EMERGENCY MEDICAL SERVICES IN THE ROCHESTER REGION OF NEW YORK STATE: ORGANIZATION, SERVICES AND SYSTEMS

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Kenan S. Baldridge

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EMERGENCY MEDICAL SERVICES IN THE ROCHESTER REGION OF NEW YORK STATE: ORGANIZATION, SERVICES AND SYSTEMS

Kenan S. Baldridge

Dissertation

Approved: ____________________________
Advisor
Dr. Raymond Cox III

Accepted: ____________________________
Department Chair
Dr. Sonia Alemagno

Committee Member
Dr. Ralph Hummel

Dean of the College
Dr. Ronald F. Levant

Committee Member
Dr. Nancy Grant

Dean of the Graduate School
Dr. George R. Newkome

Committee Member
Dr. Lawrence Keller

Date

Committee Member
Dr. Dena Hanley
ABSTRACT

In 1966, the U.S. Department of Transportation published what was to become a landmark study: “Accidental Death and Disability, the Neglected Disease in Modern Society.” This work reviewed the then current state of affairs of prehospital medical care in the United States. It painted a horrendous picture concerning the quality of care rendered to American citizens during the time of an emergency. The information presented so astounded the federal government and the medical community that many efforts were undertaken to respond to the findings of the work.

New York State responded to the report some eight years later with the enactment of the Emergency Medical Services Act of 1974. Known as “Article 30,” this act set out lofty, but vague, goals for improving the quality of emergency medical care provided to the general public. It is the thesis of this study that the organization design chosen and the implementation methods and tools employed, were grossly inadequate to the task. Add to this a meager allocation of resources, and the State’s response became pre-destined to fail.

In the Rochester Region, formal groups associated with health care or ambulance response did little. A handful of local leaders acted on their own initiative to respond to
the problem. A federal grant provided funding for a university-based program concerning data collection, “coordination” of pre-hospital programs, and medical training for ambulance attendants, though its reach was very limited. There was only limited regional effort to respond to the new State level EMS policy. EMS service levels remained dismally low in many parts of the state. The quality of care provided to the public was highly questionable for a significant number of patients treated.

This work seeks to determine whether EMS service provision in the Rochester Region of New York State meets national quality standards on a consistent basis, the reasons why or why not, and how progress actually gets accomplished.

The implementation of statewide policies requires many choices. These choices must address many levels of government and many steps in the implementation process. These include choices of goals to be achieved as well as which underlying technical theories are believed useable for obtaining them, whether to use an existing agency, or construct a new administrative organization or structure. Lastly, choices must be made as to which inputs, outputs and outcomes to measure for evaluation purposes, if any at all.

At the state level, the legislature chose to use a new organizational strategy, that of the EMS council system, which it hoped would somehow lead to progress. Additional choices were made that meant there would be little regulation and no evaluation. This left the ultimate control over service provision and control in the hands of the local EMS providers. The quality of the service provided was determined at the local level.
The research questions were answered. EMS service provision in the Rochester Region of New York State does not meet national quality standards for providing meaningful and effective emergency medical care on a consistent basis. The quality of the EMS service provider is determined in large part by the most influential officer(s) of the service. The key decisions about quality are largely retained by the organization itself, rather than outside forces.

The primary reason the region does not meet national standards on a consistent basis is because the State constructed a “system architecture” for EMS in New York with an organization design that compares poorly to characteristics of effective organizations. This left the State with an ineffective administrative system architecture to implement its policies. The EMS Council system was a poor choice. The fact that any progress was made at all was the result of local, pioneering leadership. Progress in quality EMS service provision in the Rochester region was made despite the EMS council system and State policy rather than because of it.
ACKNOWLEDGEMENTS

Many people contributed to the accomplishment of this Sisyphean labor. Several friends, teachers and fellow travelers in EMS all contributed in their own way, either with important information, insights or timely encouragement. Yet, two individuals stand out as having made the most important and significant contributions beyond all others.

Dr. Raymond Cox contributed many hours of effort, boundless energy and long measures of persistence to help me overcome all the hurdles placed in my way by time or circumstance. His timely assistance and insightful reviews of my work helped me to achieve not only this particular work, but also the years of course work, exams and endless labors of research necessary to bring this all to a successful conclusion. Most of all, he is a man of honor and integrity who keeps his word.

My loving and devoted wife, Lynne, deserves special mention for her years of support and tolerance while I undertook yet one more course, one more book, or one more draft of seemingly endless papers in order to conclude this endurance contest successfully. Her patience and undying support are most appreciated.
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In 1966, the National Academy of Science and U.S. Department of Transportation published what was to become a landmark study: “Accidental Death and Disability, the Neglected Disease in Modern Society.” This work reviewed the then current state of affairs of prehospital medical care in the United States. The information presented so astounded the federal government and the medical community that many efforts were undertaken to respond to the findings of the work. Without detailing the work, suffice to say that this work painted a horrendous picture concerning the quality of care rendered to American citizens during the time of an emergency.

Over the ensuing thirty years, a collection of national trends emerged in response to this issue. These included expert-derived standards of care and service delivery that could be used as a basis for providing top quality emergency medical care to patients in any part of the country. These standards of care and service delivery can be extrapolated into what might be called “quality determinants” that were based on research and experience in the field. This included the identification of certain important time frames for service delivery, favored treatment modalities, and, to a degree, ways of organizing and preparing one’s EMS service in order to provide top quality care (Grace, 1964, 1974,

This led, ultimately, to an array of service types and levels – a framework of sorts – that characterizes EMS today. This array includes: a) a choice of the type of service provided, b) a distinction between the levels of service, and c) choice of the degree of quality within the service level chosen to be provided. Lastly, not part of the framework, but important to the choices, is the question of the institutionalizing of the quality within the organization.

Since health care provision is the province of the states, rather than the federal government, the next logical step in the progression of standards and policy development was for each state to enact policies and take actions that would deal effectively with the problem identified.

The implementation of statewide policies requires many choices. To be effective, these choices must address many levels of government and many different steps in the implementation process. These include choices of goals to be obtained and which underlying technical theories are believed useable for obtaining them. Further, it is necessary to make a choice concerning the use of an existing agency or the construction of a new administrative organization or structure to carry out the policies. Realistically, some definition of the power relationships among all involved is necessary, as well.
Lastly, choices must be made as to which inputs, outputs and outcomes to measure for evaluation purposes, if any at all. Goals, policy adoption, administrative structure choice, resource allocation, anticipated confounding factors (and their presumed preemption), and parametrics -- it is the interplay of all these choices that will ultimately determine the outcome.

The issue of Emergency Medical Services systems is fundamentally a state-level issue. The federal government has long since abdicated the leading role in EMS it once played in the late 1970's and early 1980's. The state is the level of government that can best undertake meaningful change, establish essential administrative standards, and exert effective oversight (Bothwell, et al, 1992) The Federal government is too distant to exercise meaningful oversight, and the local governments do not have either statutory or medical authority to do so.

New York State formulated a response to the Academy report some eight years later with the enactment of Chapter 1053 of the Public Health Laws, the Emergency Medical Services Act of 1974. Known as “Article 30,” for the enumeration of the act within Public Health Laws, this act set out lofty goals “to promote the public health, safety and welfare by providing for registration or certification of all ambulance services, the creation of regional emergency medical services councils and a New York state emergency medical services council which should develop minimum training standards for emergency medical technicians and minimum equipment and communication standards for certain emergency medical services.” (Article 30, Section 3000, p. 1).
By this Act, New York State chose to create a rough framework of law that would toss the problem to a loose network of newly created local, “regional” EMS Councils. The hope was that these new EMS Councils would create both an operational approach and improved clinical effectiveness (Article 30, Section 3000). This was set against the strong tradition in New York State of the doctrine of local control – that, unless the State mandated a particular course of action, local officials or practices would continue to decide matters. Article 30 mandated only that the State EMS council would be established, that regional EMS councils would be established, that the State would set up a system of registering all ambulance services and certifying some (selected) ambulance services, and that the State EMS council would develop minimum training standards, minimum equipment and communication standards for some EMS services.

No guidance was offered nor any means provided to support these council activities. Their charge specifically included personnel training. These were only general goals and no resources were supplied to assist them, no timeline established to motivate them, and no monitoring provided to even know if they were successful.

The question to be explored in this study is whether or not the administrative design chosen, including the organization design (both structure and function), the implementation methods and tools employed, and the resources allocated were adequate to the task. This will be examined from the local perspective, that is, the Rochester Region and the constituent EMS Council Regions and counties. The overall
administrative design will be reviewed in terms of whether or not it is able to deliver
services that meet national quality standards on a local basis.

Evolution of the Policy Environment

The Legal Foundation; Article 30/Part 800 and Amendments

The legal foundation for EMS in New York State is Article 30 of Chapter 1053 of
the Public Health Law of 1974 (taking effect in 1975). This section of law, with its
subsequent administrative code ("Part 800") effectively put the undertakers out of the
ambulance business in 1974. “Article 30,” as the law is commonly referred to, required
that all ambulance services in the state become registered with the health department as
such, and that certain services providing ambulance transportation (e.g., aircraft,
maritime or other vehicles) become subject to regulation. The undertakers – who never
really wanted to be in the ambulance business in the first place -- did not register as
ambulance services, hence could no longer provide the service. "Registration," as
implemented by the Health Department, simply meant that the State knew that you were
there providing the service, and they have you on a list as a provider ambulance service.
Registrations were handed out to any pre-existing ambulance service, since all were
“grandfathered” and there were no standards that need be met.
A separate, but related, program provided registered ambulance services with “HEAR” (Hospital Emergency Ambulance Radio) radios that allowed direct communication between ambulances and hospitals. This federally funded program established a modicum of communication for prehospital providers and generated the first full reference listing of them (Communications Manual, 1979). It was not entirely accurate, but was a rather good start for an area where any information was scarce.

