 had a final discharge diagnosis of stroke. This gives a sensitivity of 83% and a positive predictive value of 42% for EMD using MPDS Stroke protocol. Of 477 patients with a paramedic

assessment of stroke using CSS, 193 had a final discharge diagnosis of stroke. This gives a sensitivity of 44% and a PPV of 40% for paramedics using CSS. **Conclusions.** In our EMS system, EMD using MPDS Stroke protocol with a high compliance has a higher sensitivity than paramedics using CSS. **Key words:** cerebrovascular accident; emergency medical services; neurologic manifestations.

PREHOSPITAL EMERGENCY CARE 2008;12:307-313

BACKGROUND AND PURPOSE OF THE STUDY

In this era of thrombolysis and revascularization procedures, management of acute ischemic stroke is a time-critical process.¹ Even though majority of the delays have been attributed to patient access of emergency healthcare, it is important for prehospital and hospital systems to respond quickly and efficiently to improve outcomes for patients with acute stroke.²⁻⁴ In prehospital systems, stroke recognition is achieved by both emergency medical dispatchers (EMD) and field providers.

EMD plays a vital role within emergency medical services (EMS) systems, as they are the first point of medical contact in an emergency response system. Roles of emergency medical dispatchers include recognition of stroke symptoms, assignment of an appropriate ambulance response for each patient and provision of post-dispatch instructions based on individual requirements. It is crucial for them to identify stroke to avoid inappropriate assignment of low acuity code and thereby reduce delays in ambulance re-

FOCUS ON EMS DISPATCH

CAN EMERGENCY MEDICAL DISPATCH CODES PREDICT PREHOSPITAL INTERVENTIONS FOR COMMON 9-1-1 CALL TYPES?

Karl A. Sporer, MD, Nicholas J. Johnson, BA, Clement C. Yeh, MD, Glen M. Youngblood, BA

ABSTRACT

Objective. The Medical Priority Dispatch System is an emergency medical dispatch (EMD) system that is widely used to categorize 9-1-1 calls and optimize resource allocation. This study evaluates the ability of EMD and non-EMD codes (calls not processed by EMD) to predict prehospital use of medications and procedures. **Methods.** All transported prehospital patients placed in an EMD or non-EMD category that exceeded 500 total calls from January 1, 2004, to December 31, 2006, in a suburban California county were matched with their prehospital electronic patient care record. These records ($N = 69,541$) were queried for the following prehospital interventions: basic life support (BLS) care only, intravenous line placement only, medication given, and procedures. Advanced life support (ALS) interventions were defined as the administration of a medication or a procedure. The numbers of medications and procedures that were performed on patients in each EMD code were measured. **Results.** Thirty-one of 141 EMD and non-EMD codes met inclusion criteria and comprised 73% of all calls during the study period. Non-EMD codes accounted for 48% of all calls in this study. Patients with shortness of breath, chest pain, diabetic problems, and altered mental status received the most medications. High rates of medication administration were also seen in the following codes: 17A (fall, 27%), 17B (fall, 14%), EMDX (unable to complete EMD process, 22%), MED (medical aid requested—details to follow, 26%), and MED3 (medical aid requested by police—code 3, 18%). Procedures were performed on only 0.9% of all calls, of which 75% were related to advanced air-

egories, including seizure, laceration/hemorrhage, sick, and traffic accident, but not seen in many categories, including abdominal pain, falls, and chest pain. **Conclusions.** This study demonstrated only a modest ability of the EMD system to predict which patients would require ALS intervention. There were limited differences noted in the ALS rates between the different codes (Alpha, Bravo, etc.) in the same complaint category, bringing into question the utility of the multiple subgroups. Non-EMD codes made up a large portion of calls (48%) and should be included in future studies. **Key words:** emergency medical dispatch; codes; advanced life support; prediction

PREHOSPITAL EMERGENCY CARE 2008;12:470-478

INTRODUCTION

Emergency medical dispatch (EMD) is an internationally utilized system of categorizing 9-1-1 calls into discrete groups or codes in order to send an appropriate ambulance response. Although EMD is widely used to allocate advanced life support (ALS) ambulances and personnel, there have been few studies validating its ability to predict prehospital ALS interventions for all call types. Prior studies in differing emergency medical services (EMS) configurations have used a variety of EMD programs with both health- and non-health-trained dispatchers as well as different clinical measures to gauge success.¹⁻¹¹ Though many of the studies

