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DELAYS IN THE EMERGENCY DEPARTMENT
AND THEIR EFFECTS ON THE AMBULANCE PROVIDER

A Thesis
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
in
Health Services Administration

by
Simon Peter Moore
December 2002

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Approved by:


Dr. Joseph Lovett, Chair

09/04/02
Date


Dr. Dan Fahey, CSUSB Faculty


Mesrak Gessesse, Committee Designee

ABSTRACT

Over the years, ambulance delays in hospital emergency departments have steadily become an increasing problem for the pre-hospital care provider, or emergency medical services (EMS). When an ambulance crew is forced to wait in the hall of the emergency department (ED) with a patient because there are no beds available for the patient, that ambulance is not available to cover their area for other 911 emergency responses. While other ambulances cover the area, if they transport to the hospital that is closed due to ED saturation, they too wait for beds to become available. There are times when multiple ambulances are waiting in the ED for a bed for their patient. When mixed with decreased ambulance resources in an area, traffic congestion and distance from a 911 call, the delays compound into larger complications in delivering emergency care to the sick and injured. Even when the ambulance clears from the hospital, their response time to a call in or out of their area is delayed. Through a case study of ED delays in a middle-size urban area of North Los Angeles County, this thesis addresses problems associated with delays in the ED. This seven month retrospective study reviews delay times and types from raw data extracted from

the computer automated dispatching (CAD) system to determine their true significance. Of 13,927 transports, 2058 were delayed (14.8%). Average delay time was 35 minutes for the seven month period (Range 11-109 min.), with 905 delays >30 min., 183 delays >1 hour. The information gained from tracking this data will serve as a tool for determining peak times, total daily ambulance deployment and possible ED - EMS provider partnering.

TABLE OF CONTENTS

ABSTRACT	iii
LIST OF TABLES	viii
LIST OF FIGURES	x
CHAPTER ONE: EMERGENCY DEPARTMENT DELAYS	
Introduction	1
The Nature of Emergency Department Delays	1
Pre-Hospital Care	3
Emergency Medical Services Regulation	3
The Anatomy of an Emergency	5
CHAPTER TWO: DELAYS FROM THE LITERATURE	
Delays as Normal Operations	8
Waiting Times in New Zealand	10
Sources of Delay	11
Effects on Emergency Department Occupancy and Delays	11
Homeless Patients	13
Patients' Ability to Pay	14
High Occupancy in the Emergency Department ..	15
Frequent Users of the Emergency Department ..	19
Nursing Staff Shortages	20
Delays Business as Usual	23

The Emergency Department as a Usual Source of Care	24
High Hospital Occupancy Rates	24
Other Hospitals are Saturated	28
Notification Times	29
Patient Abuse of 911 System	31
Triage	33
Effects on the Ambulance Provider	34
Ambulance Out-of-Service	35
Structure of Emergency Services	36
Attempted Solutions	38
Add More Emergency Department Beds	39
Put More Ambulances on the Road	39
Early Notification of Saturation	41
Patient Education	43
CHAPTER THREE: ANALYSIS OF ANTELOPE VALLEY	
Description of Antelope Valley	47
Data Sources and Definitions	50
Collection Period and Scope	52
Results	54
Daily Delays	54
Delays as a Percent of Transports	55
Lengths of Delay	55

Delays by Month	56
Average Time of Delays per Month	61
Delays by Time of Day	71
Delays by Hospital	74
CHAPTER FOUR: AN EVALUATION OF NORTH LOS ANGELES COUNTY	
Challenges to the Study	77
Hospital Responsibility	77
Hospital Versus Pre-Hospital	79
Reluctance to Address Problem	81
Personality Conflicts	82
Public Versus Private Agencies	83
Data Collection and Analysis	85
Acceptable Definitions	86
CHAPTER FIVE: A PLAN OF ACTION FOR REDUCING DELAYS	
Ambulance Diversions	89
Controlling Supply and Demand	89
Emergency Department User Education	90
Future Research Needed	92
Proposed Solutions	92
BIBLIOGRAPHY	98

LIST OF TABLES

Table 1.	Types of Delays and Probable Causes	12
Table 2.	Patient Reasons for Emergency Room Visits, 1998	17
Table 3.	Reported Delays in the Emergency Room	18
Table 4.	Systems of Response	37
Table 5.	Hospital Profiles	49
Table 6.	Total Delays per Day, Total Daily Delay Time and Mean Daily Delay Time	54
Table 7.	Average Length of Delays	55
Table 8.	Monthly Delays and Delay Length	57
Table 9.	Means, Standard Deviations, Minimums and Maximums of Minutes of Delay per Month	62
Table 10.	Percent of Delays with Paramedic Follow up, Total 911 Calls and Percent of Transports Delayed by Month	64
Table 11.	Percentages of Cases Delayed by Month	65
Table 12.	Total Minutes of Delays, Minimums, Maximums, Means, and Standard Deviations by Day of Week	69
Table 13.	Frequency Distribution, Percentages, and Cumulative Percentages of Delays by Arrival Hours	73
Table 14.	Number of Delays, Number of Transports, and Percent of Transports Delayed by Hospital ...	75
Table 15.	Total Minutes of Delay, Percent of all Minutes, Means, Standard Deviations, Minimums and Maximums by Hospital	75

Table 16. Percentages of Delays Less Than or Equal to Thirty Minutes and Greater than Thirty Minutes by Hospital	76
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LIST OF FIGURES

Figure 1.	Count of Delays by Month Incurred	59
Figure 2.	Total Minutes of Delay by Month	60
Figure 3.	Mean Delay Times and 95% Confidence Intervals by Month	63
Figure 4.	Count of Delays by Day of Week	67
Figure 5.	Means and 95% Confidence Intervals for Minutes of Delays by Day of Week	68
Figure 6.	Means and 95% Confidence Intervals for Delay Times by Time of Arrival at Emergency Department	72

CHAPTER ONE

EMERGENCY DEPARTMENT DELAYS

Introduction

The problem of delays in treatment of emergency room patients and the consequent shortages of available ambulances has begun to attract the attention of the popular press and of local policy makers. This thesis is a case analysis of the nature of delays in emergency room admissions and the effects on ambulance dispatching and availability as it occurred in one Southern California community.

The Nature of Emergency Department Delays

The emergency department (ED) of any hospital is the entry point for admission to the hospital or exit point for transfer to another hospital. The emergency department screens patients who need medical attention and, when necessary, stabilizes them for transfer to another facility.

Walk-ins, referrals and ambulance transports are the methods of entry into the emergency department for most patients. Each patient who enters the emergency department

for service is considered to occupy an emergency bed once medical evaluation begins.

Some patients who use emergency department services are subsequently admitted to the hospital on an inpatient basis. Admitted patients contribute to a shortage of beds for the hospital.

There are times when all of the available beds in a hospital are occupied, leaving a caregiver with literally no bed in which to place a new patient

A shortage of beds has become one of the most significant issues facing hospital staff and emergency medical services (EMS). When EMS resources cannot leave the emergency department because there is no available hospital bed for their patient, they are not able to respond to other emergencies. When there are no other ambulances available in the area to respond to the emergency call, emergency department delays directly contribute to a potentially increased response time for the responding ambulance, delaying care for another patient.

Patients who cannot wait for walk-in evaluation in an emergency department may access emergency medical services via 911 systems. Ultimately, the entire pre-hospital care

system may have its efficiency and effectiveness compromised.

Pre-Hospital Care

A system of medical professionals who "extend the arm of the hospital," pre-hospital care brings medical attention to the field setting. Whether the patient uses the EMS system, or enters the emergency department, he occupies a bed while receiving care in the emergency department. Bed unavailability becomes one of the primary reasons for delays in emergency departments.

Emergency Medical Services Regulation

The Emergency Medical Treatment and Active Labor Act (EMTALA) prevents "dumping" of uninsured patients by hospitals with emergency departments. EMTALA ensures that all patients receive emergency medical care regardless of insurance status or ability to pay.

"Emergency medical services are the administration of pre-hospital emergency medical care" (Grant 1991). An EMS program is typically monitored and administered by the county department of health services (DHS). DHS may have a separate agency known as the EMS Agency that oversees

emergency medical services. The DHS or the EMS agency regulates virtually every protocol related to patient care, necessary equipment, assessment procedures and response times.

Any time a hospital has no available beds, The hospital can close due to saturation. While the hospital's exercise of the option to close because it can no longer handle additional patients temporarily solves their problem, ambulances are forced to drive around until they can find a hospital that will accept their patient.

Not having a destination for a patient affects the ambulance provider's ability to meet its contracted responsibilities. The county regulates public safety agencies such as fire departments and public EMS providers. Private EMS providers face an increased threat of losing a contract for failing to meet mandated response times. The government can contract with a private provider, or a public one. If the privates do not render contracted services, the government still must provide the service.

The purpose of this study is to examine the escalating problem of emergency department delays and their impact on a private ambulance provider.

Literature reviewed for this study revealed research gathered primarily from hospital emergency departments' perspectives and little from that of the of ambulance provider. The case study conducted here confirms that, for the provider studied, there is a growing problem of emergency department delays, and that the problem affects the ambulance provider on a regular basis.

The Anatomy of an Emergency

Every ambulance service that participates in a 911 emergency system has a contract with the city or county to provide emergency and non-emergency medical transportation and care for pre-hospital patients. In this contract the provider must adhere to response time standards that define how soon the ambulance must arrive on scene and what percent of the time they must arrive on scene within the time standard.

For example, an ambulance provider may accept a contract that states that they must be on scene of the call with 8 minutes, fifty-nine seconds (0:8:59) ninety percent (90%) of the time. Urban areas meet the 8 minutes, fifty-nine seconds criteria, while rural or sparsely populated areas have a slightly longer contracted response time. A

pre-hospital ambulance provider must meet response time criteria, while the non-transporting entities do not.

If an ambulance provider fails to meet the response time criteria, they risk sanctions by the county, penalties, or the loss of their contract.

Most public safety agencies (fire, police, medical) use a dispatch system called Computer Automated Dispatching, or CAD. CAD systems allow dispatchers to direct appropriate resources to a 911 emergency call. From the time the call is made from the scene of the emergency to the time the responding units clear the scene, information is collected in the CAD. The following is a description of the elements of a 911 call:

1. An emergency (or potential emergency) occurs.
2. A call is made to the 911 number.
3. The call is routed to the local dispatching agency.

This could be the local police or sheriff's department or the fire department, or a contracted multi-agency dispatch center.

4. The dispatcher determines the nature of the call and responds by directing fire, police, and medical, or all of them to the scene.

5. Once the call has been dispatched to the responding units, the "clock starts ticking."
6. The ambulance must be on scene before nine minutes expires. If they are late, it is a point against them. Too many points in a given period of time reduce the response time percentage.
7. If the ambulance transports the patient, they usually go to the closest emergency department.
8. If the ambulance can get in and out of the emergency department, they are available for the next call in their area
9. If they cannot, another unit must cover for them. If other units cover and transport, but are forced to wait in the emergency department, the next 911 call that is made in the area could possibly exceed response time compliance.

It is this risk of compliance failure that jeopardizes a company's contract status and increases the potential for a patient's 911 call to go unanswered in a timely manner. While not every 911 call is a true emergency, each call must be treated as an emergency, both from the patient's perspective and the providers'.

CHAPTER TWO

DELAYS FROM THE LITERATURE

Emergency department delays for an ambulance provider may be considered an effect of upstream factors that happened before the ambulance has ever responded to an emergency or even arrived at the hospital.

Delays as Normal Operations

One of the most subtle factors is when hospital staff, given the current high levels of ER utilization, consider delays "normal" operations. In an article "Regulation of Response Times in California," Narad and Driesbock identified regulatory programs for ambulance response times used by California counties to identify differences around the state. "Fifty-seven percent (57%) of California counties regulate response times most in fractional time measurements (Narad, Driesbock, 1999).

Most of the counties with response time standards measure from dispatch to arrival at the scene and most use a fractional measurement to determine compliance. Fractional measurement is the most accurate method. Many of the ambulance enforcement programs in California

have enforcement mechanisms that are unlikely to promote compliance" Narad and Driesbock (1999 133).

This study was conducted to determine the standards used to measure compliance in different areas of California. Many areas require response times to be within nine minutes in urban areas, and twenty minutes to rural areas. Further, areas are broken down in terms of population to determine if an area is considered urban or rural.

When an ambulance covering a certain area responds to a 911 call in the area, another unit backs up the area. When the covering unit gets a call, other units from adjacent areas cover the area. If those units get calls, the area is vulnerable to extended response times. Usually, ambulances clear from the hospital in time enough to recover the area. When an ambulance is delayed in the emergency department and a 911 call is dispatched in his area, however, the call often is delayed due to available units waiting in the emergency department--literally because of no bed availability. The ambulances have arrived on scene of the call, treated the patient, transported and then they sit idle for extended periods of time.

Though hospitals have their own concerns over being able to handle the patient volume that the ambulances bring, not to mention the walk-ins, the response time compliance of the ambulance provider is not one of them. With the belief that waiting is an operating practice of the emergency department paired with the extended delays from emergency department saturation, ambulance providers are faced with the challenge to get in and out of emergency departments without sacrificing their contracts in the process.