*Historical Geography of EMS in New York*

New York State was surveyed, settled, and developed over a period of roughly two centuries. This somewhat unique historical and geographical pattern of progressive settlement and development of small towns and counties in New York has had the effect of "fixing the pattern" of EMS delivery (Thompson, 1977). This pattern, when combined with the political doctrine of "local control," has had the effect of allowing, if not encouraging, the fragmentation of service delivery, and guaranteeing local control over its management and evaluation. Time has ossified this pattern of fragmented service delivery (Thompson, ibidem, Communications Manual, 1977 and NYS DOH website listing of ambulance services).

This pattern of highly localized service delivery is then loosely overlaid by a network of EMS Councils that are roughly contained within a collection of eight health service regions, as illustrated in “Designated Health Service Areas – New York State,
This was later reduced to six regions by 1979 according to the Communications Manual from the Bureau of Emergency Health Services, April 1979. EMS law charges these EMS Councils to "coordinate" EMS services within their respective areas, although what "coordinate" means under the law has never been defined. In addition, there is no statutorily defined relationship between the state health department officials and the EMS Councils in any given region, or the State.

There are an estimated 18,976,457 people in New York State in 2004 (NY Statistical Yearbook, 2004). To "protect" them, there are 1,140 ambulance services in New York State (E. Wronski, personal communication, 2004 and official State reports at www.health.state.ny.us/nysdoh/ems/art30.htm) down from the 1,188 ambulance services reported in 1986 (M. Gilbertson, 1987). Of this number, 85 (7.5%) of them are commercial services, 564 (49.5%) are fire department ambulance services, and 478 (41.9%) are non-fire department services; "independent volunteer" (separate non-profit corporations not affiliated with a government or fire department), municipal, industrial or hospital based services. The remaining are run by the state or federal governments (These and immediately following data come from the official NYS DOH website: www.health.state.ny.us/nysdoh/ems/art30.htm). In 1998 (the last year for which data are available), ambulance services handled collectively a reported 1,573,350 ambulance calls. Of these calls, according to the NYS Department of Health official website, 5,650 calls for helicopter service were reported, but 2,450 (42.8%) of them were not handled.
An examination of the population base of New York State shows significant portions of the population within the prime risk age cohorts for traumatic injury (MVA & homicide) – 15-24 years, and also in the prime risk age cohorts for cardiovascular emergencies, 40-59 years. A large cohort of population (30-39) is moving up toward the prime risk ages for cardiovascular emergencies. Both of these prime risk cohorts (trauma and cardiovascular) can potentially benefit directly from prompt emergency medical care, particularly when accompanied by ALS.

A review of the Rochester Region population base reveals very similar patterns. According to official NYS listings, there are 111 ambulance services and 120 non-transporting first responder services (NYS DOH official website) providing coverage to an estimated 1,260,643 people (NYS Statistical Yearbook, op cit.). The reader should note that the number reported for the first responder services is somewhat misleading.
Some of these are actually functioning ALS provider services that support transporting ambulance services on a tiered-response basis. Although they might provide traditional first responder services on occasion, their main function is as an ALS provider service. The State reporting method does not distinguish these from other, true first responder services. All of this leads to some duplication in the listings and the numbers. Of these services, 58 (52%) are fire departments with the balance being comprised of a mixture of independent volunteer departments, commercial, industrial, municipal, college and hospital-based services (NYS official listings, ibidem). The number of ambulance calls handled in the Rochester Region is not reported by the State.

Figure 1.2: New York State Population: Age/Sex Pyramid
Source: 2001 NYS Statistical Yearbook, Rochester Institute
Note: Age categories modified to reflect consolidated categories used in county population tables
The significance of the distinctions made above is that since 1974, the commercial, hospital based, and some municipal ambulance services (those in a city with a population of one million or more) had to meet NYS certification standards, subjecting them to some very elementary form of regulation. All others did not have to meet any minimum standards at all until 1997 (Article 30, section 3002.2).

For largely historical reasons, New York State is one of several states in the northeastern part of the United States that has evolved with a history of "voluntarism" in the provision of many of the public services. As far as the three traditional emergency services (police, fire, and ambulance) are concerned, voluntarism has developed primarily in two; fire protection and ambulance service. Partly as a result of this historical evolution, plus modern considerations of public cost, the fire protection and
ambulance services (the latter now known as "emergency medical services" - EMS) have largely remained in the volunteer sector. While several commercial ambulance services and a few municipal services do exist, they are clearly outnumbered by volunteer services in terms of numbers of "provider services" (as they are often called)\(^1\) and numbers of personnel (N.Y.S. Health Department, EMS Development Program, 1987 and 2004).

Beginning about 1982, the State took on ALS course curriculum development and produced a Critical Care Technician or “CCT” curriculum. The early courses involved fifty hours of classroom training (over and above the Basic EMT requirements) and thirty-five hours of clinical training. Graduates were allowed to perform and interpret EKG’s, use defibrillators, start IV’s and give medications through them (NYS DOH official curriculum for AEMT-III).

Included in the revised Article 30, there is a provision requiring each EMS service to have a Quality Improvement Program. However, the law does not say what it must be. The EMS Council may adopt such a plan and the individual services may adopt that plan or come up with their own. According to State Health Department officials, although the DOH has authority to review such matters, there is only one such representative in the entire Rochester Region who would do it. He reviews such matters only “in the breach,” relying on the EMS councils to conduct medical oversight.

Despite this adoption of a public policy, emergency care service levels remained low in many parts of the state, and the quality of care provided to the public was highly
questionable for a significant number of patients treated (Gilbertson, 1986). EMS in New York State offers differing levels and quality of care provision that vary significantly from place to place and region to region.

The Policy; Official, Unofficial, Development and Consequences

The official policy.

"Article 30," as the law is usually referred to, established the State's official policy concerning Emergency Medical Services. The official policy of the state first declared: "The furnishing of medical assistance in an emergency is a matter of vital concern affecting the public health, safety and welfare. Emergency medical care.... And safe handling and transportation of sick, injured and disabled are essential public health services." Having made this declaration, Article 30 then declared that the goal of the state was: "...to promote the public health, safety and welfare by providing for registration or certification of all ambulance services, the creation of regional emergency medical services councils and a New York state emergency medical services council which should develop minimum training standards for emergency medical technicians and minimum equipment and communication standards for certain emergency medical services" (Article 30, Section 3000, p. 1).
To summarize the pertinent points, then, the official state policy included the following main purposes:

1) Furnish medical assistance in an emergency

2) Provide for the safe handling and transportation of the sick, injured and disabled

3) Provide for registration or certification of all ambulance services,

4) Create regional emergency medical services councils and a New York State emergency medical services council,

5) The councils would develop minimum training standards for emergency medical technicians and minimum equipment and communication standards for certain emergency medical services.

In addition, the law established certain specific definitions, identified standards to be addressed, identified training levels for personnel, and, most importantly for our purposes, created limited machinery for implementing the policy. It also provided (in rather vague terms) a description of the authority and limitations of the State (in the form of "the Commissioner") in such matters.

The official goals of the law are clearly stated, but indirect. The law said it will:
a) Provide for registration or certification of all ambulance services, a goal that is accomplished by fiat. The categories were created by definition, and registrations and certificates were mailed to all EMS providers.

b) Create regional emergency medical services councils and a New York state emergency medical services council. These categories were created by definition and local groups subsequently created the regional councils by application to the State from the local groups. There was no particular plan for what should comprise an EMS council, and no guiding strategy for how the state or the Rochester region should be served by this process.

c) Develop minimum training standards for emergency medical technicians and minimum equipment and communication standards for certain emergency medical services (Article 30, Section 3003.2, p.3).

Equipment, communication and vehicle standards were also created by state health department staff and approved by the state EMS council. These standards allowed very rudimentary equipment and supplies to qualify, and also allowed the many Cadillac and Pontiac brand low-roof ambulances to continue in service (Article 30, Part 800.11(a)). In almost every way, the State, in essence, authorized the status quo without a plan to improve it.
These very narrowly stated goals could be accomplished fairly quickly. The EMS councils were typically created by local groups, then “approved” by the State. Little was actually needed in terms of an implementation mechanism for these efforts, other than attentive staff work. The exception was that of “developing minimum training standards” for EMS personnel. It was not until nearly ten years after the operative date of Article 30 that the State was finally able to prepare, grade and process examinations for Basic EMT’s.

It is interesting to note that, although the EMS Councils are specifically charged with responsibility for training EMS personnel, in the mid-1980’s, the State took direct control over instructor training, certification and course approval, removing them from the authority of the EMS Councils. Put another way, Article 30 specifically gave authority to the EMS Councils in one area – training – and this is the same one area where the state health department took it away. It was specifically given and specifically taken away.

Instead of focusing on system architecture or EMS system development, or resource generation, the State staff engaged in a contest with the EMS councils over training. The Councils would ultimately lose this struggle and become little more than a rubber stamp for instructor approvals or course approvals. Their main function today is clerical and logistical; arranging for the courses to be held and providing them with equipment and clerical support (M. Gilbertson, 1985 and NYS DOH Website).
The broader, more vaguely stated official goals of the state ("...safe handling and transportation...") seem to be different, however, and it is these goals that required the larger implementation mechanism of EMS councils that was constructed. While they are not stated in the law, it seems possible to infer these broader goals from subsequent certification regulations embodied in Title 10, Part 800 ("10 NYCRR 800"--the administrative regulations that support Article 30 known simply as “Part 800.”) coupled with the sustained encouragement of state staff. However, all of these standards, whether stated or implied, are input or process standards. There are no output or outcome measures.