Why Bystanders Decline Telephone Cardiac Resuscitation Advice

Fabrice Dami, MD, MBA, Pierre-Nicolas Carron, MD, Laurent Praz, MD, Vincent Fuchs, and Bertrand Yersin, MD

Abstract

Objectives: The aim of this study was to evaluate the rate and reason for refusal of telephone-based cardiopulmonary resuscitation (CPR) instruction by bystanders after the implementation of the dispatch center's systematic telephone CPR protocol.

Methods: Over a 15-month period the authors prospectively collected all case records from the emergency medical services (EMS) dispatch center when CPR had been proposed to the bystander calling in and recorded the reason for declining or not performing that the bystander spontaneously mentioned. All pediatric and adult traumatic and nontraumatic cases were included. Situations when resuscitation had been spontaneously initiated by bystanders were excluded.

Results: During the study period, dispatchers proposed CPR on 264 occasions: 232 adult nontraumatic cases, 17 adult traumatic cases, and 15 pediatric (traumatic and nontraumatic) cases. The proposal was accepted in 163 cases (61.7%, 95% confidence interval [CI] = 54.6% to 66.5%), and CPR was eventually performed in 134 cases (51%, 95% CI = 43.2% to 55.3%). In 35 of the cases where resuscitation was not carried out, the condition of the patient or conditions at the scene made this decision medically appropriate. Of the remaining 95 cases, 55 were due to physical limitations of the caller, and 33 were due to emotional distress.

Conclusions: The telephone CPR acceptance rate of 62% in this study is comparable to those of other similar studies. Because bystanders' physical condition is one of the keys to success, the rate may not improve as the population ages.

ACADEMIC EMERGENCY MEDICINE 2010; 17:1012-1015 © 2010 by the Society for Academic Emergency Medicine

Keywords: death, sudden, cardiopulmonary resuscitation, methods, emergency medical service, communication systems

FOCUS ON CARDIAC ARREST

DELAY PRIOR TO CALLING 9-1-1 IS ASSOCIATED WITH INCREASED MORTALITY AFTER OUT-OF-HOSPITAL CARDIAC ARREST

Robert A. Swor, DO, Scott Compton, PhD, Robert Domeier, MD, Nika Harmon, MD, Kevin Chu, MBBS

ABSTRACT

Objective. We sought to characterize the collapse-to-9-1-1 call interval, to evaluate the frequency of pre-9-1-1 delay, and to assess whether delay is associated with decreased survival after out-of-hospital cardiac arrest (OHCA). **Methods.** This was a five-year prospective survey of bystanders to adult OHCA cases in which the victims were transported to seven local teaching hospitals in Michigan. Bystander data were obtained by telephone interview beginning two weeks after the event, and through review of emergency medical services (EMS) documents. Criteria for pre-9-1-1 delay were prospectively developed. Two paramedic reviewers were trained on these criteria and reviewed bystander and EMS data for each cardiac arrest case. Multivariate regression analysis was used to assess the independent impact of delay on survival. We collected common bystander and EMS OHCA demographics, as well as bystander description of events prior to the 9-1-1 call. Outcome was survival to hospital discharge. **Results.** During the study period we identified 1,004 OHCA, for which 779 bystanders completed interviews. Of these interviews, 688 had adequate data for analysis. Raters showed moderate to strong agreement for a 15% subsample of cases. Of all cases, 330 (48%) were identified as having had pre-

9-1-1 delay. Delay was less commonly associated with witnessed arrest (odds ratio [OR] 2.7; 95% confidence interval [CI] 2.0–3.7%) and public location (OR 1.57; 95% CI 1.1–2.2%). In a multivariate model, only initial-rhythm ventricular tachycardia/ventricular fibrillation was associated with improved survival (OR 2.28; 95% CI 1.3–4.1), and pre-9-1-1 delay was associated with decreased survival (OR 0.46; 95% CI 0.3–0.9%). **Conclusion.** This method demonstrated that prehospital delay is common in OHCA and is associated with increased mortality. Measurement of pre-9-1-1 delay may improve precision of predictive models for OHCA survival. **Key words:** heart arrest; outcome; bystander effects; delay.