Waiting Times in New Zealand

Data was collected on patients presenting to Waikato Hospital emergency department in New Zealand over a period of seven (7) weeks. Those patients who waited more than thirty minutes in the waiting room or more than two hours in the total department, were studied further. Of all patients thirty seven (37%) percent exceeded the time of two hours. Mean time for this group was 175 minutes. Only 7% stayed in the waiting room more than 30 minutes (Havill 1996). This preliminary result was unexpected by the authors. Wait times were thought to be longer for the

study was conducted to determine the length of delays after delays increased over the months leading up to the study.

Sources of Delay

Delays in the emergency department are attributed to many factors. Each may require a different administrative response. Havill (1996) reported 42% of delays found in his study were related to doctors, 16% to waiting for tests and results, 12% from prolonged treatment and assessment and 30% were due to other reasons.

Effects on Emergency Department Occupancy and Delays

As mentioned previously, the lack of available emergency department beds at the hospital is perhaps the most common problem.

Among the possible reasons for bed unavailability are:

- a) bed demand exceeds supply because of population growth;
- b) bed closures have reduced the functional hospital size;
- c) uninsured patients use the emergency department as a primary care source thereby overloading the emergency department; and,
- d) there is a shortage of staffing for available beds.

Table 1 represents the different categories of emergency department delays.

Table 1. Types of Delays and Probable Causes

Delay Type	Probable Cause
Homeless Patient Indigent Patient	When medical conditions deteriorate, the patient finally seeks care—usually after the cost of care is many times greater than the cost if the individual accessed health services before the condition worsened
Occupied emergency department	Too many patients are accessing the emergency department system at one time
Not enough nurses to staff emergency department bed ratio	Even with enough beds, if the nursing ratio is not within line of the state or nurse union regulated specifications, the emergency department cannot take on additional patients
Other beds within the hospital are all occupied	Also known as "internal disaster," this condition creates a backlog of patients needing movement to another unit within the hospital. If the beds needed to move other patients out of the emergency department are occupied, the emergency department bed is unavailable for other patients
Other Hospitals are saturated	When other emergency departments in the area are on saturation, they too cannot accept additional patients. When all hospitals in an area are saturated, the patient's care becomes delayed and impaired. The patient is then transported to the closest saturated emergency department.
Patients Want to reduce wait, so they call 911	Shocking to many (and not to others), there are patients who call 911 in order to reduce their wait in the emergency department

Homeless Patients

Homeless or indigent patients are reported to be, among users of the emergency department, the most complicated and difficult to control of patients. A case-control study was conducted in Massachusetts of 293 homeless, 334 low-income housed children aged 3 months to 17 years, and the mothers of the children. Information was collected about the children's living conditions, family type, and health status using questions adapted from national surveys.

The purpose of the study was to determine the relationship of homelessness and determinants of health on homeless and low-income housed children. The authors predicted that these patients would use emergency services more than other socioeconomic classes. Indeed, emergency department and outpatient medical visits were higher for the homeless group than others.

There were some similarities and differences between homeless children and the comparison children. The researchers reported that mothers of homeless children were more likely to report their children as being in fair or poor health compared with their housed counterparts. Homeless children were reported to experience a high number

of acute illness symptoms, including fever, ear infection, diarrhea, and asthma.

After controlling for potential explanatory factors, homeless children remained more likely to experience fair or poor health status [adjusted odds ratio = 2.83; 95% confidence interval, 1.16, 4.87 and a higher frequency [1.74. Mothers' emotional distress was independently associated with acute illness symptoms and frequent use of outpatient and emergency department settings (Weinreb & Goldberg, 1998, 558).

In examining factors defining access to health services and the use of well-child care, only small differences were seen between the respective comparison groups. More than 99% of both the homeless and housed children had medical insurance, primarily through Medicaid. The homeless children were significantly less likely to have a regular health care provider [93% vs. 98%] (Weinreb & Goldberg, 1998, 558).

Patients' Ability to Pay

Indigent patients exhibit similar characteristics to those of the homeless patient: intermittent use of medical care, little to no use of preventive medical services, sporadic visits to different emergency departments instead

of having a regular relationship with a primary care physician. In Los Angeles County alone, sixty two percent (62%) of uninsured families surveyed indicated difficulty in paying for their children's' medical expenses, thirty five percent (35%) of the adult population was uninsured and eighteen percent (18%) of the child population were reported to be uninsured (Los Angeles County DHS, 1997).

High Occupancy in the Emergency Department

Over utilization of the emergency department can result in long waits to be seen. In 2001, The National Center for Health Statistics published "Major Reasons Given by Patients for Emergency Room Visits, 1998." Of a total of 100,385 visits surveyed in the study, the top twenty reasons a patient visited the emergency department were given. Table 2 lists the patients' chief complaint, total number of that complaint, the percentage of the total 100,385 (per 1,000), and the adjusted percent. The adjusted percent is the percent of 100,385 minus the "all other reasons category" (46,382 or 46.2%), since the "all other reasons" category is so large. This adjustment allows a consideration of the data without concealing the seemingly low percentage.

With the exception of chest pain, which could be early symptoms of cardiac distress, and shortness of breath, (early signals of respiratory distress or associated cardiac complications), the majority of the chief complaints could be downgraded from an emergency department visit to a primary care physician or urgent care visit without compromising patient care or adverse outcomes. In fact, many of the chief complaints seemingly did not meet emergency department criteria and could have been handled in an urgent care or doctor's office.

The reasons for the documented emergency department visit were those given by the patient (Table 2). No follow-up was studied to determine the perceived nature of the patient's reason versus the actual nature or chief complaint. The information provided does not indicate whether the patient was a walk-in to the emergency department or brought in by ambulance. The reasons are predominantly non-emergency conditions.

Unfortunately, unless patients are insured, they may not have been evaluated by a physician until visiting the emergency department, where the ER is obligated to accept all patients and patients' ability to pay. Whether walk-in patients or not, an arrival still occupies a bed in the

emergency department resulting in one less bed for an ambulance patient.

Table 2. Patient Reasons for
Emergency Room Visits, 1998

Patients' Chief Complaint	Total	Percent of 100,385	Adjusted Percent of 54,003
Stomach and abdominal pain/cramps/spasms	5,958	5.9	11.0
Chest pain and related symptoms	5,329	5.3	9.8
Fever	4,419	4.4	8.1
Headache/pain in the head	2,867	2.9	5.3
Cough	2,471	2.5	4.6
Laceration and cuts (upper extremity)	2,293	2.3	4.2
Back symptoms	2,284	2.3	4.2
Shortness of breath	2,283	2.3	4.2
Throat symptoms	2,205	2.2	4.0
Pain (no specific body system)	1,990	2.0	3.7
Vomiting	1,985	2.0	3.7
Earache/ear infection	1,947	1.9	3.6
Labored/difficulty breathing	1,690	1.7	3.1
Laceration/cut (facial area)	1,623	1.6	2.9
Unspecified accident	1,560	1.6	2.9
Other unspecified injury (head, neck and face)	1,465	1.5	2.7
Skin rash	1,346	1.3	2.5
Neck symptoms	1,346	1.3	2.5
Low back symptoms	1,298	1.3	2.4
All Other reasons	46,382	46.2	

Doctors Havill and Van Alphen of the Emergency Department in Waikato Hospital in Auckland New Zealand studied wait times in their article "Waiting in the

Emergency Department" (Havill 1996). The focus of the article was to examine wait times in the emergency department, reasons for waiting, and patient knowledge of those reasons. The results point to a perceived bed management issue.

Over a period of seven weeks, data was collected on patients who were seen in Waikato Hospital's emergency department. The wait types were stratified into those who waited >30 minutes in the emergency department waiting room and those who waited >2 hours in the entire emergency department visit. Patients who waited >2 hours were studied further, but were not the focus of the study. Only seven percent waited >30 minutes in the waiting room. The delay times are shown in Table 3:

Table 3. Reported Delays in the
Emergency Room

Delays Related to Doctors	42%
Waiting for tests and results	16%
Prolonged treatment and assessment	12%
Other reasons	30%

Only 47% of the patients surveyed knew why they were waiting. Most people understand that waiting is sometimes unavoidable—especially anyone who visits the emergency

department. What further frustrates a patient is lack of knowledge as to why the patient must wait. Visiting the emergency department is a stressful experience by itself. When extended delays for care or treatment are an issue, a patient must suffer additional stress. If a patient is in pain, his ability to cope with the discomforts is reduced.

Simple steps to reduce a patient's anxiety would be to update the patient at least every thirty minutes, on the progression of the patient's visit. The amount of time this would take is insignificant compared to the positive results ongoing communication would render.

Frequent Users of the Emergency Department

Frequent users of the emergency department are those who visit the emergency department more often than the average person. Fernandez and Pope (2000) set the parameters of necessary use of the emergency department: "a patient's visits were considered appropriate if he or she required resources or physician services not readily available in the community" (Fernandez & Pope, 2000, 1018). These patients may or may not have health insurance, but they still occupy a bed when they visit the emergency department. Many patients are genuinely sick and need attention.

Fernandez & Pope presented a case study aimed at identifying frequent users of the emergency department, creating a care plan for them and monitoring its progress (2000). The data that related to the frequent users of the emergency department is also generalizable to the reasons for increased bed occupancy. Over a period of twelve months, twenty-four patients participated in a single-subject design study to determine individual use. Before referral to the program, the twenty-four patients accounted for 616 visits to the emergency department (median 26.5); each patient could have visited the emergency department at least 2.2 times per month—while some individuals had not visited the emergency department in years.

Nursing Staff Shortages

While most staff in the emergency department has little control over the patient volume they see in a day, they do have control over whether the patient remains on the ambulance gurney or not. One reason for delays in the emergency department is lack of proper staffing (Havill, 1996). The shortage of nurses in most hospitals across the nation has increased the workload of those nurses who are working. The desirable ratio of nurses to patients is increasingly challenging to maintain.

Nurses across California have experienced an overload of duties attributed to the nursing shortage. In April of 2002, nurses at St. Mary Medical Center in Apple Valley California voted for and passed a nurses' union. Among the primary reasons the unionization succeeded was nurse to patient ratios. In a related article, the San Bernardino County Sun highlighted the financial aspects of emergency department usage. Entitled "Finances in ERs on Life Support" (Bender 2001 B8). The writer noted "Thirteen San Bernardino County Hospitals lost a combined \$20 million providing emergency room care during the 1999-2000 fiscal year, according to the California Medical Association" (Bender 2001). Among the top five hospitals that lost money on patients per visit:

1. Arrowhead Regional Medical Center
2. Bear Valley Community Hospital
3. Desert Valley Hospital
4. High Desert Medical Center
5. KPC Global Medical Center (Doctors' Hospital, Montclair)

Havill has suggested that alternative services and protocols are needed to address ER staffing shortages.

"Waiting time in emergency departments will alter as

observation wards and definitive treatments by emergency specialists increase. When the emergency department assessment staff is available to expedite the patient through the network of tests and procedures, wait times decrease" (Havill 1996).

Based upon national standards, hospitals are short-staffed nearly 50% of the nurses they should have (Lewis 2000). Hospitals are paying skyrocketing per diem rates for any nurse who will work for a day or two. Staff shortage of RNs asserts that a patient cannot be properly monitored if he does not have a nurse. Additionally, one nurse cannot provide adequate care for too many patients without impacting the level of care and attention other patients may need. Hospitals have attempted unique and different ways of recruiting nurses for their facility. Sign-on bonuses, referral programs, allowing the nurse to choose their own hours and shifts, and relocation bonuses are all used. As fast as nursing schools can train nurses, is as fast as the nurse can obtain employment. The ones that have been working in the nursing field have experienced an increased workload. Though they are being asked to do more work because of short-staffing problems, their quality of care should never be impaired.

Delays Business as Usual

Authors Chinnis and White (1999) evaluate the mindset of the nursing staff in their article entitled:

"Challenging the Dominant Logic of Emergency Department Guidelines From Chaos Theory." The article addresses the predominant mindset of emergency department caregivers regarding waits in the emergency department: The mind-set, or dominant logic of this system of emergency department patient flow assumes that waits are acceptable and unavoidable, and that the function of the emergency department is to care for only the truly emergent patient"(1053). While this logic seems harsh, it is accurate. Few caregivers have cold hearts for people in need of medical attention. The nursing staff is no different. When a patient presents in the emergency department with symptoms that are indicative of a non-urgent condition, the caregiver has difficulty in not exercising a similar logic to that of the emergency department being needed for only truly emergent scenarios—especially considering the emergency department overuse crisis. Since EMTALA requires a medical screening for every patient who visits the emergency department, regardless of their ability to pay, extracting the non-

emergent patients from the patient pool remains an increasing challenge.

The Emergency Department as a Usual Source of Care

"When people want to see a doctor, they want to see a doctor now, so they show up in the emergency room," said Dominic Nigro, spokesman for Arrowhead Regional Medical Center (Bender 2001). This scenario is a common occurrence among many users of emergency medical services. Those who use the ER as a primary care source are aware that they will receive care whether or not they can pay for the care.

High Hospital Occupancy Rates

When a hospital's emergency department reaches its maximum capacity, there is literally no place for patients to be evaluated. When a room is made available upstairs, the patient can be moved to the room, creating an open bed in the emergency department. When all of the beds within a hospital emergency department are full, a condition known as "emergency department saturation" exists. If other beds do not become available within the hospital via discharge, completion of care, transfer or other means of progressing patients forward, then the problem of unavailable beds becomes what's termed as "internal disaster." When a hospital is closed to emergency department saturation,

ambulances must divert to the next closest hospital emergency department. If all hospitals in an area are closed, then the nearest emergency department must accept the patient. When the emergency department accepts a patient, the patient is not able to leave the ambulance crew's gurney until there is a bed available. Crews can wait hours in the emergency department before a bed is made available. There are times when there are multiple crews in the emergency department waiting for a bed. One way to reduce the number of crews in a holding pattern at the emergency department is to provide the emergency department with extra gurneys. When more than one crew is waiting they can assume care of the newly arrived patient, allowing the other crew to remain available for area coverage.