These vague, but formal, goals were later detailed by the Health Department staff via administrative regulations to yield requirements for improved physical characteristics of ambulance vehicles, including length, width, and height of the vehicles, improved medical equipment on board ambulances, including oxygen, splints, and spinal immobilization devices (Part 800.11 and 800.12). State staff encouraged all ambulance personnel to improve their training levels to that of Basic EMT as a minimum, not merely for those few ambulance services that were subject to regulation.

All are input standards of a sort, though the last carries with it the hope of a process standard. Process standards ultimately have been developed by means of medical control officials and the emergence of clinical treatment standards. These form the basis of training course material. In this sense, training itself constitutes what Perrow (1986) might call an “unobtrusive control” mechanism.
At first reading, this would appear to be a "top down" policy as described by Paul Sabatier (1999) with the locus of activity and authority resting at the state level with the Commissioner of Health and the State EMS Council. A closer reading, and certainly actual practice, however, will reveal a somewhat different approach. Although Article 30 provides a legal foundation for EMS, the law is silent on the matter of anything that could be called a "system architecture," or structural foundation – a design for the actual provision of prehospital Emergency Medical Care. As a result, throughout the state, the network of councils, bureaus, offices, associations and departments that actually provided the service is structured in a rather diverse fashion. This constitutes a network of independent players, not a system.
Although Article 30 addressed itself to all EMS services, specifically defining the ambulance services within its scope, there remained a rather disorganized and disjointed approach to EMS system organization in New York. This was due partly to the fact that the EMS providers are somewhat scattered in terms of their organizational bases or “corporate homes.” Some are within the fire service and some not. Some are based at hospitals, while others are run by municipalities, corporations, or the state or federal government themselves.

There was also established within the State Health Department an EMS Development Program (formerly the "Bureau of Emergency Health Services") that had a fairly limited mandate (Article 30, section 3006.6, 3003.8, 3011 and 3012). Their authority to exercise oversight powers was specifically restricted to commercial, hospital, and certain municipal ambulance services, as well as individuals whom they certified (e.g., Emergency Medical Technicians). They were not empowered to supervise personnel whom they did not certify, thus depriving them of authority over those individuals who were probably in greatest need of supervision. (Bothwell, et al, NHTSA, 1992, Pages 6 and 11).

As a matter of practice, Bureau staff are primarily consumed with developing and processing training course material, individual certifications and prehospital care (“PCR”) reports. There is exactly one Regional Representative for oversight of 231 provider services in the nine-county Rochester Region (NYS DOH website staff listing). According to the Rochester Regional EMS Representative, even today each certified
ambulance service is inspected for compliance only once in every three (two-year) applications, or six years. Any more frequent inspections occurs as a consequence of investigations spurred by complaints or problems.

Thus, State policy provides for a statewide “EMS system” that could be characterized as merely a loose network of autonomous EMS providers that was fragmented at the top and even more fragmented at the bottom. This non-system contained divergent and often confusing lines of communication descending from the state level, through regional levels, to the local level. This resulted in, among other things, "turf wars" over authority, control issues and competition for funds, as well as the usual problems attendant with attempting to accomplish things using committees as large as thirty. There has been a corresponding disunity of command, vague or conflicting lines of authority, and relatively little planning and/or control exercised. The only clear line of authority was that originating within the Health Department and descending through its regional offices to the local commercial or hospital-based EMS providers—until recently the only ambulance services that were required to meet state standards. Further, it exhibited disunity not only of authority, but purpose, since each state-level body has its own political agenda.
To summarize, the policy environment is characterized by:

a) Decentralized policy and decision-making, leaving little role for the state or other sub-state level agencies or municipalities to exert much influence.

b) Policy and decision-making by those who provide the service, rather than those who "consume" it. This included decisions about the type of service (that is, whether to provide first responder service, basic ambulance service, or paramedic level service), the level of service, (basic, intermediate or advanced) what quality to subscribe to, the frequency and sophistication of service, and policies about limitations to service.
c) A practice of political activism concerning resistance to regulation or standard-setting by state or similar agencies. Much of the resistance was passive resistance. If the provider did not like what the DOH said, it was simply ignored. There is a corresponding history of success with these efforts as there simply were no consequences for ignoring the health department.

*The unofficial policy.*

In their 1984 work, *Implementation, How Great Expectations in Washington are Dashed in Oakland, 3rd* Pressman & Wildavsky observe that policy is the official approach to a problem which is intended to provide guidance in decision-making so that there is consistency, effectiveness and fairness while accomplishing the officially sought goal. Further, they note that in the case of Oakland, it also seemed to be whatever the particular administrator in charge of the program happened to want.

Pressman and Wildavsky (1984) observe that any policy implementation must be based upon a sound technical theory for how that might happen. Such a technical theory becomes the basis for a program --as distinct from the policy on which it is based -- that operates based on certain premises that are established and known. In the case of New York’s Article 30, the initial conditions and foundational premises were unknown, the underlying technical theory was inherently unsound, and there was no program to
implement it. Since the initial conditions and premises of the technical theory were-and are-nebulous, an effective program to implement the goals could be constructed.

Further, Pressman and Wildavsky (ibidem) observe that, if you want a policy implemented successfully, you should give it to an agency that knows how to do it. In the case of Article 30, the existing agency accustomed to dealing with health issues – the Department of Health – was relegated to an auxiliary role and the primary role was handed over to an entirely new organization – the EMS council system.

Pressman and Wildavsky (ibidem) also observe that implementation programs are systems of interdependent elements. Failures in one area may easily cause failures in other areas. They also express concern that implementation plans may be too simplistic. That is, the people involved may be overlooked. The number and diversity of “players” injects an element of complexity into the implementation that may not be sufferable by the original plan. Further, such complexity may include too many approval points by too many people. This introduces at the very least, a source of delay even if people all agree, which rarely happens. If disagreement rules, then delay becomes the norm and achievement becomes the victim. The program stalls.

Another source of concern for Pressman and Wildavsky is the possibility of too few resources to support a program. If the resources are absent, scarce, or very late in arriving, then one is left with a policy without a real program – good intentions that cannot be carried out. Since provision of resources is one of the first elements in the
interdependent system mentioned above, absent or late-arriving resources can lead to program stall. In the case of Article 30, resources were extremely limited in the beginning and meager in the following years. Those resources that have been allocated have arrived rather late in the game and may, arguably, go to the wrong players as the entire process becomes “turned” toward the providers rather than the public.

Another important characteristic of successful implementation is prior coordination with other agencies that may have a stake in the outcome, or at least, the process. Absent such prior coordination, agencies need to devote time and energy to securing agreement, defining relationships or overcoming objections as the project is ongoing, distracting management attention and resources from the initial goals and objectives. In constructing the EMS council system, the legislature did not define the relationships or power structures between the EMS council system and the other “players” in the State ambulance business. This left the playing field absent of demarcation or rules, and the door open to mischief.

Lastly, Pressman and Wildavsky observe that the failure of an organization to learn from experience precludes future success. Learning requires the ability to test the environment so as to “…correct error and reinforce truth…” (p. 125) leading to effectiveness. In constructing the EMS council system, there was no provision for feedback and learning from the environment.
New York State, by virtue of passing the EMS Act of 1974 established two policies; one official and one unofficial. Although official policy was lofty, unofficial policy became fragmented and turned, under the control of EMS councils and whoever controlled them. Whether understood at the time or not, the net effect of the EMS Act of 1974 was to establish as public policy that the nature, level, and quality of Emergency Medical Services to be provided to the public would be decided at the local level only. Further, that these decisions would be made chiefly by those who provided the service, rather than by those who need or use it.

Further, a defacto policy of reliance on volunteer services has emerged, and is maintained to this day, supported by a State ambulance registration system that affirms a network of marginally regulated monopolies and near exclusive service areas. The absence of, and indeed, the prohibition of, minimum standards for volunteers has been seen as an essential prerequisite for the maintenance of this policy.

One important aspect that betrayed the intent of the original official policy is the existence of a little noticed, but key phrase in Article 30. Section 3002.2, stated that; "No minimum standards shall be established for services provided by a voluntary ambulance service operating solely pursuant to a statement of registration..." (Article 30, 3002.2, p.3). This phrase exempted volunteer ambulance services from virtually all regulations and standards, and had the effect of undoing all the rest of the article, at least as far as volunteer ambulance services are concerned. Since two thirds of the ambulance services in the state were volunteer ambulance services, this had a profound impact on
the field. The fact that fully half (51.43%) of all the ambulance services in the state were sponsored by fire departments ("Statewide Ambulance Totals by Type and Status," 10 March 1989, as provided by the New York State Health Department, EMS Development Program) contributed to a significant issue of self-interest among the fire service in maintaining these policies.

Since 1997, new regulations requiring certification have lead to staffing pressures for volunteer services. Put another way, the State imposed a standard on the volunteers without an effective program to make it happen. This has stressed the volunteer system in many areas and the ultimate outcome of this development is unclear.

It is clear from more than thirty years of application of this policy, however, that the official policy is not quite the real policy. The real policy is to have no statewide policy at all. More precisely, the statewide policy is to have a collection of local policies, or, one might argue, a state policy of local control in EMS matters. For all practical purposes, it is a policy of "lassaiz faire;" the ambulance services operate in an environment of virtual complete independence. In their activities as local organizations comprised of local people, EMS services have behaved like many other organizations, following the dictum of attempting to manage the external environment before making internal changes (Barnard, 1968, Pfeffer, 1981).

As in the rest of New York State, in the Rochester Region, actual policy was a bit different than that which was intended by the official policy. Although the EMS councils
had been created and they, plus EMPIRE Nine regional EMS program, proceeded to establish EMT courses, the fact of the matter was that only the six commercial services in the region were required to use EMT’s when carrying patients. The remainder of the ambulance services were volunteer services and were specifically exempt from this requirement. The Empire Nine ambulance service directory of 1980 shows that only four volunteer services committed to doing this.