PREHOSPITAL EMERGENCY CARE 2008;12:333–338

INTRODUCTION

The Chain of Survival paradigm for response to out-of-hospital cardiac arrest (OHCA) proposes four key links to improving survival after OHCA.¹ The Utstein style similarly defines key elements that should be reported for OHCA data, defining the response interval as time from collapse to arrival of the first emergency medical services (EMS) vehicle at the location of the arrest.² Vir-

REASONS 9-1-1 IS CALLED FOR CARDIAC ARREST CASES IN WHICH NO RESUSCITATION IS ATTEMPTED

Hendrika Meischke, PhD, MPH, Devora Chavez, MPH, Sylvia Feder, MA, MICP, Tom Rea, MD, MPH, Tyler Albert, MD, Mickey Eisenberg, MD, PhD

ABSTRACT

Objective. The goal of this investigation was to describe the reasons emergency medical services (EMS) is activated when resuscitation is not desired or when patients show signs of irreversible death. **Methods.** All medical incident report forms (MIRFs) indicating a cardiac arrest for which resuscitation was withheld were obtained from five participating fire departments. For each eligible case ($N = 196$), one of the emergency medical technicians (EMTs) present at the scene was interviewed and the dispatch tape of the 9-1-1 call was reviewed. Patient and caller characteristics were abstracted from the MIRFs and dispatch tapes. The EMTs were asked about the reasons for the call, whether the family expected this death, and the caller's emotional state when EMS arrived at the scene. In addition, EMS providers were asked open-ended questions about the services they provided for the patient and patient's family. Using chi-square statistics and t-tests, we compared two groups: 1) patients for whom resuscitation was not desired as indicated by a do-not-resuscitate (DNR) order, terminal illness, or hospice ($n = 66$) and 2) patients for whom resuscitation was not started because of signs of irreversible death ($n = 130$). **Results.** Compared with callers for patients with signs of irreversible death, callers for patients for whom resuscitation was not desired were less likely to access EMS because they needed medical assistance (11% versus 30%) and more likely to call 9-1-1 because they thought it was "required by law" (30% versus 8%). Other common reasons in both groups for activating 9-1-1 were confusion regarding what to do and a request to confirm death. The most frequently reported service provided by EMTs for both groups was to "offer to contact a chaplain." **Conclusion.** In a third of patients for whom EMS did not initiate resuscitation, resuscitation was withheld primarily because it was not desired rather than because there was evidence of irreversible death. Efforts to improve education may prevent EMS activation in these cases. An alternative EMS response could also help ensure patient au-

tonomy and decrease costs to the EMS system. **Key words:** end-of-life; EMS; resuscitation; calls; 9-1-1

PREHOSPITAL EMERGENCY CARE 2009;13:335-340

INTRODUCTION

A sizable number of patients in cardiac arrest for whom emergency medical services (EMS) are called do not have resuscitation performed¹—either because signs of irreversible death are present or because the patient has expressed wishes not to be resuscitated. Calls to 9-1-1 in such circumstances may inappropriately use EMS resources or lead to unwanted interventions.² Little is known about the reasons for EMS activation in these circumstances. Why do family members call 9-1-1 when a loved one wishes to die without medical intervention? Are families unsure about whether death has occurred, or are they unsure about how to report a death? The reasons families call 9-1-1 for a death where resuscitation is not desired, especially when this occurs in private residences, are not well understood. A better understanding of these issues might help improve care for patients at the end of life and their families, as well as ensure more appropriate use of EMS resources. The goals of this investigation are to describe the reasons EMS is activated when resuscitation is not performed and to assess differences between events in which family members call 9-1-1 but do not want resuscitative efforts and events in which EMS providers do not start resuscitation because of signs of irreversible death, typically the presence of lividity and rigor mortis. Characterizing the nature of these calls may help us understand how to better serve families during end-of-life events and how to