In a simulation model conducted in Great Britain in the mid-1990s, a hypothetical hospital in England was created to answer questions regarding a more accurate estimation of bed need due to emergency admissions at an acute hospital. The main outcome measures were "the risk of having no bed available for any patient requiring admission for any patient, the daily risk that there is no bed available for at least one patient requiring immediate admission and the mean bed occupancy rate" (Bagust, Place,

1999, 157). The study revealed consequences for not having a bed available for a patient. The consequences were shared among the patient, ambulance crews, and most heavily, the hospital:

The relation between demand, capacity and the risk of failure was reflected in the average occupancy rate. All rates above 85% risks became discernable, and above 90% the hospital system was subject to regular bed crises. The average bed occupancy rate in acute hospitals in England 78.9% in 1996-7. A projected rate of growth in emergency bed days of 2.5% a year suggested that the NHS as a whole might be operating at 85% occupancy at the time of the study and could exceed 90% by 2002-3 (Bagust, Place, 1999).

Once bed capacity reached greater than 85 percent, recovery to a normal state was virtually impossible. Capacity above 85 percent equated to emergency department saturation and only when capacity was less than 85 percent was the emergency department not saturated. This entire study was based upon a simulation in which certain parameters were given using a discrete-event stochastic simulation model reflecting the relation between supply of available beds and the demands of emergency department admissions. The excerpt lists demand and capacity as the

risks with the consequences as failure to meet the supply and demand. The consequences of failure were realized if the demand exceeded the supply. This was measured via the "average occupancy rate." When the occupancy rate rose to 90%--just 5% higher than the lowest possible recoverable rate--the systems in the hospital were subject to a regular bed shortage crisis.

What does this mean? Without a contingency plan, such as increased nurse staffing, hospitals will undoubtedly experience major complications in being able to meet the demand of increased bed occupancy. A contingency plan could consist only of additional beds with staffing comparable to the additions, once the occupancy rate increases to 90%.

As this model exemplified, the problem of emergency department delays and bed availability is not expected to improve. No one wants to see their hospital as one that cannot function up to its full potential or one that cannot handle the needs of the community. Hospital administrators are aware of the delays in their facility, they know about cases and complaints from patients and staff alike, and they can pinpoint the issues and consequences at hand. Many of these administrators--along with the line staff--are

under the popular, and all too accurate, impression that nothing can be done about the problem. Like most problems, one can be aware of the problem and can or cannot do anything to repair the problem. Some deny problems exist, while others want to fix it but have little or no resources to correct it. In the case of emergency department delays, the entire paradigm must be shifted in order to effectively address the problem. There are no one-step solutions. To solve, correct or even reduce the delay problem, numerous simultaneous steps must be taken in order to combat the manner in which care is offered, diverted, as well as monitored.

Other Hospitals are Saturated

Typically when one hospital is on saturation, other local hospitals soon become saturated as well. As the previous section demonstrated, once a hospital reaches 90% occupancy, the risk of failure—inability to take on additional patients—is almost certain. With this in mind, once an ambulance crew is enroute to a hospital that advises them it is closed due to saturation, the crew should pull to the side of the road until they are advised which hospital will accept their patient. The likelihood of their diversion to another hospital after they were

diverted from their initial destination hospital is high. It is not unusual for an ambulance to drive around the city waiting to be cleared to a receiving hospital. Even when they are cleared, they will wait in the emergency department hall with their patient until there is a bed available. For patients not serious enough to warrant an immediate emergency department bed, the ambulance crew is able to release the patient to triage. While the crew can leave the hospital, the patient is not too happy about having to wait once again in the emergency department waiting room.

Notification Times

In a study to determine the warning time given to accident and emergency departments by ambulance services before arrival of a critically ill or injured patient, Cooke and Harrison (1999) addressed the notification and communication concerns between the ambulance crew and the hospital.

They found the average alert warning time was seven minutes [range 1-15 minutes]. Mean time on scene was 22 minutes [range 4-59 minutes]. In trauma patients alone, the average alert time was seven minutes [range 2-15

minutes], with an average on scene time of 23 minutes [range 4-53 minutes]" (Cooke & Harrison, 1999, 340).

The purpose of their study was to address the emergency department delay issue from another angle: that of the ambulance provider. When an ambulance is on scene of an emergency, the paramedic must communicate with the hospital base station. At the base station, there is a mobile intensive care nurse (MICN) and physician, if needed. When an ambulance spends too much time on scene and waits too long to communicate with the hospital base station, by the time the ambulance is prepared to transport the patient to the hospital, they often do not have enough time to prepare for the patient's arrival. If the paramedic could advise the hospital earlier, they could possibly have a greater chance of being prepared for the patient. The early communication between the paramedic and the base hospital would be helpful in reducing an unprepared emergency department staff for patient arrival, however, even if the emergency department is not able to handle the additional patient effectively due to no available beds, the patient will still occupy the bed of the ambulance crew until a bed in the emergency department is made available. The purpose of early notification would

not solve the no-bed-availability problem but it would, however, reduce unnecessary driving time to a hospital that the crew believes is open, when in fact it is not.

Patient Abuse of 911 System

No research was found that studied the incidence or prevalence of patients who use 911 systems to expedite their care in the emergency department. There are few studies to determine if patient who accesses 911 will get a bed in the emergency department faster than if the patient had walked into the waiting room.

This area must be carefully treaded upon to reduce misunderstanding. Hospital administrators and medical staff refrain from any action or statement that would conflict with EMTALA or other governing statutes that guarantee emergency medical care to all people. A scenario, therefore, will be narrated in order to create the picture of the patient who uses 911, the ambulance and the emergency department for expedited care in order to reduce their wait in the waiting room. To neglect this patient type would leave a void in the final patient delay type that contributes to emergency department delays.

This patient is usually uninsured, but can also be insured with governmental health care (i.e.: Medicaid).

There are patients who have private health plans, but they rarely access 911 for non-emergency reasons. They may be responsible for pre-authorization from their health plan, unless their condition is potentially life or limb threatening.

If health plan patients abuse the emergency system even once, their plan sends them the bill. Some patients dispute the bill, the plan denies their dispute, they pay the bill and never use emergency services unless the condition is truly close to an emergency. Some dispute the bill, the plan denies their dispute, they appeal and the plan pays the emergency bills. Either way, health plan members experience repercussions for mismanagement of their health events. What is left is the uninsured patient population. This population's characteristic use patterns are the same. They have a health event, they visit the emergency department, the wait is long, and they are frustrated. Some wait it out. Others leave—without the care they sought in the first place. Over time, future visits to the emergency department train the emergency department user either to use the emergency department at less busy times, visit emergency departments in less-busy areas, not visit the emergency department at all, or call

911. They know that if they call 911, they will receive transport to the emergency department and first priority. For years, this plan worked for the patient who wanted emergency department care but did not want to wait.

Finally, there are those patients who present to the emergency department, wait awhile, realize the wait is too long, leave the emergency department and call 911. An ambulance arrives, transports them to the emergency department, they return through the ambulance entrance. For years, this plan worked for this patient type, as well.

These days, emergency department staff is becoming a bit more "hip" to these types of patients who inappropriately use 911 and emergency department services. "Frequent flyers" are becoming well known in the 911 and emergency department setting. Characteristics are little to no life-threatening distress, poor excuses for the need for ambulance service, and exaggerated signs that do not match symptoms of distress.

Triage

Ambulance service providers and hospitals are communicating more prior to emergency department arrival. If a patient's symptoms and vital signs are non-indicative of immediate emergency department bed occupancy, the

patient is sent to triage. At the hospital, the triage nurse evaluates the patient. If the triage nurse's evaluation is similar to the ambulance crew's evaluation, the patient is sent to the waiting room. This prevents a bed from being used by someone who does not need it as much as another patient who is obviously more ill. When the word or experience of this innovative method of curbing emergency department misuse gets out, the patient is forced to devise more effective means of reducing wait times in the emergency department.

Effects on the Ambulance Provider

In many health systems, ambulance service is considered separate from other forms of medical care. Throughout history, the ambulance provider has evolved from a not-so-glamorous means of moving an injured individual from the scene of an emergency to a place to receive care. It is seen now as a fully implemented and functional department.

Since the early seventies, paramedic ambulance providers have been able to perform what is considered advanced life support (ALS) measures, including cardiac monitoring, defibrillation, intravenous vein (IV) therapy,

injected medications, breathing treatments and other life-saving procedures to "extend the arm of the hospital."

This care, offered in the pre-hospital setting, has been hindered recently by delays in the emergency department.

Delays in the emergency department are a problem that affects the hospital as well as the patient. Whether the fire department or the private ambulance provider provides the ambulance service in an area, the public realizes the issues of emergency department delays. When an ambulance crew delivers a patient to the emergency department, they should be able to clear the hospital within ten to fifteen minutes, by ambulance service standards. Depending upon the 911 demands in the area, the crew may clear the hospital sooner.

Ambulance Out-of-Service

There are times when an ambulance is out of service in the emergency department due to clean up from a call or lack of supplies. Usually, both of these out-of-service reasons are quickly resolved—either by the crew, or other internal support services—allowing the ambulance to once again be placed into service.

Ambulance service providers, like many service organizations, are faced with unique issues that complicate

or obstruct their ability to provide vital public service. Among them are arriving at the scene of an emergency in an efficient, safe and rapid manner; providing high quality patient care for the sick and injured at the scene of an emergency (wherever the patient is found); transporting the patient quickly and safely; handling litigation; and, hundreds of other standard operational issues.

Structure of Emergency Services

In emergency medicine, time is one of the most important factors in determining temporary discomfort, morbidity or mortality. When time is extended, the patient is the ultimate victim. When an emergency occurs, the ambulance, fire department and police are the second entities on scene able to make a difference in the life of the victim of an emergency (the first entities are bystanders). The care that is provided by the paramedics and ambulance crew should be the highest possible outside of the hospital setting. Getting to the scene of an emergency in a timely manner is not at the leisure of the ambulance provider. There are variations in the arrangement of paramedic and ambulance service in an area.

Per California Health & Safety Code (2002), every city in California must have both paramedic and ambulance

service accessible via an emergency access number, typically 911. Paramedic service is considered ALS while ambulance service is not always ALS and can be basic life support (BLS). Table 4 lists examples of systems in effect:

Table 4. Systems of Response

Sample Area	Service	Provider
Area X	Paramedic Ambulance	Fire Department Fire Department
Area Y	Paramedic Ambulance	Fire Department Private Provider
Area Z	Paramedic Ambulance	Private Provider Private Provider

A system in which paramedic service could be separate from ambulance service is only possible in an area similar to the above area "Y". In this case, paramedic service would be provided by a fire department while a private ambulance provides BLS ambulance transport. The fire department would respond on either a fire engine/truck or a paramedic squad. The ambulance would transport the patient with a fire paramedic aboard.

The ambulance service is usually the affected service as a result of emergency department delays. Emergency department delays affect the ambulance provider more than

they do the paramedic provider, if the paramedic service is provided separate from the ambulance service. But, the paramedic provider can also experience the effects of emergency department delays if forced to remain in the emergency department with the ambulance crew because a patient must be monitored.

Chapter four will discuss further the affects of wait times on paramedic follow-ups.

Attempted Solutions

What are some of the attempts made by hospitals and pre-hospital care provider to reduce the emergency department delays or prevent them all together? The most inappropriate method of handling the problem is to avoid it. It is much easier to allow the emergency department delays to become a way of life in the emergency department, as opposed to devising innovative ways to reduce the impact on the ambulance provider. The problem has no simple solution. Avoidance, however, does not solve the problem for the ambulance provider who has no choice but to submit to the lack of available beds. After all, the problem of a patient on the ambulance crew's gurney is just that: the crew's problem, and not the hospital's. While the hospital

emergency department has a general concern for their ability to treat a patient in need of medical evaluation, their concern becomes diluted when the demand for such evaluation is multiplied many times by their available space for efficient patient care delivery.

Add More Emergency Department Beds

In the case of emergency department crowding, one recommended solution is to add more beds. When emergency departments are expanded, the expansion only means that there are more beds to fill. In January 1996, the emergency department of Antelope Valley Hospital (AVH) had twelve beds. After four years, they more than doubled their bed capacity to 26. In the Antelope Valley Case Study discussed later, this expansion has had little effect on wait times for a bed in the emergency department.