In addition, most of the ambulance services in the Rochester Region were embedded within the volunteer fire service as “rescue squads” (pursuant to General Municipal Law, not Health Law). Each county had its own fire coordinator, a part or full time position that was thoroughly political and entirely subject to the wishes of the fire service in that area. County fire coordinators were keen to keep their jobs and they knew that placing requirements on their constituents was a definite career-limiting move. The status quo was looking pretty good, since it meant staying employed, and that was “good enough.” Every county fended for itself. There was willingness to cooperate, but not consolidate.

One interesting point of contention involved industrial ambulance services. This was emblematic of the confused state of affairs in that it displayed how the vagueness of the official statute combined with really minimal resources on the government’s part, allowed a contest of authority to develop between “big industry” and the State health department. Certain corporations in the Rochester Region were large enough operations to have their own medical departments and, in some cases, their own fire departments.
Two leading examples of this were the Kodak Corporation, specifically the Kodak Park location in downtown Rochester, and Xerox Corporation at their Webster base just east of Rochester, both in Monroe County. Both corporations had their own medical operations for employee health, and their own safety and fire departments. As in most communities, the fire departments tended to get called for emergencies, as well as fires. It was a short step for the fire departments to start providing ambulance services. Neither was established as a commercial ambulance service, since they did not serve an area outside their walls, yet each had paid staff providing the services and transported patients to the local hospitals when needed. This fit the definition of an “ambulance service” as determined in Article 30. The State Health Department took the position that they qualified as “proprietary ambulance services” and, as such, not only came under the jurisdiction of Article 30, but needed to meet State certification standards as well, as determined by the State. That is, they not only needed to meet the standards, they needed to become state certified, submitting to the authority of the Department of Health. Kodak denied it was a commercial service, insisting it was not subject to the health department and, therefor, was not required to meet certification standards. According to State staff at the time, numerous attempts were made to catch the Kodak ambulance on the city streets so the State could impose a fine for unauthorized operation of an ambulance, forcing the issue. It was to no avail.

Xerox responded in just the opposite fashion. While not admitting that it was required to do anything, its ambulance service voluntarily met certification standards, participated in the EMS council coordinating efforts, and later even established its own
ALS service (Medic 90) which it highlighted in its own company advertising. This ALS unit would later become the basis for a Northeast Quadrant ALS service in Monroe County providing coordinated, tiered response ALS service to three adjacent fire districts (D. Garman, personal communications 1982-86, and the M-L REMS website).

The legislature reviewed the EMS situation at least three times in a formal way: once in 1974 to pass the above-mentioned act, again in 1986 to review (and reject) a proposed significant revision and again in 1996 when the legislature changed this to include a requirement that all ambulance services meet certain minimum standards. These were not to be effective until 1997, with generous waiver provisions for those services that claimed hardship until the year 2000 (Article 30, Section 3005).

The existing situation can be said to be a deliberate policy decision on the part of the legislature to allow this laissez-faire approach to EMS to continue for the better part of three decades. This then sets the stage for the current implementation of EMS policy by New York State.

*Development of EMS in Greater Rochester*

When considering the wide area involved in the entire state, the fact that there are over 1,100 different ambulance services, at least that many first responder agencies and over a hundred hospitals are involved in this endeavor, it is useful to remember Pressman
and Wildavsky's (1984, op cit.) clarion call concerning the complexity of joint action. Although it is easier to describe the problem than to control it, the essential point is to understand that this represents an area of great danger for the implementation of any policy, and the admonition to “keep it simple” is something to heed.

In the Rochester Region, there are nine counties and three different EMS councils (see Map 1). There are 111 ambulance services and 120 first responder agencies. There are 49 basic ambulance services, 19 intermediate life support and 43 ALS providers, all feeding in to 21 hospitals³ (See Maps 2 and 3). There is a mixture of “corporate homes” for the EMS providers. Most of the first responder agencies (though not all) are fire department services. However, 52% of the ambulance services are also within the fire service. The others are a mixture of independent volunteer services, commercial, hospital, university and local government services.
Into this complex situation the State introduced a new and complicated administrative system of councils, committees and subcommittees. From the very beginning, the state missed entirely the chance to simplify its approach. A further complication was the fact that the EMS councils, both at the state and the regional levels, were invented out of nowhere. If there were to be any effective policy implementation, then the clear identification of their role and mandate was essential. A necessary prerequisite for successful implementation of state policy would be defining the role played by the state EMS Council organization, as distinct from the state level health department, and also distinct (though, perhaps, overlapping) from the regional councils. Such a role definition would necessarily have to include clarification of their authority, power and resources. This was not done.
In the Rochester Region, a handful of local leaders acted on their own initiative to respond to the need. According to former employees of the organization, Dr. Peter Mott of Strong Memorial Hospital in Rochester undertook a grant from the federal Department of Health, Education and Welfare (H.E.W.) to form the “Rochester Regional Medical Program” (“RRMP” or just “RMP”). This program began data collection, “coordination” of pre-hospital programs, and training of ambulance attendants.

Dr. David Kluge and some colleagues formed the “STEP” organization (Society for Total Emergency Preparedness) and pushed for the creation of the first two mobile critical care (“paramedic”) units in the Rochester Region. Drs. Milton Luria and Morton Drucker, of Strong Memorial Hospital, designed the curriculum and the exams, and taught the first critical care course that was only 40 hours long. The State gave its approval to the locally produced curriculum and exam. Two “Cardiac Care Units” (Medic 1 and Medic 2) were installed in National Ambulance, Inc. and Perinton Volunteer Ambulance Corps, respectively in 1975, though not at the paramedic level. These were intended as “proof of concept” services, one in the commercial ambulance service, the other in the volunteer service, to prove that advanced level “paramedic” care could be provided effectively in Monroe County. The service level was that of “cardiac care.” Coverage was limited to the cities of Rochester and the Villages of Brighton and Irondequoit (the regular service area for National Ambulance) and the suburban Town of Perinton, all in Monroe County.
Dr. John Davis of Newark (Wayne County) acted on his own initiative to introduce mobile critical care units to selected ambulance services in southern Wayne County, also in 1975. Participation was limited by invitation only to a handful of ambulance services that were in the Newark-Wayne Hospital “catchment area” and enjoyed the confidence of Dr. Davis.

In the Southern Tier portion of the region, Dr. William Nowill, of Arnot-Ogden Hospital in Elmira, started the first “shockmobile” in 1970, commencing cardiac care service in that city (“Shockmobile Annual Report, 1972”). Only two ambulance services, Erway Ambulance Service in Elmira (Chemung County) and Corning Ambulance Service in Corning (Steuben County) would move to the Advanced Life Support (ALS) level of service, again, owing to the initiative of local leaders. Forward progress toward paramedic level EMS occurred in only these four of the nine counties contained within the Rochester Region.

In both the Rochester and Newark examples, it is important to note that the level of training provided in order to reach “critical care” was not that of the full-fledged paramedics, as defined at the national level. New York State “invented” a new category of advanced life support, that of “critical care technician.” This involved a level of training that was greater than that of Basic EMT (or “MET”), more than what is now known as “Intermediate EMT,” yet less than that of a full fledged paramedic (Part 800.41). Beginning in 1975 and lasting until about 1982, according to former Empire Nine training officials, local physicians drew up a 40-hour curriculum that the State
approved. The same physicians would construct a written and practical exam for the course and, if one passed, the State would certify the individual as a “Critical Care Technician.”

Two regional organizations in succession sought to provide an organized and coordinated response to the State EMS law. RMP (Regional Medical Program) and its successor, EMPIRE Nine, were instrumental in establishing the three regional EMS councils that comprise the nine county region. The regional organizations had a few paid staff members and became the official course sponsors for most State EMT training classes. At that point in time, hosting a class was a paperwork challenge, and EMPIRE Nine was able to routinize the process, thus making it somewhat easier. At that time, the State did not have a curriculum for its state certifying EMT course, nor did it have its own instructors to teach such a class. The State provided neither a written nor practical exam to test the students involved. These were entirely locally generated from the best information available locally and, if reasonable, were given blessing by the State staff until such time as they could take over the task themselves. During the late 70’s and early 80’s, the State did take over standard course curricula preparation and test generation for basic EMT, ILS and – eventually -- ALS courses. Finally, in the mid 1980’s, the State took over the role of instructor development and certification, taking all this away from the EMS councils. During the late 1970’s and early 1980’s, some EMT courses were conducted and advanced life support service started in very limited areas (see Map 5).
The EMS councils were developed locally at the instigation, and with the help of, first Mr. Roy Nichols and later Mr. Kevin McGinnis, successive Executive Directors of
EMPIRE Nine, the regional EMS organization and successor to the Rochester Regional Medical Program (See footnote 1). Rather than have one EMS council for the entire nine counties, three such councils were formed; one for Monroe and Livingston Counties, one for the Finger Lakes Counties of Wayne, Ontario, Seneca and Yates, and one for the three Southern Tier counties of Steuben, Schuyler and Tioga. These represented fairly traditional groupings of counties that existed for other reasons unrelated to EMS. However, part of the reason for the formation of three councils rather than one, was financial expediency. EMPIRE Nine provided staffing services to the councils with no funding at all. In the early 1980’s, state funding was finally provided for administrative services to the tune of $5,000 per council, a small sum even then. Because of the arrangement between EMPIRE Nine and the Councils, this money was signed over to EMPIRE Nine to pay for the secretarial services already provided. Thus, by having three Councils, a financially pressed EMPIRE Nine was able to receive $15,000 instead of just $5,000 for services it was already providing. It was a new revenue stream to offset an existing cost center. For an organization that was already living on a shoestring budget, any additional money was welcomed.

The EMS councils are volunteer organizations. Although Article 30, Section 3002-3 provided for a membership comprised of a mixture of constituencies (voluntary and for-profit ambulance services, hospitals and physicians, “local emergency medical care committees, health planning agencies,” fire department emergency squads, public health officers and “the general public”), presumably to achieve a representative body, in practice, the Councils were populated almost entirely with EMS volunteers and almost
exclusively by EMT’s. As an example, the Monroe-Livingston Council membership numbered in the thirties, met once every two months, with an executive committee meeting in the opposite months. There was a constant juggling for power between the two rival commercial ambulance companies, between the two commercial services versus the volunteers, and between the Monroe county EMS coordinator and the EMPIRE Nine staff, who outnumbered him and had a bigger budget.

The Monroe-Livingston council did have some very limited public participation in the form of the Livingston County public health nurse and the Rochester Regional Hospital Corporation (a trade group representing the region’s member hospitals) did, on occasion, send a representative to the group. However, seats reserved for non-EMS agencies often were filled by EMS personnel in a dual role. That is, a “public” member might also be someone who rode ambulance, but was not representing that ambulance service at the meeting. Professional managers from hospitals or health systems agencies sometimes attended the meetings, but quickly deduced that these meetings were fundamentally unproductive and not a good use of their time, so were absent more often than not, ceding the field to the most active members, who were the EMS personnel.

The Monroe County EMS coordinator acted as staff to the council, but was not a voting member. The commercial ambulance services, volunteer ambulance services, and fire department services all had members on the council. However, there were no members of the public, few representatives of local government. Even those professionals who were officially members of the council, such as hospital
administrators, often did not attend, ceding the territory and the issues to those who did attend, who were mostly EMT’s and almost always volunteers.

The three EMS councils (Monroe-Livingston, Finger Lakes, and Southern Tier) were formed and nurtured by EMPIRE Nine. Because of the specific authority under Article 30, The EMS council provided the official authoritative umbrella under which EMPIRE Nine operated its courses, trained instructors, and—eventually-- developed clinical treatment standards for patient care. This was all done in the name of the EMS councils that had precious little authority for anything else. In turn, EMPIRE Nine provided staff support, mailings for course announcements and other logistical support for the councils that had no money or staff of their own. It was a symbiotic arrangement: the EMS councils had the statutory authority and EMPIRE Nine had the resources, however limited they might be. It worked for a time.

Over a period of some six years, this arrangement led to a significant increase in the number and type of training courses available in the region. A cadre of trained instructors was developed for each level of EMS training, and specialized rescue and pediatric training was implemented as well. Further, EMPIRE Nine staff fostered the development of two new models of Advanced Life Support service provision particularly useful for rural areas. The work of the Monroe County leaders established that ALS could be provided through either a commercial ambulance service or an all-volunteer ambulance service. However, these were urban and suburban examples, respectively where volunteers were fairly numerous and money was plentiful.
EMS personnel from rural areas were apprehensive that ALS could not be provided in the rural setting. During the mid-1980’s, EMPIRE Nine staff developed and piloted two different operating models intended for rural areas to use as demonstration projects. The first was a hospital-based model in Canandaigua; Ontario County (Ontario County ALS - Medic 60) intended to be based out of a hospital emergency room. The second was a community-based model based in Wolcott, Wayne County (Northeast Wayne ALS - Medic 88) which was intended to be based out of a mixed fire department/volunteer ambulance service base. Both services used a tiered-response method of providing ALS, relying on the local ambulance service for basic treatment and transportation. Simultaneous dispatch of ambulance and ALS unit, using a predetermined list of dispatch criteria, was used as the chief method for overcoming the distances involved. These were intended as demonstration projects to showcase the fact that ALS could be provided by rural volunteers on a quality and affordable basis. Since that time, these two models have been replicated in Livingston County (Towns of Avon, Rush and Caledonia), and Penn Yan (Yates County) and by Wayne County itself, which now operates several ALS units on a shared, tiered response basis (see Map 6).
Active leadership and publicity stimulated some interesting examples of competition in geographic areas that already had political rivalries. Citizens in the towns
of Irondequoit and Brighton, Monroe County, formed independent volunteer ambulance services in direct competition with the dominant commercial provider service, then National Ambulance & Oxygen Service (now Rural/Metro). Their rivalries centered over the question of response time and state certification. The newly formed volunteers contended that they could provide an improved response time, while National contended that (while not admitting that it was not timely) it provided a State Certified service that also had ALS units (exactly two covering the entire city), while the volunteers did not. Irondequoit and Brighton later responded by also meeting State Certification standards and, eventually, becoming ALS provider services themselves. According to company officials, National Ambulance eventually responded by becoming an all-ALS provider service using computer assisted dispatch and system status management to drastically improve response times.

In Wayne County, the Palmyra Volunteer Emergency Ambulance Service (PVEA) was formed as a direct response to the Palmyra Fire Department ambulance ("oxygen squad") service. The two proceeded with a rivalry that divided the town’s available volunteers between two services in the same small town, often shorting both. The competition continued as first one, then the other, voluntarily met State certification standards and later became ALS providers. PVEA became an ALS provider service, working with Dr. John Davis of Newark Hospital. The Fire Department eventually became an ALS provider also.
The Lyons Town Ambulance Service, a municipal paid service, was challenged by a group of local citizens who threatened to form an independent volunteer ambulance service. To fend off this threat, the Town service raced to meet State Certification standards on a voluntary basis, something the proposed volunteers could only promise. The proposed volunteer service remained on the horizon for some years, but eventually faded as the Town service moved on to ILS and --later-- ALS service provision.

Finger Lakes (nee Walters) Ambulance Service, based in Clifton Springs, faced stiff and aggressive competition from National and Monroe Ambulance Services for ALS transfers from the Finger Lakes hospitals to and from Rochester. Although all were commercial services, thus meeting State Certification standards, Finger Lakes was behind the curve on providing ALS services. Monroe and National were taking away needed and lucrative ambulance transfers that it counted on as part of its basic business strategy. This competition forced Finger Lakes to enter the ALS game in a serious way, reversing a previous decision by its owner not to undertake ALS level services.

These positive outcomes were not caused by Article 30 or the EMS Council, but by free competition. However, the general availability of new resources (chiefly training, medical control and professional guidance) to each of the pre-existing rivals and the publicity generated by it, allowed each rival to try to outdo the other in a quality or, at least, a credentialing contest in the hope that it might be the EMS service that ultimately survived the struggle.
In the end, most survived and they are all ALS service providers. Competition, or the threat of it, worked to improve EMS service provision where other methods and motivations did not.

Consequences.

There is another area of potentially confounding events or forces that could interfere with successful implementation of State policy goals. Perrow (1986) has described what he calls “the power view.” That is, the tendency of street level players to attempt to “turn” these policies or programs away from the stated goals and toward the goals or self-interest of local or regional level players. To a degree, mutual interests need to be accommodated for any policy to succeed, but Perrow (ibidem) warns of the actual transfer of control from the originator to the recipient. Here again, this is easier to warn about than to do, but it is very much a case where “forewarned is forearmed.”

Although Article 30 was silent on the matter of other organizations, several other players at the state level have emerged over the years to become influences in EMS. Entirely independent of Article 30, local fire departments have formed regional and state associations, the most influential of which is the Firemen's Association of the State of New York (usually called “FASNY”). Non-fire department volunteer ambulance services have organized similar associations, most notably the New York State Volunteer Ambulance and Rescue Association.
Because the network of regional EMS councils is a weak consortium, the locus of control has tended to be at the local level. This has made each council fairly easy to “turn” to local wishes, depending on the dominant player of the council. This has permitted, and perhaps caused, what has been described as a "crazy quilt pattern" of inconsistent and sometimes conflicting activity on the part of EMS providers. Further, as a result of this historically derived policy environment, certain shortcomings continue to exist to this day.

At the local level in the Rochester Region, some municipalities became involved in EMS by virtue of their authority to provide emergency services (under the "police powers" doctrine) to their public, and inject some degree of involvement into the situation. Municipalities chose different methods for addressing this issue. The Town of Lyons chose a department of EMS separate from either the police or fire departments. The Villages of Clyde, Macedon, Brockport, Honeoye Falls and the City of Hornell chose to use the fire department. Others, such as the Village of Webster, chose to contract with a neighboring fire district to provide the service. The City of Geneva chose to use a municipal contract with a private commercial ambulance service. The fire department of the Village of Wolcott chose to get out of the business, spurring the formation of an independent volunteer ambulance service. Many unincorporated towns and hamlets simply ceded the domain to whomever was willing to do it, usually the local fire department.6
The City of Rochester maintained a practice of awarding a city contract to one of the two or three commercial ambulance services in the city at various times for coverage to the entire city. Although there was no payment of money for the contract, the winner of the contract was forwarded all EMS calls received by the city police and fire dispatcher (later, the 911 dispatcher). Since this amounted to a considerable number of calls, the reward was a substantial increase in business volume. Some performance requirements did exist concerning the number of ambulances that needed to be deployed at specified times of day, response to assist the fire department and so on. These requirements have changed over time and have been effectively superseded by computer assisted dispatch and “system status management,” technical improvements that rendered municipal contract standards obsolete.

In the mid-1980’s, the City of Rochester embraced a First Responder program for its line firefighters. With the close cooperation of EMPIRE Nine staff, the fire department began a program to train and certify all its line firefighters to the First Responder level of training (then 40 hours of instruction). Instructor development soon followed and the Department took the program inside. Soon, the Rochester Fire Department began responding with the City contract ambulance service (then held by Monroe Ambulance, one of three commercial services in the city) to assist the patient prior to the arrival of the ambulance, and to assist the ambulance crews once it did. Although the decision was made largely to fend off further budget cuts for a declining department, the consequence was to improve response time to city residents and increase the number of trained hands

There are similar examples of cities or large villages making contracts for service to the local ambulance services. These sometimes involved the payment of sums of money to assure the service, as in the case of the City of Geneva (since discontinued), but as often they did not.