Put More Ambulances on the Road

The solution to add more ambulances to a given area was undertaken by American Medical Response (AMR) Antelope Valley Division, the ambulance company of this study, around the same time Antelope Valley Hospital added additional beds in late 1996. During that period of time, AMR deployed six ambulances in the Antelope Valley. By 1999, the number had risen to eight. By mid-2001, the

Antelope Valley division deployed thirteen ambulances to cover the area. Still, in April 2001, the emergency department delays have remained a serious problem. From the period of September 2000 through April 2001, Antelope Valley ambulances transported 13,927 times to area emergency departments. Of the 13,927 911 emergency department transports, there were 2,058 delays. In all, 12% of the total transports to the emergency department resulted in a delay. In this example, adding more ambulances to cover the additional call volume can make the ambulances more available to cover additional calls. At the same time, the ambulances will continue to experience a high number of delays. An ambulance provider—public or private—can add units to the 911 systems until the delays virtually disappear. Additional units, while they may reduce the delays experienced in the emergency department, the revenue generated would not produce a profit in an ambulance provider setting due to the provider's limited ability to collect full usual and customary charges on every patient. Simply because an ambulance transports a patient, does not equate to revenue, since the payment of ambulance bills—like most medical bills—are retrospective; a patient does not pay the bill prior to transport. Like

an emergency department, the ambulance must transport everyone—whether or not they can pay. Additionally, the ambulance provider is not compensated for responses, only transports. An ambulance provider can staff an ambulance for eight hours, the ambulance can respond on ten calls and only transport six patients. Payment is only collectable on the transports. Finally, of the six transports, half will pay the bill, while the others do not pay at all, or are reimbursed with a governmental discount (i.e.: Medi-Cal or Medicare).

Early Notification of Saturation

If an emergency department is notified early enough, the medical staff can make the appropriate arrangements to be as ready as possible for the responding ambulance. There are times when the emergency department is saturated (no available beds), yet if they receive early enough warning of an ambulance enroute with an unstable patient, they can move less severe patients to other areas of the emergency department.

In 1999, The Journal of Accident and Emergency Medicine (Cooke & Harrison, 1999, 340) published an article that studied the early warning of accident and emergency departments by ambulance services to determine if early

notification from the ambulance to the emergency department was possible. They also considered if accessing an open bed by the time the ambulance arrived at the emergency department could be increased due to early notification. Most ambulance crews know within the first five minutes of rendering care on scene that the patient will be transported to the emergency department. Most crews spend between fifteen and twenty minutes on scene before transport, and approximately ten to twenty minutes transport time. In the study, the average alert time was seven minutes (range 1-15 minutes). Mean time on scene was 22 minutes (range 4-59 minutes). In trauma patients alone, the average alert time was 7 minutes, range 2-15 minutes, with an average on-scene time of 23 minutes, range 4-59 minutes. The reason for the extended on-scene time for trauma patients is typically due to extrication from vehicles or additional rescue efforts not necessary in non-trauma responses. There was a potential earlier alert time averaging 25 minutes [SD 18.6, range 2-59 minutes] if the alert call was made five minutes after arrival on scene (340). Emergency departments could be alerted much earlier by the ambulance service. This would allow staff to be assembled and preparations to be made. Disadvantages may

be an increased 'alert rate' and waste of staff time while awaiting the ambulance arrival" (Cooke & Harrison, 1999, 340).

This study focused on one of many possible methods of reducing wait times. At the same time, it took a further step to implement methods of locating a bed in the emergency department, even when they are not available, by encouraging the ambulance crews to notify the emergency department within five minutes of arrival. This gives the emergency department an extra 30 to 40 minutes to prepare for arrival, instead on only five to ten minutes--current practice. Early notification, however, would only make a difference for patients serious enough to receive a bed in the emergency department upon arrival. If the patient is not serious and is stable--even if the hospital received early notification from the ambulance--with the emergency department saturated, the ambulance waits..

Patient Education

One of the most effective methods of reducing unnecessary demand is to limit the demand. A constant challenge to reducing demand in emergency department use is the uninsured or Medicaid patient. These patients have little incentive to use other means of receiving medical

care, other than the emergency department. Until laws are created to prevent or reduce patients from overusing emergency services, the only other option is cooperation.

St. Paul's Hospital in Vancouver, BC had a problem with over users of emergency department services. Through a case-management program designed for individual users of emergency department services in a certain area, emergency department use was reduced from 616 in 24 users down to 175 over a period of twelve months (Fernandez & Pope, 2000, 1019). Some of the patients visited the emergency department for services that could otherwise be provided in a community clinic. Among the users were the homeless, those seeking drugs, those with complex medical conditions and social problems. In the study individual care plans were attempted to no avail. Comprehensive care plans that involved more than one agency appeared to have the most effective results. Canada has a universal health system, where everyone receives governmental health care. Though the United States does not have a universal health system, a system such as the used at St. Paul's Hospital would work in small areas that cooperate with one another, to a degree similar to that attempted by the Vancouver community.

Frequent users were identified and referred to the Difficult Case Management Committee consisting of social workers, medical director of the emergency department, director of CQI, a patient care manager, psychiatric nurse, clinical nurse specialist, family physicians and community care providers. To be referred to the committee, the user had to have visited the emergency department several times over the past year, with a potential for future use. The committee met once a month for one hour. At the monthly meeting, an individual care plan was designed. A patient's visits were considered appropriate if he required resources or physician services not readily available in the community. At the beginning of the study there were 24 patients, 616 visits over 12 months. Over the course of the study, 1 patient died, 2 moved (1021). By the end of the study, for the period of one year, the patients accounted for only 175 visits to the emergency department (1023).

The program proved effective because of adherence to the care plans. The crucial element was close follow-up for each visit. A blanket approach to reduce visits has little effect on frequent users of emergency department services. For example, diversion of non-urgent cases from the ED had no effect on frequent users. Educational interventions have also been unsuccessful. Our program focuses on the needs of the patient and allows a multi-disciplinary approach (Fernandez & Pope 2000 1020)

The study had a small sample size and the period of the study was relatively short. While the program was effective in reducing emergency department visits, its implementation is not practical in many settings due to the increased involvement with meetings, case management and multi-disciplines within the health care access setting. Changing behavior continues to prove to be a complex problem to solve—or even reduce—when services needed are perceived to be unavailable in care settings other than the local emergency department.

CHAPTER THREE

ANALYSIS OF ANTELOPE VALLEY

Description of Antelope Valley

The Antelope Valley is a region in the northern-most part of Los Angeles County. Located approximately sixty miles north of Metropolitan Los Angeles, forty miles from the San Fernando Valley, sixty miles east of the Ventura coast and seventy-five miles from the city of San Bernardino, the Antelope Valley is one of the fastest growing areas in the nation.

Largely due to its relatively close proximity to other urban cities, as well as the affordability of housing on larger lots, the desert area of the Antelope Valley has grown to a population of over 472,000 (2000 census data). Considered an urban area consisting of the two largest cities, Palmdale and Lancaster, the Antelope Valley -while spread out from other metropolitan areas-is self-sufficient and otherwise confined from the rest of LA County. Santa Clarita is approximately forty miles south of Antelope Valley and lies in the service area of AMR Antelope Valley Division. Because AMR Antelope Valley Division services

Santa Clarita, it will also be included in the study, but referred to as the Santa Clarita Valley (SCV).

In the summer of 2000, the Operations Department of American Medical Response determined it was time to address the excessive number of delays the ambulances experienced over the past year due to no available beds in the emergency departments of the Antelope Valley. It appeared as though the delays were increasing in number and no matter how many ambulances were added, the delays seemed to remain. Just one year ago (July 1999), the Antelope Valley Operations deployed eight ambulances in the Antelope Valley area and three in the Santa Clarita Valley, for a total number of eleven ambulances. In July 2000, the Antelope Valley area was staffed with thirteen ambulances while the Santa Clarita Valley staffed five, for a total daily ambulance deployment of eighteen (up 7 from the year before). Ambulances were added every two months at the cost of \$80,000 each unit. Over one year, AMR spent nearly one million dollars in ambulances alone. The Antelope Valley area has two hospitals, while the Santa Clarita Valley has one. Table 5 shows the hospital profiles and their bed capacity. Antelope Valley Hospital and Lancaster Community Hospitals were within three miles of each other.

Table 5. Hospital Profiles

Hospital	Number of Beds	ED Capacity	Specialty or Trauma?
Antelope Valley Hospital	350	28	No
Lancaster Community Hospital	117	9	No
Henry Mayo Hospital	250	9	No

It was a regular occurrence for both of the Antelope Valley hospitals to be closed due to no available beds. Since Henry Mayo Hospital (HMH) was approximately forty-five minutes away, the only options were either AVH or LCH. It became apparent to the ambulance provider AMR that something must be done about the emergency department delays, since they began to affect their response times to other calls since the ambulances were waiting for beds in the emergency department instead of responding to 911 calls. The Los Angeles County Department of Health Services 911 contract specified that AMR must arrive on scene within eight minutes fifty-nine seconds (0:8:59). There are approved exceptions to the 8:59 clock that allow certain responses to be extracted from the total responses. Among the exceptions:

- Road construction
- Train passing in the path of travel

- Following a responding fire unit (heading to the same call)
- Adverse weather (wind, rain)

When these exceptions are used, the response time is not used against the responding unit for the call. The rationale is these conditions are no fault of the responding ambulance provider. Emergency department delays are no fault of the responding ambulance provider's, yet they are not considered exceptions, unless the responding unit is coming directly from the emergency department, so whether the ambulance just cleared the emergency department and was dispatched holds no bearing on being able to use emergency department delays as an exception for not making the contracted response time.

Data Sources and Definitions

Over a period of seven months data was collected from the computer automated dispatching system (CAD) AMR uses for dispatching their ambulances to emergency and non-emergency medical requests for service. The CAD is also used by other public safety agencies like the police and fire departments. The CAD tracks most information such as:

- time of call,
- day of call,
- time call received,
- time ambulance dispatched,
- time ambulance arrives on scene,
- how long the unit is on scene,
- time the unit transports to the hospital,
- time the unit arrives at the hospital,
- whether the unit calls in an emergency department delay,
- time the emergency department delay begins and ends, and
- time the unit clears the hospital.

While the CAD system produced regular management reports on productivity, workload, other business statistics, it was decided that special analyses were needed to answer questions about ER delays due specifically to the lack of available emergency beds at local hospitals.

Specifically, the purpose of the data analysis was to answer the following questions:

- What are the total and average numbers of emergency department delays due to no bed availability, by month, day of week, and by time of day?
- What are the total and average times expended for emergency department delays due to no bed availability, by month, day of week, and by time of day?
- What are the total and average numbers of emergency department delays due to no bed availability, by hospital?
- What are the total and average times expended for emergency department delays due to no bed availability, by hospital?

Collection Period and Scope

The data were collected over the period of seven months (September 2000 through April 2001).

Bed unavailability was based upon the time interval between when an ambulance unit arrived at the hospital and was advised by the emergency department charge nurse (or equivalent) that there were "no beds available." until the unit was released for service.

In normal operations the crew was obligated to notify dispatch immediately upon notification that they would be delayed due to no beds being available. The dispatcher entered the reason for the delay into the CAD and automatically stamped it with a start time. After the crew cleared from the emergency department, they would advise dispatch and the emergency department delay clock would stop. The code that indicated a bed was not available was used to select cases from the data set that qualified as "bed availability related delays."

The delay codes were extracted from the CAD at the end of September, October and November of 2000 and January, February, March and April of 2001. Delays for December were excluded from the study due to a change in operating computer systems on December 10, 2000. If the numbers for December were included, there would have been ten days of information missing from the final month's calculations.

Non-emergency medical transports were not included in the analysis because they are considered a non-contractual obligation for pre-hospital care with the county contract. While AMR provides non-emergency medical transportation services, a public provider would not. Including these transports would inaccurately depict the true significance

of emergency department delays as they are related to the 911 System, because non-emergency calls are not contracted.

Results

Daily Delays

The data set contained delay data for 208 days. Over these days, 2,066 delays occurred representing a total of 1,213 hours of delay three (Table 6). The average number of delays per day was 9.9, ranging from a low of one per day to a high of thirty.

Table 6. Total Delays per Day, Total Daily Delay Time and Mean Daily Delay Time

	Delays	Minutes of Delay per Day
Minimums	208	208
Maximums	1	22
Sums	33	1,479
Means	2,066	72,782
Std. Deviations	9.93	349.91
	5.953	247.785

The daily delay time ranged from a low of 22 minutes per day to a high of 1,479 minutes—the equivalent of 24 hours—per day. The average minutes of delay per day was 349.9 or approximately 6 hours per day. What this means is that six hours out of every day, units were unable to respond to emergency calls in the area, increasing the chances of being late on subsequent emergency responses.

Delays as a Percent of Transports

The 2,066 delays during this period represent 14.8 percent of a total of approximately 13,927 transports of patient that occurred. The County Department of Health Services EMS Division allows for ten percent (10%) of total responses to be out of compliance.

For the first three months of the study (September, October, November), the average number of delays each month was only 199. The reason for the increase was the computer program transfer, which occurred in December. Prior to the CAD upgrade, there were calls not coded consistently with all emergency department delay codes. After the upgrade, all delays were captured, since all dispatchers were entering the same codes into the CAD.

Lengths of Delay

Lengths of delays contributed significantly to the availability of an ambulance for response in an area. The average length of delays was thirty-five minutes (Table 7).

Table 7. Average Length of Delays

Number of Delays	2066
Minimum Minutes	0
Maximum Minutes	229
Total Minutes	72782.13
Mean Minutes per Delay	35.23

This average delay of thirty-five minutes created an extended time to become available from arrival to the ED until clearance from the ED. This time (known as the turn time) represents from the time of arrival to the hospital with a patient to the time the patient leaves the ambulance crew's gurney. It is thirteen minutes longer than it should normally take to transfer the care of a patient. When an ambulance crew arrives at the hospital, completes transfer of the patient, paperwork, clean up and prepares for the next response, typically twenty minutes pass. Thirty-five minutes, when compounded with additional waiting crews, can have a disparate impact on the crew's ability to respond immediately to the next request for help.