Helicopter service has improved since 1980, since there was none at all at that time. There are still some important limitations. Response time and thin coverage are the two chief limitations. Published response times are not available, and the main helicopter service, Mercy Flight, declined to provide such information. The question of “unmet need” cannot be answered definitively, given available information.

At the ambulance service level, organizational stressors spurred progress despite the above. Certain areas of competition emerged. The currency of competition came in the form of ambulance calls and cash donations. Examples included dueling ambulance services in Palmyra, the contest between the Lyons Town Ambulance and a proposed volunteer service, and Irondequoit and Brighton Volunteer Ambulances versus National Ambulance, a commercial service. In each case, the competition for calls and dollars spurred progress in quality and credentialing that might otherwise not have occurred.
It was the pioneering efforts of individual physicians who would blaze the trail for EMS in the Rochester Region. According to former Empire Nine training officials, Drs. Peter Mott, Morton Drucker and Milton Luria opened the door to the initial clinical training so that the technicians for Medics One and Two could be trained and certified. Dr. John Davis of Newark – Wayne Hospital used his considerable influence to obtain that rare commodity -- hospital support – for clinical training and biomedical radio control over the field personnel for the limited Wayne County critical care units.

It is important to note that, as praiseworthy as these efforts were, their scope was quiet local. The Rochester efforts were focused primarily on the City of Rochester and a few of the immediately surrounding suburbs. The Newark-Wayne efforts were focused mostly to Newark-Wayne Hospital, and some (not all) of the ambulance services that transported there. Despite RMP, there was little regional effort to respond to the new State level EMS policy. Whatever discussion occurred in Albany and whatever directives were given concerning progress in EMS, they landed in the Rochester Region with a deafening silence.

There is no appreciable citizen training, either in emergency care or "system access" (learning how to activate the EMS system by means of the emergency telephone number or citizens' band radio). Historically, there was often no centralized dispatching service for all EMS services in a given geographical area, and often no common emergency number (such as a 911 system) when it does exist, although this has changed in very recent years.
There were few First Responder programs and few Advanced Life Support (ALS, or "paramedic") services throughout the state. As recently as 1986, New York provides ALS to only six percent of its emergency patients (Gilbertson, 1987). Not all patients require ALS treatment, but experience in those areas with ALS indicated that the appropriate utilization rate was between twelve and twenty percent of all calls. As recently as 1986, personnel with no medical training handled fully eighteen percent of all ambulance calls reported in the state (Gilberston, 1987). More recent data are not available.7

Medical control, where provided, was not usually too bad, owing in part to the fact that it is one of the few areas of EMS that is regulated. However, medical control historically has been a low priority undertaking for the hospitals that offered it. Further, medical control was not required for most ambulance calls (e.g., basic life support) leaving provider services to do as they wished.

The "system status" of hospitals (their ability to receive emergency patients at any particular time) was not always maintained in some regions. Where done, it was often limited in frequency or utility.

There existed some limited performance review of field personnel, but there was little authority for anyone to do much about poor performance. Health department review was and is extremely restricted due to a combination of personnel shortage and by the
fact that the health department had no authority over non-certified personnel (Bothwell, 1992, op cit. and confirmed by State staff). Thus, the individuals most in need of oversight receive none at all.

“Command and control” was, and is, fragmented. Individual EMS provider services are typically autonomous corporations or municipalities that are able to do as they please, with virtually no oversight. They also typically retain independence of operation, leading to disunity of command at any higher level.

Hospitals play little role in prehospital EMS planning or operations. While there are admirable exceptions to this, the typical hospital is simply too busy to participate in prehospital plans or systems. Time or effort spent in this area is an unreimbursable expense. This has the unfortunate effect of depriving prehospital systems of the benefit of professional management and planning abilities based on clinical outcomes.

Based on the most recently available data from 1987, a review of patient care treatment modalities used demonstrates an alarming rate of inappropriate or under-treatment (Gilbertson, 1987). A significant number of shock patients were not provided with oxygen, nor were patients who were listed as having "respiratory problems" given oxygen. Additionally, over 50 percent of patients had no complete set of "vital signs" (pulse, blood pressure, and respiration rate) recorded by the ambulance crew. This means that they either were not obtained, or obtained, but not recorded, or--one suspects--some
combination of the two (Gilbertson, opt cit). More recent data are not available (see footnote 7).

Why Study the Implementation of an EMS System in the Rochester Region?

This review is important because of the typicalness of the Rochester region to New York State and the state to the nation. The Rochester Region is roughly typical of the rest of the State in terms of the geography, population, transportation network and mix of EMS providers. What happens here has been, and can be instructive, for the rest of the state.

New York is one of the larger states of the nation and millions of people are affected by the policies adopted and implemented. The non-New York City municipalities are typical of much of the nation in size and composition. The rural and suburban areas are typical of much of the rest of the nation east of the Great Plains, including the more rural areas where vast distances play a complicating role in service provision. The dependence of the State on volunteer EMS providers is similar to many other states in the northeast in that one of the most critical community services is dependent on a patchwork quilt of local EMS providers who are not necessarily coordinated by any guiding medical or legal authority.
Having established that the service level and quality decisions are made by the providers of the service, rather than by the public, the question then arises of what are the bases for these decisions made on the local level? Observation of the EMS providers supports the notion that decisions concerning quality in EMS are made in essentially four logical steps: type, level, quality and durability. First; the choice of the type of service to be provided by any given department (that is, rescue, basic ambulance service, first responder service, etc.); second, a choice from among the levels of service (that is, basic, intermediate, or advanced life support; third, a choice of the level of quality within the service level chosen to be provided, that of national standards, state standards, or no standards (and that was historically an option). And lastly, but equally important to the choices, is the question of institutionalizing the quality within the organization. That is, once decisions are made about how good the service will be (or not be), what is done to institutionalize the choice and shield it from future changes?

In the case of EMS in the Rochester region, these four steps have been taken. The details are unknown, though some additional questions may remain. For example, what are the other factors are in this decision-making process, if any? Who makes these decisions about service and quality levels and, second, on what basis are the decisions made? Additional factors may be at work. Two pertinent questions are: 1) who decides what factors will count? And 2) how would they know what “quality” is in the first place? Specifically, what exposure to national level information do they have that would allow them to determine what quality is? What process do they use to make the decisions? How do they enforce and institutionalize the decisions (that is, how do they
“make them stick”?). Finding the answers will help explain the current situation in the Rochester Region and NY State, including the wide disparities of service level and quality observed throughout the region and state.

An EMS system is a collection of individual providers organized in such a way that an operating strategy can be employed to provide a type and level of service that meets desired standards, and an evaluation strategy can be employed to know if this happens.

The EMS system’s performance standards are driven by clinical imperatives described in Chapter 2. That is, particular biological certainties have been discovered by research that determine the issue of life or death. These include recognition of essential time frames and capabilities that are needed if one is to be successful in preventing death. These clinical imperatives drive the operational doctrines of BLS care in four minutes, ALS care in four additional minutes, and the “Golden Hour” for trauma patients. No organizational or political need can change these. The way that one designs and builds the EMS system architecture, organization or network can predispose the organization to success or doom it to failure. Even with a good design, the way that one implements the chosen policy can predispose the policy to success or doom it to failure.

These questions described above are all set within the larger context of an organizational framework or superstructure established by Article 30 and related codes, rules and regulations, the EMS councils and related “players” and interest groups. The
ultimate product of the decisions is as much a result of this organizational architecture as it is of the individual EMS provider decision. To a significant degree, the premises of decision-making, options and resources available are determined by this larger superstructure, if only by default. That is, shortcomings in the larger superstructure may foreclose options to the local EMS providers.

This work poses a frame of reference against which comparisons of survey material from the region can identify what determined the level of service and the level of quality for EMS services in the Region. This is supplemented by official data reported by the providers and EMS councils and the State. Personal observations and experience in the field in this region then supplement the data. This work also used expert-generated material from the national level, including formal national standards established by expert groups or leading individuals. This included a review of pertinent clinical, organizational and implementation literature for important observations and salient points. Reviewing this literature will help us learn whether the characteristics of the administrative superstructure or the implementation of the policy are effective in meeting the standards imposed by the clinical imperatives.

The primary research questions are: does EMS service provision in the Rochester Region of New York State meet national quality standards on a consistent basis? What are the reasons why or why not, and how does progress actually get accomplished? This includes the factors that determine the level and degree of quality in EMS, who makes the decisions and how they provide for the durability of the decisions.
Notes

1. Certain names and phrases are commonly used almost interchangeably. “EMS agencies,” “EMS” and “provider services” are more all-encompassing terms. “Ambulance services” means only those EMS agencies that transport patients. “ALS services” (or “providers”) may or may not transport the patient, depending on whether they are also ambulance services. Traditional “First Responder agencies” never transport patients, but the State lists many ALS services, which sometimes do transport patients, with first responders, which do not. The names are a bit confusing. Thankfully, the people in the field keep them all sorted out even if the nomenclature does not.

2. “EMPIRE Nine” was the regional EMS program agency, the successor to the “Regional Medical Program” originally started by the University of Rochester using Federal D.O.T. funding. The name of the organization actually had nothing to do with New York State’s nickname as “The Empire State.” It actually was an acronym for “Emergency Medical Program Interconnecting Rochester and Elmira,” followed by “‘nine’ or ‘9’” for the number of counties involved, hence the reason for an all capitalized first name. The name later was often written in lower case, rather than all capitals, as a name, rather than an acronym. It was a name born of political expediency as the new executive director sought funding from each of the nine counties in the service area to replace the federal funding that dried up two months after he took his new position. Both the source of the funding and the name had to change.

3. These figures come directly from the NY EMS website and linked EMS council websites, op cit.

4. See the NYS EMS Council membership list for a partial listing of interest groups that have become members of the EMS Council.

5. A complete listing can be found on the NYS Regional EMS Council section of the state EMS website found at http://www.nysremsc.org/www.health.state.ny.us/nysdoh/ems/main.

6. A complete listing of EMS service providers can be found on the NYS DOH website found at www.health.ny.us/nysdoh/ems.

7. These facts and figures were published by the NYS DOH EMS Development Program under the direction of Michael Gilbertson, then director of the program. This publication was funded by federal block grant funds that were used to develop the Prehospital Care Report (PCR) system that would later be described by the “MEDICS” report (see “References” section). This funding has not been sustained and continued
such publications have not been forthcoming. Attempts by this author to secure similar such data from more recent years has been met with statements that the department was not familiar with such reports nor was such data available. This report establishes an important benchmark for patient care and no similar, recent comparative report has been generated for comparison purposes, depriving the researcher of an important tool for measuring success.
CHAPTER II

LITERATURE REVIEW

This chapter will review four sets of literature, each of which provides a different, yet complementary perspective on the question of EMS in New York State. These include; a) strategic management, b) organization design, c) emergency medicine, and d) learning organizations. Strategic management literature is valuable because it serves to examine the fundamental direction of or for an organization. It provides important considerations for guiding the organization, most important of which is identifying ultimate goals and constructing a strategy for success.

Organization design literature, including both structure and function, serves to take the goals and strategy identified in the first stage above, and construct an administrative framework (“superstructure” or “architecture”) that allows an organization or program to be effective at implementing those goals. It does not guarantee success, but may allow it.
Implementation literature then provides one with some details of “how to” and “how not to.” That is, it serves to make one aware of the problems, perils and pitfalls of implementing a program so that the skilled (and aware) practitioner can avoid the known problems, while maximizing those techniques that have proven most effective for others.

A significant quantity of emergency medical literature is reviewed because in emergency medical services, the clinical requirements of the patient must drive the operating design of the organization. Program effectiveness and efficiency are driven more by considerations of patient morbidity and mortality rather than customary business standards. This section serves to explain what standards have become important and why, as well as how they should influence operating doctrine.

Some additional information is provided concerning learning organizations. This is because, if the initial organization design is not perfect (as is often the case), a learning organization can get better over time anyway. A good learning process can help overcome a weak design, over time.

Strategic Management and Policy Literature

Paul Joyce (1999) posits strategic management as a set of three distinct activities: futuring, planning and implementation. The first is, perhaps, the fun part – “thinking great thoughts,” analyzing, and generally pondering the state of affairs and what to do
about it. The perspective is global, holistic and creative. It includes conducting an environmental assessment, stakeholder analyses, and analyzing strategic issues, among other things. The second part – planning – is where one begins to run into the hard part. Joyce advocates the synthesis of these great ideas into a coherent policy and plan. He advocates that one should construct a pathway toward the goal(s), determine objectives and milestones, and articulate in words and numbers what should be accomplished. The third step, implementation, is actually travelling the path to measure the progress, evaluate and adjust the process as needed, and complete the effort. This includes what he calls “backward mapping”—identifying and using emergent strategy from the street level (e.g. service level) professionals, mapping it backwards up the hierarchy to determine what adjustments need to be made.

In his work on wartime leaders, Elliot Cohen (2002) reviews attributes of leaders and the bedeviling problem of choosing or developing effective strategies and managers (in this case, generals) to carry them out. Although discussed in the context of war, the problems of developing effective policy strategies is similar. One must often make decisions in advance of good information, cast the implementation into the hands of others, and may not know the success or failure until it is too late to do anything about it. Cohen reviews the leaders and some of the important characteristics and behaviors that contributed to success. These included maintaining a method to exert control on an ongoing basis, visiting the troops – seeing things for yourself, questioning things in depth, “Think everything through afresh,” and, above all, having a strategy for success in the first place. Cohen observes that it is important for strategic leaders to know details –
not for the purpose of manipulating them, but for the purpose of integrating these details with the grand theme (strategy). But, you have to get the right details. Doing so provides a real world test of the theory of victory (the strategy) against the realities of the field. If they do not mesh, then the strategy must be revisited and probably revised. In the course of doing this, the strategic manager must consider whether the organization has the right structures, tasks and leaders, and not be afraid to change if the answer is disappointing. All the more reason to create a policy environment that is conducive to successful implementation.

James Q. Wilson (1989) enters the strategic domain by noting that organizations are especially important and useful when they are successful at analyzing the problem at hand accurately. This includes first identifying the critical environmental problem that must be overcome, and then also identifying the critical task to be mastered so that success may be achieved. It is not about goals, he observes. Rather, it is all about tasks. Successful strategy formulation includes selecting the “right” organization to undertake a goal, task or program and it is easier and more conducive to success if one picks an organization that already knows how to do it, rather than making one up from scratch. The organization that has the best chance of being successful is the one that can and does identify the key core tasks and the technologies needed to accomplish them.

Brewer and deLeon (1983) present a process for constructing a sound approach to policy development, if not implementation. Getting oriented, having operational principles that guide decisions, understanding the factors involved as well as the context
of the factors and players, and so forth. They present a process that allows for a careful pre-thinking of the larger problem under review before the construction of a policy that speaks to each of the factors (though not necessarily correctly). This preview, it would seem, is essential to the development of a sound technical theory of how to approach things.

Jeffrey Pfeffer (1981) discussed power in organizations; its sources, role, uses, and perpetuation. Consideration of how to place power into the areas favorable to policy development and away from areas contrary to ones goals seems essential for constructing a policy environment conducive to success. How local officials may have used these concepts, or developed their own, may be a point of interest in this work.

Organization Design Literature -- Structure

When reviewing the factors that lead to decisions about quality in local EMS service provision, it may prove useful to review the structure of the EMS “system” of organizations as it currently exists. This “system” or network of EMS related organizations sets the stage on which the local providers must play. To appreciate fully the backdrop to local decisions and action, we must focus on the design consideration of the State and regional councils as well as local EMS organizations. By the nature of the design of this collection of organizations, the local organizations may have either an easy or difficult time of it. In evaluating whether a system design is streamlined, efficient and
effective or cumbersome, bureaucratic and inert, we can turn to some literature from the national level that may inform us as to some important and fundamental aspects of organization design.

Wilson (op cit) observes that an organization is useful for effective implementation of strategy. To be effective, however, it must be structured for success, both in terms of traditional box and line structure and the people and culture within the structure. This includes possessing the needed functions for core technology (critical task accomplishment), information handling and resource allocation. Wilson observes that it is very important to match the distribution of authority and control over resources to the critical tasks being performed.

Mintzberg (1983) describes a structure that has five main elements based not only on the division of labor, but on the nature of the work to be undertaken (particularly routine and stable vs. unusual and dynamic). This is so the organization is able to provide for the routine, relatively efficient delivery of routine tasks, yet can undertake unusual, somewhat unpredictable tasks without interfering with its core service delivery. The purpose of the differentiated structure is to allow differentiated functions to occur effectively and efficiently within the same organization. That is, so the necessary work can get done without the structure “getting in the way.” Better still, so the structure is actually conducive to getting the work done effectively and efficiently.
As described in Article 30 and related regulations, there is relatively little actual division of labor within or among the EMS councils, either at the regional or state level. There is some specialization of focus in the work of committees within the various EMS councils. However, this often involves overlapping roles and players. Further, it is often duplicated from one Council area to another. On the State level, this often resembles a collection of specialized fiefdoms, rather than an emerging body of expertise. This would suggest that a structure based on that premise (the division of topics) would be an inappropriate choice.

Gordon (1987) differentiates organization structures into four types: horizontal, vertical, personal, and spatial. Of these, one type seems most appropriate; that of spatial differentiation. It would seem that a state as large as that of New York would benefit from employing an organization that is differentiated on the basis of geographic regions. Given that the State Health Department already has five separate administrative regions based on the five major cities within the state, this would seem a natural fit.

One obvious and important question, though, is whether this logic would then apply within the Rochester Region as well. Is the Region so large geographically that it needs to be subdivided, organizationally, in order to acquire a better “fit” between administrative superstructure and the functions on the ground? The answer to that question is not obvious.
Robey (1986) describes the idea of a “team-based” structure for organizations. Although intended for lower levels of large organizations (such as motor companies), this author thinks the basic principles could have been employed effectively IF they were accompanied by firm guidance from a strong leader at the state level. Each “team” (in this case, Regional EMS Councils) was intended to be comprised of a collection of representative “players” from that geographic area, comprising a group possessing a mixture of complementary knowledge and skills. Presumably, this mix of EMS providers, consumers, hospitals and municipal government representatives could, and would, be approximately duplicated from one region to another. It would seem reasonable that this “team” could be employed effectively in pursuit of the policy goals, if they were lead by a strong leader in that direction.

Any structure selected would necessarily be hierarchical with the state at the top of the heap. Further, it would have to have wide area coverage consistent with other health department regions. Provision is made within Article 30 for diverse, representative membership from providers, consumers and hospitals, and local governments. On paper, this must have looked like a good idea. The administrative framework described in Article 30 was a collection of EMS councils that are erected outside of the normal state administrative bureaucracy.
Mintzberg (op cit) recognized the distinctions that must be made in organization functions if the larger goals are to be met. He noted that the core function of the organization may well be a routine, day-to-day service delivery that is fairly well understood and can be delivered on a predictable basis. He further advocated for a solid data collection and analysis section for obtaining feedback and analyzing it into usable decision options. Perhaps the more intriguing idea is the recognition that some element of the organization must be developed for the purpose of responding to environmental changes, probably from the external environment. He recommended that this group be maintained in a flexible posture with its work environment less structured so it can respond effectively and rapidly.