Delays by Month

For the seven months of data analyzed, the average number of delays per month was 295 with a total delay time of 1.213 hours. Monthly delays ranged from 176 to 426 per month. Transports to the emergency department that were considered delays were any transports that resulted in an inability to immediately receive direction to a bed for the patient. The total amount of delay time per month ranged

from 5,023 minutes per month to a maximum of 15,801 minutes per month. Monthly delays and delay lengths for the period of the study indicated a considerably higher number of delays than previously thought (Table 8). For the period of seven months, the increased number of minutes indicated a significant complication in the delivery of care for the pre-hospital patient.

Table 8. Monthly Delays and Delay Length

	Minutes of Delay	Number of Delays
Number of Months	7	7
Totals	72,782.13	2,066
Minimums	5,022.77	176
Maximums	15,800.87	426
Means	10,397.4	295.1
Std. Deviations	4,176.781	96.712

Not only was consideration of the total number of delays, as well as delay lengths analyzed, it became important to evaluate the number of delays each month to determine if there was a certain month that experienced more delays than another month. Assuming that every month would render the same types of delays, both in length as well as number, inaccurate results would have produced, directly affecting the data.

The Operations department at American Medical Response wanted to determine the total number of delays that occurred each month. Additionally, the need to visualize the number of delays in comparison with the other months of the study proved to be an important component of consideration. The question that needed to be answered was: Do delays happen all the time, or during a certain month? Most medical events are seasonal, meaning that during certain seasons, there is an increase in medical events. In the case of the ambulance provider, medical events could either be life-threatening (immediate) or chronic in nature. Ambulance providers should not be summoned to the chronic or non-life-threatening medical events, though they typically are requested to respond. Figure 1 displays the number of delays for each month and how they compared to other months in the study. Even though data collection improved in January 2001, the delays still increased. Data was collected differently in September, October and November 2000. There was a computer upgrade halfway through December 2000. Figure 1 displays the improved collection while also tracking true delays. Clearly, a trend is visible from the Figure 1 profile.

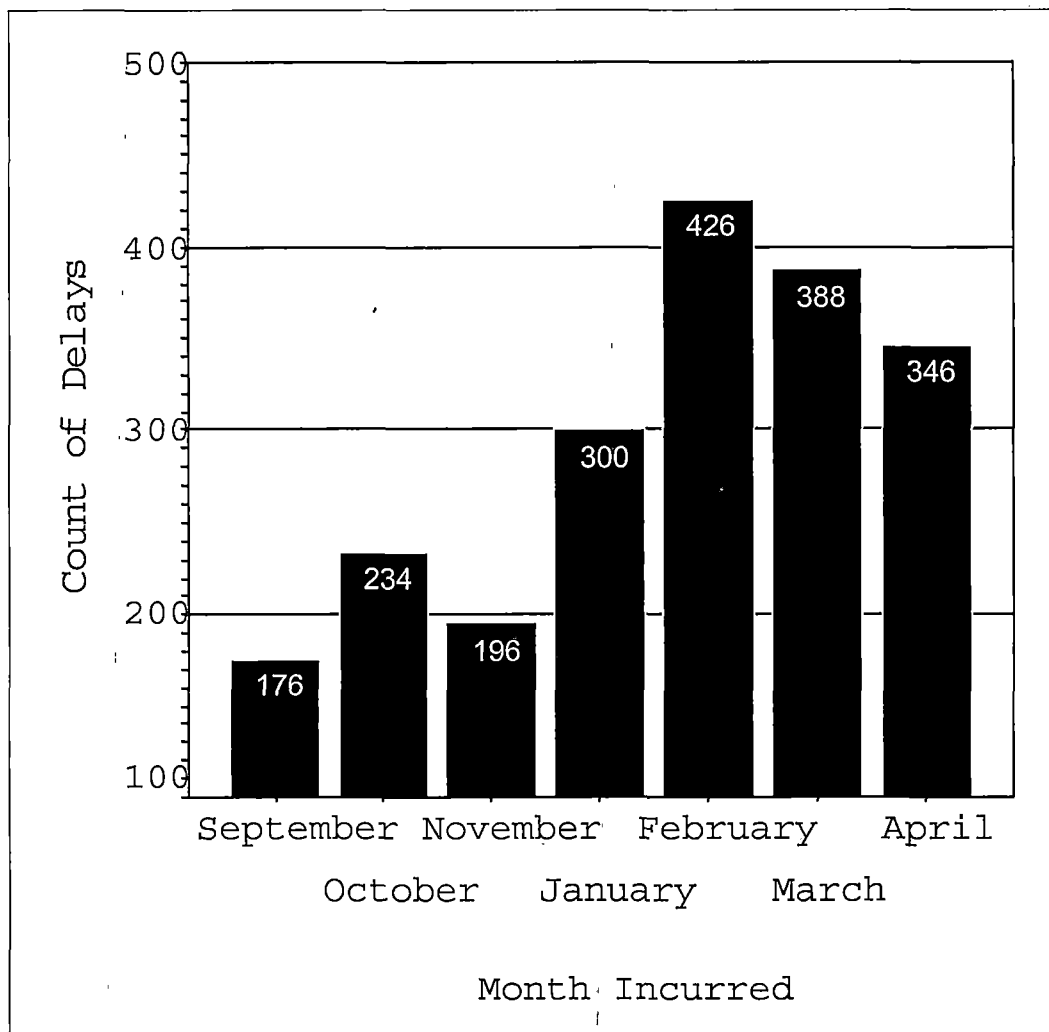


Figure 1. Count of Delays by Month Incurred

Clearly, the number of delays increased from the time the study began (September 2000) until the time the data collection ended (April 2001). Figure 1 lists the total minutes of delay. Note the similar appearance of the bar in each figure, suggesting that the higher number of delays, the longer the number of minutes delayed for a specified month.

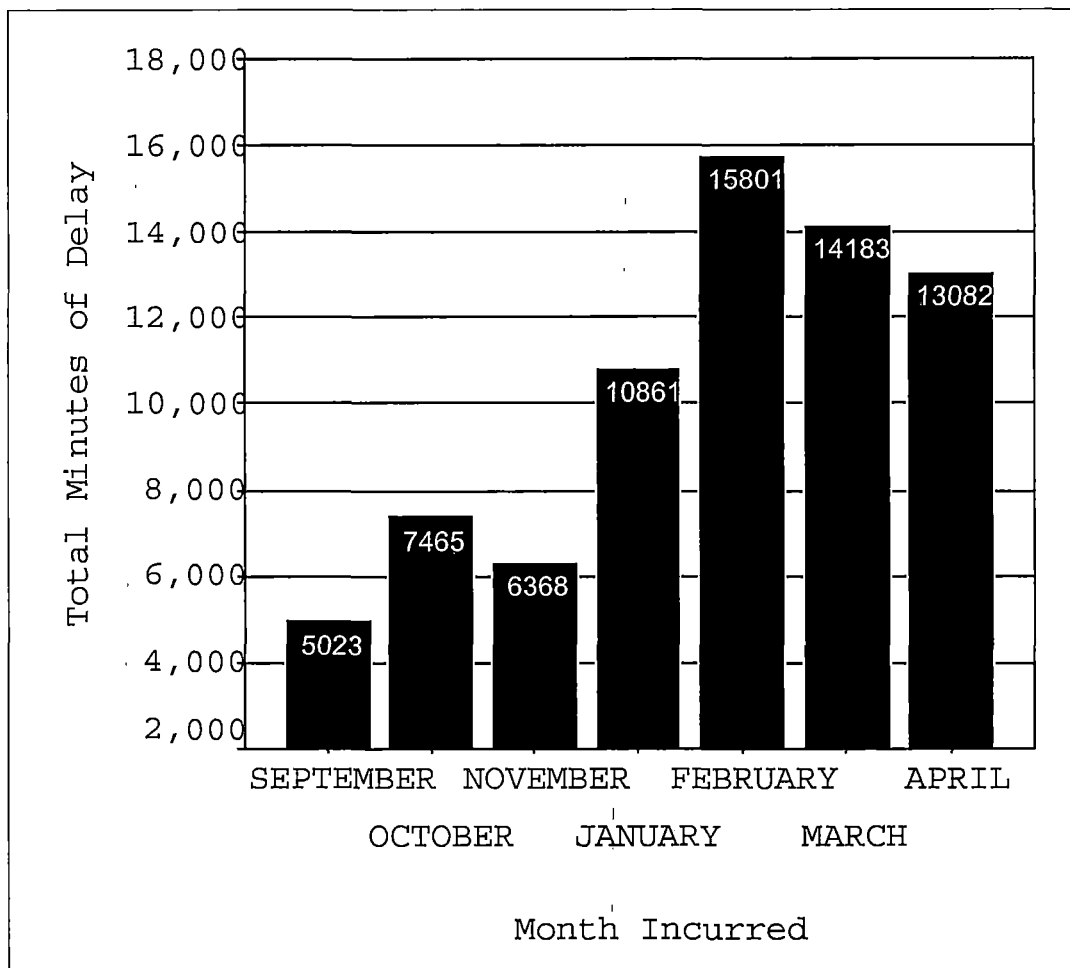


Figure 2. Total Minutes of Delay by Month

From September 2000 through April 2001, average delays, as well as delay range, increased steadily. While the average delay time for the seven months (34 minutes) appears to not be an issue, for every minute the ambulance was not available to respond to a 911 call, the risk of a patient not receiving immediate care increases.

In June 2002, the Los Angeles Times featured a front-page editorial on emergency department delays entitled:

"Crowded ERs Put patients on Hold" (Ornstein 2002 A29).

Regarding Los Angeles City Fire Department Paramedic ambulances being held in the emergency department with no beds, Dr. Mark Eckstein was quoted as saying "the paramedics by default become ER nurses or part of the hospitals' staff" (LA Times). Eckstein is the medical director for Los Angeles City Fire Department and advocate for pre-hospital staff. The multi-paged article in the Los Angeles Times profiled the emergency department delay problem from the north Los Angeles County (Antelope Valley), down through Central and South Los Angeles. The potential for an otherwise available ambulance not being able to respond represented a liability for the ambulance provider, intensified by their inability to obtain an exemption for such a delay type.

Average Time of Delays per Month

As reported, the average delay time per episode of delay is 35 minutes. Average trip delays by month have been slowly increasing, from 28.5 minutes per delay in September 2000 to 37.8 minutes in April 2001. From September 2000 through April 2001, there the Antelope Valley experienced 2,066 delays ranging from .00 minutes to 228.52 minutes (Table 9):

Table 9. Means, Standard Deviations,
Minimums and Maximums of Minutes
of Delay per Month

Month	Delays	Mean Minutes	Std. Deviations	Minimum Minutes	Maximum Minutes
September	176	28.5	11.5071	7.70	76.37
October	234	31.9	17.0027	9.27	117.38
November	196	32.5	18.7042	8.80	178.53
January	300	36.2	20.4325	.02	119.55
February	426	37.1	19.0727	.08	166.68
March	388	36.6	21.2089	.00	228.52
April	346	37.8	19.4416	.02	155.55
Totals	2066	35.2	19.1761	.00	228.52

From September 2000 through April 2001, minutes of delays increased steadily (Figure 3). Given this continually upward path, the trend appears to be in line with even more increased number of delays with extended number of minutes required to handle the delays. What is important to remember is that Figure 3 is similar to Figure 2 in that both figures mimic an upward trend of both increased number of delays, as well as increased delay times. This trend, given its displayed pattern will only increase in both frequency of delays as well as length of delays. Both Table 9, as well as Figure 3 illustrate the immediate state of urgency in correcting and reducing emergency department delays.

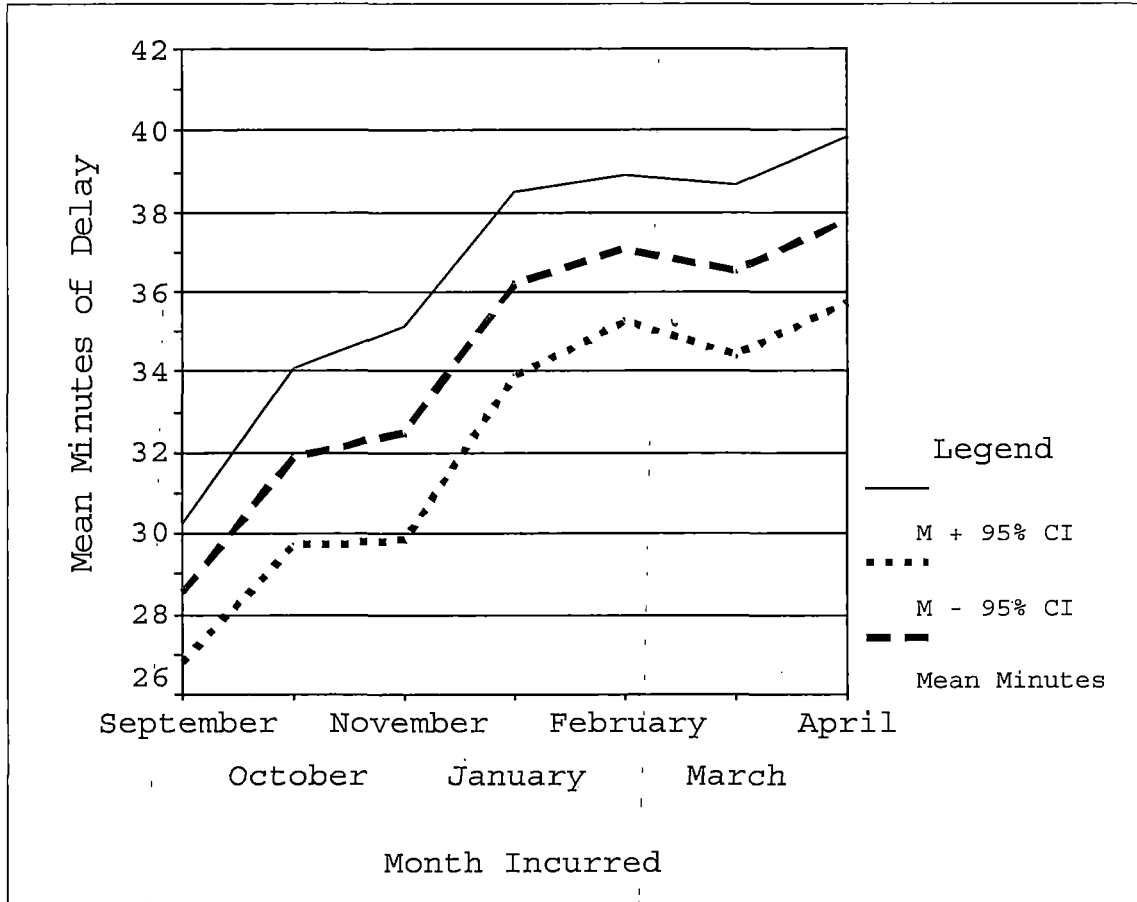


Figure 3. Mean Delay Times and 95% Confidence Intervals by Month

The lines are nearly identical, which suggests a grim trend that will continue over time given an unchanged state of supply and demand similar to that exhibited in this study. Table 10 lists the total number of paramedic follow ups, total number of 911 calls for the period of the study and the percent of transports by each month. From September through the end of the study (April 2001), the percent of delays increased (from 9.1% to 17.5%). In February 2001,

delayed emergency department transports increased to a percentage of 21.6%.

Table 10. Percent of Delays with Paramedic Follow up, Total 911 Calls and Percent of Transports Delayed by Month

Month	Total Paramedic Follow-Up	Percent of Delays With Paramedic Follow-Up	Total Delays Each Month	Total 911 ED Transports	Percent of ED Transports That are Delayed
September	93	4.9	172	1,807	9.1
October	77	3.7	229	1,895	11.0
November	84	4.9	196	1,702	11.5
*January	895	47.8	300	1,874	16.0
February	829	42.0	426	1,974	21.6
March	860	35.6	388	2,419	16.0
April	788	39.8	347	1,980	17.5
Totals	3,626		2,058	13,651	
*In January 2001, there was a CAD (computer automated dispatching) upgrade. This upgrade allowed information to be collected more accurately due to a standard code extraction, as opposed to codes that were entered differently, and therefore not tracked.					

What were the lengths of time an ambulance waits in the emergency department for a bed for their patient? The hospitals had suggested that the tracked data grouped shorter delays into the total number of delays, making the total number of delays at their facility seem larger than they truly were.

Delay lengths were stratified into four separate categories.

1. Number of delays less than ten minutes
2. Number of delays greater than ten minutes
3. Number of delays between thirty and fifty nine minutes
4. Number of delays greater than one hour

The delay detail is profiled in Table 11.

Table 11. Percentages of Cases Delayed by Month

Months	Time Interval				Totals	
	00-09	10-29	30-59	60+		
January	4.0%	40.3	42.7	13.0	100.0%	300
February	0.7%	37.8	50.9	10.6	100.0%	426
March	0.8%	41.0	49.0	9.3	100.0%	388
April	1.4%	36.7	50.6	11.3	100.0%	346
September	0.6%	61.9	35.8	1.7	100.0%	176
October	0.4%	56.8	36.3	6.4	100.0%	234
November	1.0%	51.0	42.3	5.6	100.0%	196
Totals	1.3%	44.0	45.5	9.1	100.0%	2066

For the four categories (<10 min., 10-29 min., 30 -59 min., >60 min.), percentages each category represented for each month were calculated. Total number of delays that were less than ten minutes were only 28, representing one percent of the delays for the seven months studied. Such low numbers and percentages of total delays will most likely result in a modified tracking of future delays to include only those delays that are greater than thirty

minutes. Tracking delays of just any number would produce inaccurate results.

The total number of delays that were greater than ten minutes (10 - 29 minutes) was 942, representing 48% of the total delays for the seven months studied. Total number of delays between thirty and fifty-nine minutes were 905, or 42% of the total delays for the seven months studied.

Finally, the last category of delay was of those greater than one hour. Delays greater than one hour totaled 183, or 8% of the total number of delays for the seven months studied (Table 11). While the delays greater than one hour were the second to the lowest category of total delays, the problem that they represent could be detrimental to the system, considering the length of time it takes to return an ambulance back into service.

Considering the above chart, an operator of pre-hospital care medical services would want to pay particularly close attention to delays between ten and sixty minutes. All delays in the emergency department have the potential to contribute to a subsequent delay in response to another request for service, though delays between ten and sixty minutes are the most common. Delays by day of week are profiled in figure 4:

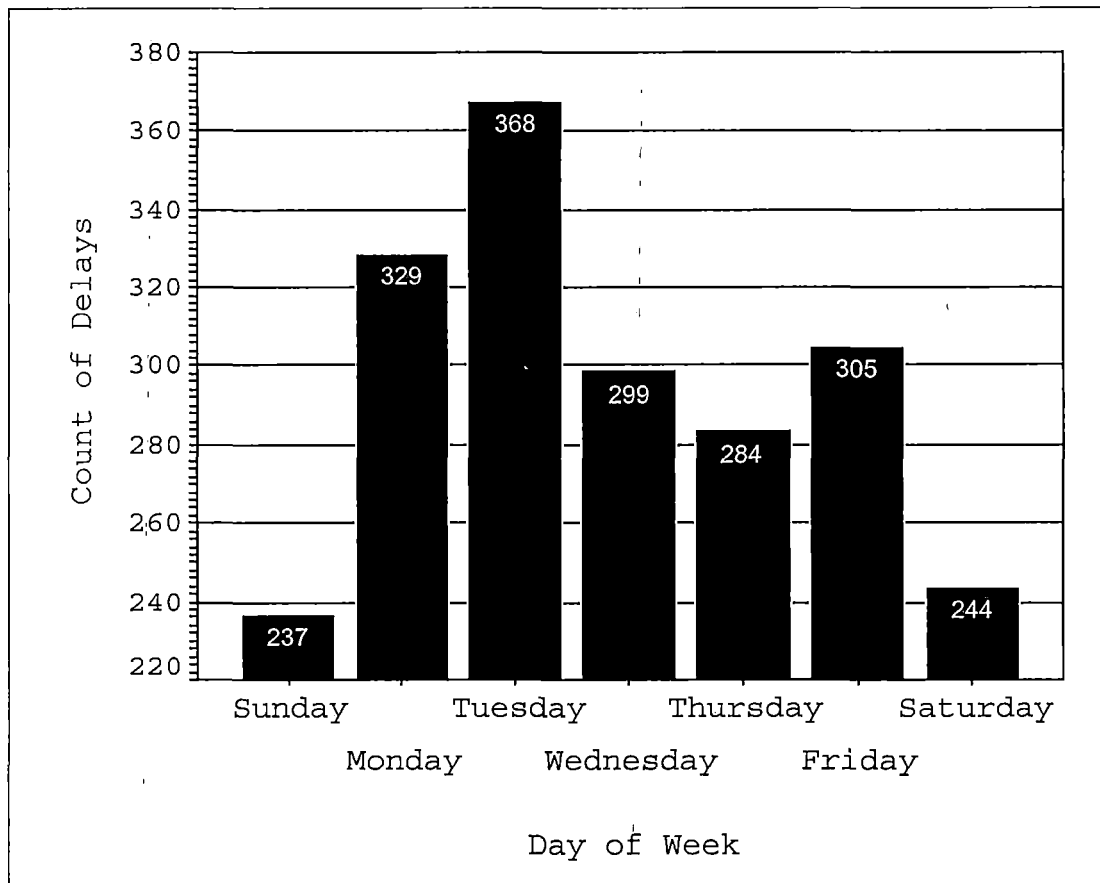


Figure 4. Count of Delays by Day of Week

The average number of delays that occur on a given day of the week (Monday, Tuesday, Wednesday, etc.) and their variations reflect the experiences of hospitals' emergency room demand. Figure 5 profiles the total number of delays throughout the course of a week for the entire period of the study:

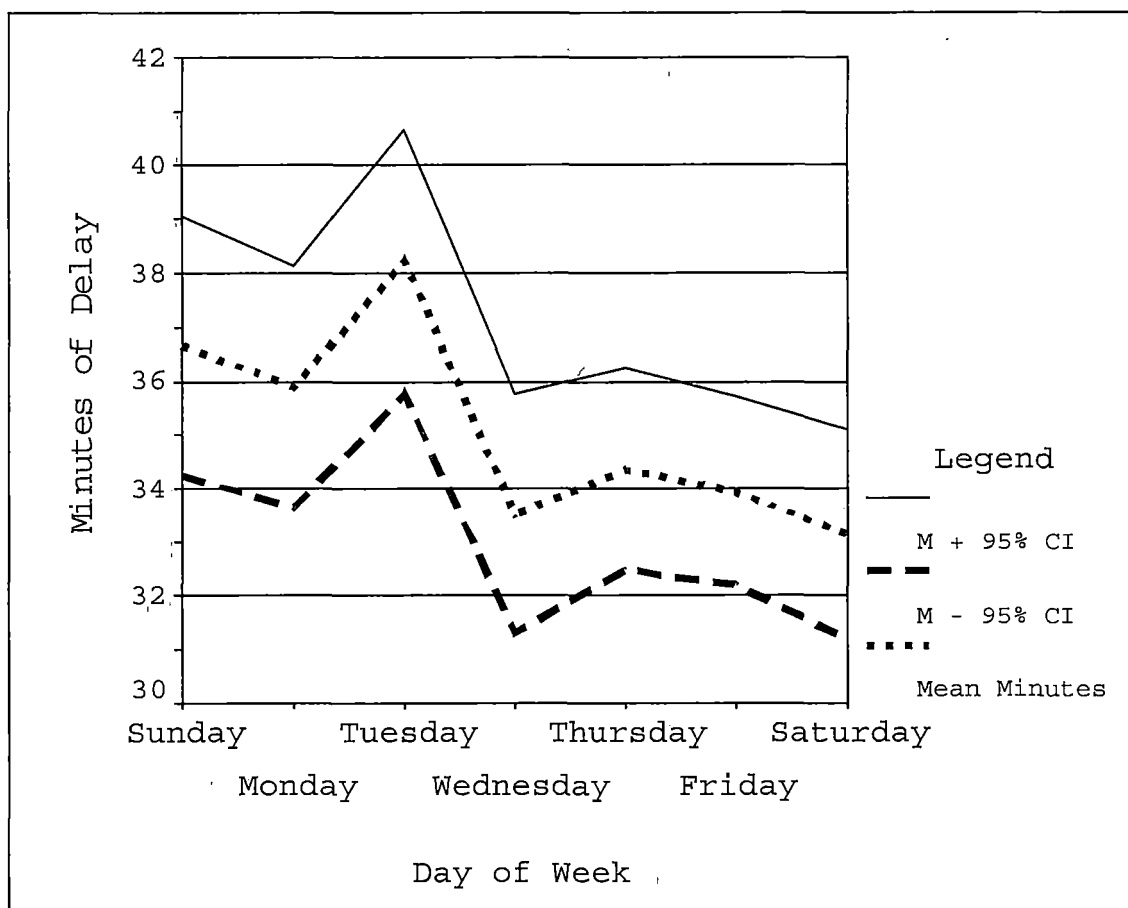


Figure 5. Means and 95% Confidence Intervals for Minutes of Delays by Day of Week

The longest delays occur in the following descending order: Tuesday, Sunday, Thursday, Monday, Wednesday, Saturday, and Friday (Figure 5). When the total number of delays is considered, Tuesday, Monday and Wednesday are the days with the highest number of delays. When the length of delays is considered, Tuesday, Sunday and Thursday experience the longest delays, as opposed to the greatest number of total delays. What is suggested is that just

because there are delays, does not mean that the number of delays correspond to length of delays. The longest delays, occur with the greatest number of delays on Monday, Tuesday and Wednesday of every week (Table 12):

Table 12. Total Minutes of Delays, Minimums, Maximums, Means, and Standard Deviations by Day of Week

Day of Week	Number of Delays	Total Minutes of Delay	Minimums	Maximums	Mean Times	Std. Deviation
Sunday	237	8685.02	.02	116.70	36.6	18.711
Monday	329	11807.37	1.07	178.53	35.9	20.587
Tuesday	368	14062.35	.00	228.52	38.2	23.942
Wednesday	299	10025.92	.03	220.25	33.5	19.574
Thursday	284	9759.18	1.27	155.55	34.4	16.120
Friday	305	10355.90	.08	107.55	34.0	15.681
Saturday	244	8086.40	.03	119.55	33.1	15.507
Total	2066	72782.13	.00	228.52	35.2	19.176

While the greatest number of delays occur on Tuesday, Monday, Wednesday, Thursday, Saturday, Friday, Sunday (greatest to smallest), the average length of delay is close, but not concurrent, with the days that experience the greatest number of delays.

Viewing the average delay times for each day in each month studied revealed an otherwise implicit characteristic of the delays. Sunday is the day of the week every month with the least amount of delays. Sunday has the second longest average delay time—just after Tuesday. The average

delay time on Sunday is the second longest (0:35), just behind Tuesday (0:36).

Determining any significance in the day of week for each delay was one of the most important components of the study. Even if the hospital is not able to address the emergency department delays in their facility, the ambulance provider can increase staffing on the days that emergency department delays are the highest. In order to determine a trend, the emergency department delays for all days were totaled and graphed. Month after month, the trend remained similar, with the emergency department delays from highest to lowest on the following days: Tuesday, Monday, Wednesday, Thursday, Saturday, Friday, Sunday. To determine if the number of emergency department delays were greater on certain days of the week, the total number of delays on each day of the week were graphed. Contrary to preliminary theories, which proposed Friday and Saturday as the busiest time for emergency department delays, Tuesday, Monday and Wednesday consistently experienced the most number of delays.

Contrary to many public safety agencies' assessment of delays which assumes emergency department delays will increase on the weekends, the Antelope Valley study

revealed that delays occur most often on Tuesday, then Monday, then Wednesday, through the end of the week until the weekend, where the delays occur least often. With this revelation, increased staffing of ambulances and emergency departments should occur during these peak times and days to be able to offset the historical influx of patients during these times.

Delays by Time of Day

Is there a specific time of day that delays occur more often? This question was important in order to determine if ambulance deployment could be modified in such a way to minimize the number that would be occupied in the emergency department during saturation. Some staff members with AMR assumed their own times and compared them to the times tracked in the study. The majority of the assumed times were in the morning and evenings, because of rush hour driving to and from work, school and other common places of travel. The time of day that delays are the most prevalent were screened and graphed in Figure 6. Figure 6 represents delays only and not total number of transports to the ED. While the total number of minutes were common around thirty-five minutes, there were spikes in delayed minutes.

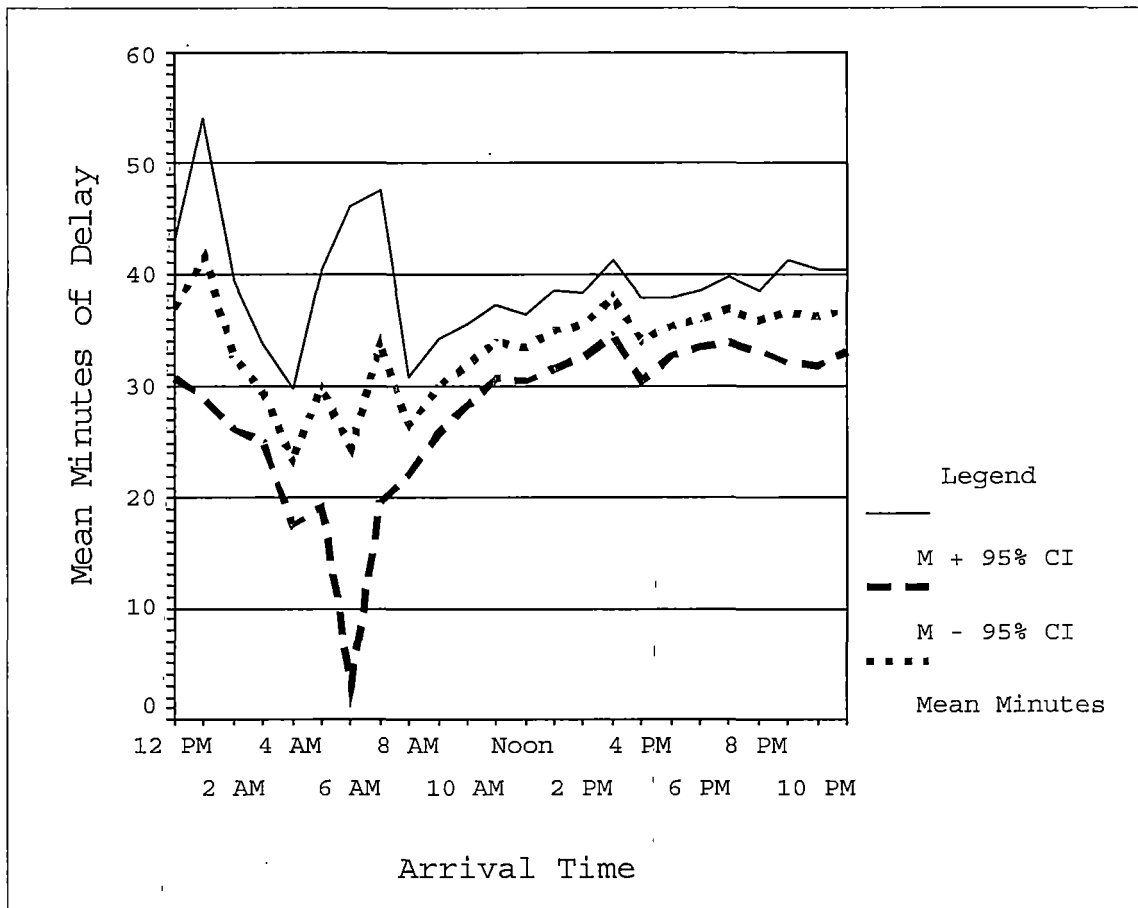


Figure 6. Means and 95% Confidence Intervals for Delay Times by Time of Arrival at Emergency Department

The greatest number of delays occurs between 12PM and 8PM each day. Time of day is relative to the number of delays that occur during the course of a day. From 12AM, with a total number of delays of 44, the total number of delays starts to reduce in number, through 7AM, when they again begin increasing in frequency. From 7AM, the delay totals steadily climb until 2PM where the delay totals peak at 154. This continues through 8PM (113 delays). After

8PM, the numbers reduce, but remain steady through midnight. While they are less than the triple digit peak time of 2PM (Table 13), the number of delays during this period (1,525), remain a potential problem for an ambulance requested to respond on an emergency request for service.

Table 13. Frequency Distribution, Percentages, and Cumulative Percentages of Delays by Arrival Hours

Time of Arrival	Frequency	Percent	Cumulative Percent
12 PM	52	2.5%	2.5%
1 AM	36	1.7	4.3
2 AM	22	1.1	5.3
3 AM	22	1.1	6.4
4 AM	10	.5	6.9
5 AM	9	.4	7.3
6 AM	2	.1	7.4
7 AM	15	.7	8.1
8 AM	23	1.1	9.2
9 AM	30	1.5	10.7
10 AM	84	4.1	14.8
11 AM	115	5.6	20.3
Noon	131	6.3	26.7
1 PM	140	6.8	33.4
2 PM	175	8.5	41.9
3 PM	163	7.9	49.8
4 PM	137	6.6	56.4
5 PM	159	7.7	64.1
6 PM	182	8.8	72.9
7 PM	165	8.0	80.9
8 PM	130	6.3	87.2
9 PM	102	4.9	92.2
10 PM	83	4.0	96.2
11 PM	79	3.8	100.0%
Total	2066	100.0%	

The period from midnight to ten AM experienced the least amount of delays. From 10AM until 7PM, the delays in the emergency department seemed to be constant. It would appear to be that during this period of time (from 10AM - 7PM) ambulance deployment should be the highest compared to any other time of day. It would be in this time period that the greatest number of ambulances should be on the air and ready for response, due to the regular delays experienced in the emergency department at these times. The period of 10AM to 7PM should be staffed most days and to refine the days, deployment should be at its highest during those hours and on Monday, Tuesday, Wednesday and Thursday--since the highest number of delays have occurred during these times.

Delays by Hospital

In an effort to further determine delays versus total transports to each hospital emergency department, total number of delays were computed as a percentage of total transports. Table 14 lists the total number of transports, total number of delays and the corresponding percentage:

Table 14. Number of Delays, Number of Transports, and Percent of Transports Delayed by Hospital

ED	Transports	% of All Transports	Delays	% of All Delay	Delays as % of Transport s
AVH	8,094	58.1	1,591	77.0	19.7
HMH	3,565	25.6	75	3.6	2.1
LCH	2,268	16.3	397	19.2	17.5
Total	13,927	100.0	2,066	100.0	14.8

Even though AVH transports over 58% of all emergency department admissions, LCH has the longest delays (Table 15). In other words, LCH receives less transports, due to their smaller bed capacity, though making the bed available takes more time.

Table 15. Total Minutes of Delay, Percent of all Minutes, Means, Standard Deviations, Minimums and Maximums by Hospital

Hospita l	Total Minutes Delay	Percent of All Minutes	Mean Delays	St.Dev.	Minimum	Maximu m
AVH	53,497	73.5	33.6	16.6	0.0	220.3
HMH	2,324	3.2	31.0	14.6	9.6	86.1
KP	85	0.1	28.5	5.1	22.8	32.6
LCH	16,876	23.2	42.5	26.4	0.1	228.5
Total	72,782	100.0	35.2	19.2	0.0	228.5

The preceding stratification of delays provided details. Tables 14 and 15 proved what AMR proposed, which was that delays at HMH in Santa Clarita were not an issue of concern

(2%), compared to the Antelope Valley, where nearly twenty percent of all transports resulted in a delay. The attention to the emergency department delay problem remained within the Antelope Valley, as opposed to the entire service division of the Lancaster AMR Operation. Table 16 lists the percentage of delays stratified to determine if the delays are just delayed (any delay; less than thirty minutes) or for any delay that is extended (greater than thirty minutes):

Table 16. Percentages of Delays Less Than or Equal to Thirty Minutes and Greater than Thirty Minutes by Hospital

Hospital	Delays		Totals	Delays
	<=30 Minutes	> 30 Minutes		
AVH	50.2%	49.8%	100.0%	1591
HMH	58.7%	41.3%	100.0%	75
KP	66.7%	33.3%	100.0%	3
LCH	41.1%	58.9%	100.0%	397
Totals	48.7%	51.3%	100.0%	2066

While the majority of the delays were greater than thirty minutes (>30 min.), the delays greater than one hour (>1 hr.), as well as those less than thirty minutes (<30 min.) all contributed to a delay or potential delay of the otherwise available ambulance responding to a 911 request for service.

CHAPTER FOUR

AN EVALUATION OF NORTH
LOS ANGELES COUNTY

Challenges to the Study

Attaining full cooperation with participating agencies remained a challenge to the Antelope Valley case study results. Among the agencies participating were Lancaster Community Hospital, Antelope Valley Hospitals, and the Department of Health Services. By not siding with the hospitals or the fire department and ambulance provider, DHS assumed a neutral role.

Hospital Responsibility

It was with the hospitals that the most challenging episodes of responsibility were experienced. The topic itself (delays in the emergency department) instantly placed the hospital management into a defensive mode. The task force knew that the emergency department was the bottleneck to the rest of the hospital, where patients arrived both by appointment, walk-in and via ambulance. This premise was agreed upon early in the process. When speculation about extended delays were transformed into numerical data from the ambulance provider, and supported

through the ALS pre-hospital care provider (the fire department) reporting, the two hospitals moved into a defense mode, attempting to explain the reasons there are delays and that nothing could be done to correct them. Their defensive stance complicated the efforts to analytically assess the delays and collectively arrive at a common solution.

In the beginning of the study, the larger hospital (AVH) assumed a more active role in the solution process. The hospital had a paramedic liaison nurse (PLN) who effectively conveyed the data to his management team and arrived at the meetings with positive feedback to brainstorm methods of reducing delays.

LCH—the smaller hospital—became defensive and did not participate in the meetings regularly. Within one year, the roles were reversed. The AVH PLN was hired by LA County Fire Department; AVH got a new PLN and voluntarily dropped their base station status. LCH got a new emergency department Director and CEO and regularly attended the meetings. In early 2002, AVH held a press conference and diverted the attention away from their emergency department. They publicly asserted that as the larger hospital, they received more patients than LCH and this

contributed to their inability to effectively manage the extra patient load. They further made a standard practice of literally closing their doors to internal crisis. In this mode, pre-hospital care providers would have to transport one patient to LCH, two to AVH. Because AVH asserted that the ambulances automatically bypassed LCH for AVH because of AVH's active efforts to remove the patient from the ambulance gurney, AVH would take increasingly longer to downgrade from emergency department saturation. This method worked effectively for AVH and DHS made the method a protocol under review through 2002.

Hospital Versus Pre-Hospital

Even before the emergency department delay task force, pre-hospital care providers and emergency department staff experienced a challenge to authority. Largely due to the "rescue" mentality among pre-hospital care providers and the fire department, the hospital staff remained offensive to certain members of the pre-hospital care community. Once the emergency department delays were brought to the attention of the emergency department management, the line staff of the emergency department went into defense mode. With an already tense relationship (at times), this

suggestion of responsibility for the delays belonging to the emergency department created an increased resistance to methods that were produced from the meetings. One of the methods the emergency department would implement was to have the ambulance crew's patient evaluated within five minutes of arrival in the emergency department. This evaluation consisted of an initial report to an emergency department nurse. The crew would also advise the emergency department staff of the level of units available to run calls at that time. If the crew stated, "we are at a level two," that meant that there were two other ambulances available to respond to 911 requests for service. Advising the evaluating nurse of the level was intended, theoretically, to increase or decrease the urgency of transferring the patient to the hospital's bed. This plan did nothing short of further emphasizing the already perceived "rescue" mentality of the pre-hospital personnel, suggesting that their ability to respond to a call was more important than the hospital's ability to handle excessive patient flow. This advising was informally discontinued due to the response from the emergency department staff.

Cooperation among the different agencies remained among the most compelling improvements to emerge from the

emergency department delay project. Traditionally executing their duties independent of one another, the ambulance provider, fire department, department of health services, EMS agency and the local hospitals voluntarily contributed to accomplish a common goal. Contrary to preconceived reservations prevalent within each organization, each agency brought something unique and useful to the meetings!

Reluctance to Address Problem

The reluctance to address the true problem of emergency department delays was largely due to the hospital's normal methods of evaluating, treating and releasing patients. Throughout history, they did it the same way. While delays in the emergency department were a formality of the system, they did not last long (from the perspective of the hospital staff). With the exception of ambulance gurneys lined in the hallway, patient complaints about waits or pre-hospital care providers bringing the problem to the attention of hospital management, the hospital had no way of knowing that the delays impacted the ambulance provider; nor were they aware of the degree.

This unknown became one of the many motivating factors that guided the study.

Personality Conflicts

Among many duties, fire fighters fight fires, respond to rescues and perform inspections to ensure the safety of structures and state fire standards. Nurses comfort and evaluate patients. Ambulance providers perform the duties of comfort and evaluation of patients, complemented with the aura of fast driving, lights, sirens and rescues. The combination of these varying personalities created an ever-changing conflict during task force meetings. The leaders of the meetings (Assistant Chief with LA County Fire Department and the Assistant Director of the EMS Agency) were forced to maintain an objective role during the process, while interjecting their own experiences relative to the discussion at hand. At times, certain members of the team implemented sarcasm and passive resistance methods, in order to emphasize personal or professional disagreement with certain members or topics of discussion. These tactics proved to be counter-productive and were even commented on in one meeting. Department heads were even contacted on more than one occasion.

Public Versus Private Agencies

The public agencies were:

- Los Angeles County Fire Department
- Department of Health Services
- EMS Agency
- Office of District 5 Supervisor Mike Antonovich

The private agencies were:

- Antelope Valley Hospital
- Lancaster Community Hospital
- American Medical Response

Public and private interests are items of discussion in many groups. They are weighted during requests for proposals and even voted upon initiatives during elections. The systems that offer the most benefit to the most people remains the preferred unit of measurement to determine efficacy of public or private service or goods. The delivery of pre-hospital care and ambulance service continues to be a debatable subject of should the public or private provider do the job? In LA County (and other parts of the country, there is a joint effort between the fire department and the ambulance provider. The fire department provides the ALS care while the ambulance provides the BLS care and the ambulance transportation. The question was raised: whose responsibility is it to ensure that patients

receive medical care? The answer was not the government. Contrary to public perception, the government is not charged with ensuring medical care for all. The hospitals, fire departments and contracted private providers are obligated to provide medical care to all—regardless of their ability to pay. However, if there are no hospitals in an area, or if medical care is needed, the public is burdened with attaining such care. Once it was determined that the government (federal, state or county) was not obligated to bring medical services to those who need it, the focus of public versus private became less of an issue. The public sector confirmed their position of providing for the good of the people (even though they were not constitutionally obligated to do so, while the private providers were obligated to provide care to all—due to EMTALA and all contractors of Medicare and Medicaid programs. If nothing else, both the public and private providers learned more about the other side of care providers' duties and roles in the communities that it serves. This benefit was extra and certainly not a planned part of the process. Considering initially different representatives would attend the meeting each month, cooperation became an asset to the teams.

Data Collection and Analysis

Data collection and analysis remained among the most continually evolving aspects of the study. The initial data to be collected started with time of day, day of week and call type and was scheduled to be tracked for only three months: September, October and November 2000. This initial tracking proved to be limited in determining true trends that would appear over time, and needed to be expanded to include at least six months and other more compelling constructs such as length of delay, length of delay for each day of the week, compared delays over time for the half year and others. The question to be answered was when do delays occur and are there any reasons for delays that can be eliminated through identification of factors to which the ambulance provider held some control? Through the monthly meetings, via input from each contributing agency involved, data collection by the ambulance provider was modified to reflect areas of relevance to the study of wait times as a whole. Once the task force agreed upon data, changes were made to the report that reflected additional tracking of trends and types.

Acceptable Definitions

Just what is considered a delay in the emergency department? How much time is expected to pass during a normal transfer of care scenario, in which an ambulance crew would arrive at the emergency department, transfer the patient from the ambulance gurney to the hospital's, give the patient report, prepare the ambulance for the next call and leave the hospital ready for the next response? The national company standard (American Medical Response) is between twenty and twenty two minutes. This standard is based upon the crew arriving at the emergency department and no one from the emergency department advising that there are no beds available. For the purpose of the study, the initial tracking of delays was the point when the crew arrives in the emergency department and the emergency department staff advises "no bed availability." At this point, the clock would begin ticking. After the patient was transferred to the hospital's gurney, the crew was supposed to advise dispatch that they are "10-98" (available, but still at the facility). Once they are available and on the air ready to respond, they would be "10-98, 10-8." If the crew failed to advise dispatch when

they were 10-98, the delay clock continued to run, extending the delay an average of ten extra minutes, depending upon the length of time it took for them to complete their call after the patient had been transferred. It was not until May 2002 that this question was raised by the EMS department. The data collected prior to this streamline in tracking the delays all contained potentially extended delay times. After May 2002, the crews were specifically required to advise dispatch when the patient left their gurney under a delayed bed scenario.

To further narrow the potential of losing data to crews not advising when they are delayed with no beds, "turn times" were later tracked for all calls. Turn times are the hospital departure time (10-98, 10-8) minus the arrival time (10-10 time). For example, if a crew arrived at 21:15 and left the hospital at 22:30, the turn time would be 1 hour, fifteen minutes (01:15). Compensating for the times that are acceptable or standard turn times (20 to 22 minutes), delays of greater than twenty minutes were tracked only. A call was not considered a delay unless the delay was greater than twenty minutes (>20 min.). Delays are now tracked in the following levels:

- >20 minutes
- 30 minutes to 59 minutes
- 1 hour or greater

While this latter modification to the criteria that defined delays and turn times reduced the total number of delays overall, it increased the range of the delays as well as the average length of the delays. Since these modifications were implemented after the initial seven-month project, the data is not included past April 2001. These modifications are anticipated to effectively track true delays and their effects on the ambulance provider, as well reduce the potential for dispute when data is brought to the attention of the hospital management. It also increases the validity of the data by using methods that have been utilized over time, and collectively enhanced, modified or completely eliminated by the emergency department delay task force.

CHAPTER FIVE

A PLAN OF ACTION FOR REDUCING DELAYS

Delays in the emergency department due to bed shortages presents as an unsolvable problem in its current form. The problem is a direct one: No beds equal emergency department delays. The solution is not as simple, since bed availability is rarely reparable without adding more beds to the emergency department, ICU and hospital as a whole. If more beds are added, then those too will possibly be filled.

Ambulance Diversions

"Over four years, diversion increased 453% [n=718 in 1986 versus 3,973 in 1989]" (Redelmeier 1994). Diversion to other local hospitals proves to be a temporary solution for the inevitable: ED saturation (Redelmeier 1994).

Controlling Supply and Demand

Considering supply and demand drives the bed shortage issue, the only viable solution is to reduce the demand. In the Antelope Valley study, it was determined that one of the most significant reductions in emergency department

delays would be that of upstream methods. If patients could use an alternative source for access to care, the emergency department would be less taxed. To facilitate the need for health insurance for those who would qualify, AMR became an enrollment entity (EE) with the California State Healthy Families Program. Attaining this EE status allowed AMR to work with the county and state to reduce the number of uninsured users of 911 services. Having health insurance would promote the insured to use a primary care physician or urgent care instead of the emergency department.

Emergency Department User Education

The Los Angeles County Department of Health Services composed a pamphlet to be distributed to the public at health fairs and community events. The pamphlet outlined the important question of what is a true emergency and where does one go to get care if they experience a non-emergent medical condition. The LA County Fire Department also worked with AMR to create a pamphlet to be distributed on 911 responses. The pamphlet would be given to any patient who called 911 and could have accessed medical care in an alternative setting such as an urgent care or clinic.

The difference between LA County DHS' pamphlet and LA County Fire and AMR's is the fire department and AMR have the ability to give the material to the user immediately upon access to the 911 system, while DHS would hopefully prevent the 911 call in the first place. Methods to reduce demand have been attempted in most hospital settings across the nation and even the world. The ones that work the best are those that virtually change the thinking of the patient in order to modify the behavior and subsequently reduce emergency department use.

Hospitals have exhausted their expendable resources and ideas to reduce emergency department delays. However, when hospital administration accepts that emergency department delays are a way of life for the ailing patient, efforts to defeat the delay crisis will have failed.

Though delays present as an unsolvable problem in its current form, hospital administration must never accept the problem as a formality of the system. One of the jobs of a health educator is to convince people to stop smoking cigarettes. Some people stop, others continue. Whatever the outcome, the health educator never ceases the message. Like the health educator who has a message to send, even

though it is not always received, administrators must always battle the emergency department delay beast.

The Antelope Valley Case study and retrospective analysis of ambulance delays in the emergency department due to bed shortages presented a problem of emergency department delays, their origin, most common reasons for delays and potential solutions to the problem based upon what has been done to reduce the delays as well as new ideas of prevention.

Future Research Needed

While the data extracted offered a considerable amount of information, there is ~~more~~ research to be done to determine trends in different areas, as well as accurate tracking of reasons for calling 911, versus the actual admission reason on the emergency department medical chart.

Proposed Solutions

- Implementation of a computer program would increase accuracy of extrapolated data

A computer-programmed database in conjunction with the ambulance provider and emergency department should be implemented in order to create a more accurate depiction of

true emergency department delays. In the Antelope Valley study, emergency department delays were described as any time the emergency department staff advises the ambulance crew there are no beds. The delay clock would begin and would not end until the crew cleared the hospital. This method of tracking delay data had the potential to be extended, especially if the crew failed to clear the hospital immediately after the patient was unloaded. A computer database would be able to track the delays more accurately if the crew could call into dispatch a time of arrival at the emergency department and a drop time. Even if the crew remained at the hospital after the patient received a bed, the delay clock would stop at a true drop time. An average drop time would be established based upon an efficacious, reasonable amount of time expected to be able to secure a bed for their patient and leave the emergency department. Delays over the average drop time only would be tracked. This would render a more accurate depiction of delay times in the emergency department. Standardizing the parameters of wait times based upon a simple database would reduce the presence of false data.

- The length of the study should have been longer.

Seven months covers the majority of a year. At the same time, the period of time this study was conducted was around the time the weather changes and the likelihood of illness is higher at the change of seasons. The study began in September 2000—the beginning of autumn. It continued through autumn, winter and into spring. At these times of year, illness is higher, compared to the summer. The potential for a higher number of emergency department delays during this time due to an increased number of illnesses, which taxed emergency resources, had the ability to negatively affect the results. Though this possibility existed, three out of the four seasons of the year were studied. Increasing the period of study would also reduce the controversy over administrators who use length of study as a reason to further postpone addressing the emergency department problem.

- Increased coordination is needed among the ambulance provider, emergency department and hospital staff.

Tracking delays in the emergency department from the ambulance provider's perspective proved to be a challenging and often times inflammatory process that produced few positive results with pre-hospital care providers and hospital line staff. The ambulance providers were placed

in an uncomfortable position with the county EMS agency, since the ambulance provider could not always meet the response time criteria set by the county, due to an occupied ambulance in the emergency department. The emergency department staff faced a challenge to reduce wait time by magically making beds appear for the ambulance patients, as well as the walk-ins. When the ambulance provider failed to effectively (and cautiously) communicate their needs to the hospital staff, the results were less-than efficacious. The pre-hospital staff is viewed as unrealistic and unsupportive of the emergency department's dilemma. The emergency department is presented as insensitive to the ambulance provider's needs. At times, the emergency department presented as the origin of the problem—the reason the ambulance could not unload the patient and be on their way. Communication between the two organizations proved to be essential in managing the problem. In fact, over the period of the study, not only did emergency department delays not decrease, they increased in number and length (172 in September 2000 to 347 in April 2001). Communication must be improved to render a quality service the hospital staff can deliver,

the ambulance provider can handle and the patient and county will accept.

Since May 2002, the results of the Antelope Valley case study have become the leading indicator of emergency department delay progress in the North Los Angeles County region. Originally involving American Medical Response Antelope Valley Division, Los Angeles County Fire Department and the Antelope Valley hospitals, the monthly meetings have progressed to a North Los Angeles County task force now including LA County Department of Health Services, LA County Public Health Department and LA County District five (5) Supervisor Mike Antonovich's office. At the monthly meetings, each agency brings their own data, issues, experiences over the past month and ideas for improvement of the system. While the communication has improved from heated discussions, to controlled cooperation, the delays remain constant. Antelope Valley Hospital has expressed a concern over receiving more than their fair share of emergency department transports. In February 2002, they began closing their doors to any additional patients once they reach saturation. Prior to this tactic to "catch up" with the flow of patients through the emergency department, AVH-like all others—would still

accept patients; the patients would just have to wait. Using their current methods, the waits are expected to increase in number. This action by AVH has also further complicated the already sensitive relationship between AVH, pre-hospital care providers and Lancaster Community Hospital. Each month, the Antelope Valley population increases, the potential for the number and length of delays also increase.

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