Gordon (op cit) also calls for coordinating mechanisms so that the many diverse functions and energies can be turned toward the common goals. Of those identified, few seem applicable to the state and regional view, as most require a context of authority in order to be exercise. Of those described, that of mutual adjustment seems most useful in this context of limited authority and scarcity of resources, where there is no direct supervision that may be exercised. However, it is not at all clear if this is applicable at the EMS Council and local levels. This would be due mostly to the fact that EMS provider services do not need the EMS Councils for much of anything except training courses and ALS medical control – if they have ALS. The EMS council provides no day-
to-day control over the provider services and has few, if any resources to bring to bear on issues. The “mutual adjustment” called for by Gordon may not be so mutual after all.

Certainly the work processes and the standardization of skills mentioned by Mintzberg and Robey probably are unnecessary and inappropriate for the EMS councils. There were few identified work processes being undertaken and there were no skills being employed, other than clerical functions. No distinction was made between regional councils or between the regional and the state council on either basis. Could this be appropriate at the local level instead? This author thinks these concepts may apply within the context of training courses for EMT’s, but not for service operations or administrative functions. The EMS councils were charged with responsibility of providing training for EMS courses (e.g., patient care courses) but there is no mention of training for planning, operating or administering the EMS service organizations. Administering an organization requires a very different set of skills than managing a patient. If the legislature anticipated that management skills were necessary, they allowed the law (and funding sources) to remain silent on this point.

The importance of the above-mention top-down hierarchy becomes evident when one considers the functions that the state level organization could and should perform. Since there is no particular EMS service delivery function at the state level (this being impractical due to geography and duplication of service), it would seem that the appropriate state level functions would include those of establishing goals, mandates, and
standards, and distributing any available resources. In addition, the routine monitoring function called for by Mintzberg (op cit) would appropriately be located at this level. Left entirely unaddressed are the questions of what the core functions of the state, region, council, local levels are, or at least, are intended to be. This remains a vague area.

In addition, centralized, coordinated medical control is an appropriate function to be exercised at the state level in a top-down fashion. This would not consist of “on line” radio communications with field units. Rather, it would be fulfilled by the enactment of printed medical standards documents for distribution to the regions and to the field units, as well as standard setting for medical training of personnel. A natural following function would be that of establishing training and certification standards for EMS personnel, the development of a cadre of instructors, as well as the actual training of EMS field personnel. Further, a certain coordinating function would be exercised in dealings with and between the regional councils, and between the state council and the state health department staff, which acts as a resource to the council. These would all be consistent with classic “top down” organization design theory.

At the regional level, the EMS council would be intended to play a coordinating role with the actual EMS providers. Since no real service delivery occurs at this regional level, there is no authoritative relationship with anyone. The regional councils, however, can act in a “top down” capacity for distributing resources (passed through from the state level), and for enacting and implementing standards for training and certification courses.
Since the Article 30 is vague on these latter points, the councils would need to exercise their coordinating functions with substantial energy and consistency.

At this local level, the medical control function is more likely the actual provision of on-line communication with the field units, consistent with the published medical standards documents adopted at the state levels. Although training and certification standards should be set at the state level, the planning and holding of training courses would be an appropriate function at the regional level. In this way, these functions become dis-aggregated by structural levels.

Implementation Literature

When considering the wide area involved (the entire state), the fact that over 1,100 different field agencies and over a hundred hospitals are involved in this endeavor, it is useful to remember Pressman and Wildavsky’s (1984) clarion call concerning the complexity of joint action. In the Rochester Region alone, there are 111 ambulance services and 21 hospitals, plus another 120 non-transporting first responder agencies, all of whom are independent of one another, and of the EMS Council. Although it is easier to describe the problem than to control it, the essential point is to understand that this represents an area of great danger for the implementation of any policy, and the admonition to “keep it simple” is something to heed. There are simply too many players for a complicated system.
A further complication that is important to note is the fact that the EMS councils, both at the state and the regional levels, were invented out of nowhere. There was no obvious guidebook for the State or regional councils to follow. If there were to be any effective policy implementation, then the identification of their roles was essential. Defining the role played by the state organization, as distinct from the state level health department, and also distinct (though, perhaps, overlapping) from the regional councils, was a necessary prerequisite for successful implementation of any state policy. The role of the “Consumer” representative on EMS councils was never defined and needed clarification. Such a role definition would necessarily have to include clarification of their mandate, authority, power and resources.

This implementation need is then set in the essential New York context: the doctrine of local control. Absent a clear and firm state policy, local control will dominate. For EMS system development to occur, a process identified by Pressman and Wildavsky (ibidem) must take place -- a transfer of power and authority must occur from the local providers to the State or, at least, to a regional level organization. This is because an effective EMS system must at least explore, if not adopt, a method of delivering the service other than that already existing, e.g., through the current EMS providers, particularly fire departments. This, by its very nature, is a threat to the current providers because it puts their funding base at risk. Most EMS services are funded by voluntary donations. If the service becomes provided by some other entity, the chances seem reasonable that the donations will follow. If the new service is a paid or
commercial service charging for its services, then the donations to the existing provider service may dry up altogether. Given this absence of guidance from above, and strong incentive for the existing providers to retain authority and power, progress in EMS system development all but requires an entrepreneurial spirit at the local level for any progress to be made at all.

McDonnell and Elmore (1986) identify four alternative classes of instruments for implementing public policy: mandates, inducements, capacity building and system changing. Each brings with it its own set of advantages and disadvantages the skillful use of which might bring about successful implementation of the intended program. In the case of New York, the State allowed for all four to be used, but initially used only one (mandates) in a very limited way, followed a few years later with a second (inducements), providing very modest expenditures for training funds. The last two categories would require substantial investments of funds and complicated delineations or transfers of authority and power, hence were never really employed to full effect. Investing in capacity building would require expenditures of capital the legislature was not prepared to make. Furthermore, such expenditures would undoubtedly lead to system changing, since the current providers could not employ the funds for the purpose intended. There were few agencies or organizations that could build the systems contemplated. McDonnell and Elmore warn that use of system-changing tools (i.e., transfers of authority) may give rise to defensive responses on the part of the organizations being changed.
Giandomenico Majore and Aaron Wildavsky (1979) writing in Pressman and Wildavsky (1984, chapter 8) observe that implementation is evolutionary, requiring, or at least characterized by, control and interaction. In this view, the “solution space” is always moving as new forces that were not known or anticipated in the early stages of policy formulation or development come to light and are brought to bear on the subject. In this context, they postulate that the essential constituents are objectives, resources and constraints. Objectives may not be knowable and/or may change.

Even if one concedes that the more detailed objectives of EMS policy in New York may not have been known or knowable at the outset of the policy in 1974, one all-important constraint was built in to the policy: the necessity of getting the EMS providers to agree on whatever objective, policy or program was under consideration. Given that the EMS providers were ceded such a large role in the EMS council structure and membership, they emerged with a de facto veto power over any determination of anything.

This leads directly to another area of potentially confounding events or forces that could interfere with successful implementation of state policy goals. Perrow (1986) has described what he calls “the power view.” That is, the propensity of street-level players to attempt to “turn” policies or programs away from the stated goals and toward the goals or self-interest of field or regional level players. To a degree, mutual interests need to be accommodated for any policy to succeed, but Perrow warns of the actual transfer of control from the originator to the recipient. Here again, this is easier to warn about than
to do, but it is very much a case where “forewarned is forearmed.” Given the absence of strong, clear leadership at the state level, this is exactly what happened with the EMS councils, as described in Chapter 1. Control over a state policy has been “turned” to the local level.

Emergency Medical Care Literature

Certain basic principles of effective organization and operation of medical services have emerged from a review of the professional medical literature. They include design and structural characteristics, as well as patterns or characteristics of operation. One inescapable fact emerges: that the medical technology has implications for elements of the operation. Its corollary is that changes in medical technology require corresponding changes in operations and operating systems. There occurs an inevitable mixing of clinical medical concepts and technology with organization and operating concepts. One of the fundamental ideas behind the concept of an EMS System is that quality emergency medical care cannot be delivered on a fragmented, "piecemeal" basis. It requires a planned, systematic, reliable response that can deliver predictably high quality care on a consistent basis.

In structural terms, the overall EMS response should be characterized by a planned system design that is segmented, sequential, intended to be linear and purposively incremental. The complex task of an emergency response forms a continuum of activities that is divided into individual components. These components of
the response become separate points on this linear response continuum. During the emergency phase of caring for the patient, it is also important that the prehospital and hospital phases be tightly coupled, both internally and externally. While this is not a guarantee of patient survival, the whole operation is so potentially complexly interactive that any breakdown in the coupling of individual components on the treatment continuum can have disastrous results.

Charles Perrow, in his 1986 work *Complex Organizations*, discussed the importance of understanding the difference between linear processes and those that are complexly interactive. It would be easy to get confused on the question of whether EMS systems are linear or complexly interactive. It is this author’s perception that individual stages or points in the response continuum can be extremely complex and interactive. Examples of this would include the scene treatment stage where EMS personnel are interacting among themselves, the family, the patient, the police, bystanders, and with the base station physician. Another would include the initial emergency room contact where a team of individuals is attempting to make sense out of a difficult situation by making assessment and treatment decisions almost simultaneously, or at least along what might be called "segmented parallel tracks." However, this author thinks the overall system response can still be linearized by arranging and (to the extent possible) simplifying the operations of each stage or point on the treatment response continuum. One of the measures of success for such a system will be the degree to which the managers are successful in imposing and maintaining the linearization of effort onto the complexity of
the situation. This problem represents one of the difficulties inherent to rescue and medical environments. It is simply part of "the nature of the beast."

Experience in other states support the idea that a large area "regional systems approach" is essential for success. There needs to be an overall systematic response to emergencies, and this response needs to be guided by some type of "system architecture." That is, an EMS system should be characterized by a planned approach to the systematic delivery of care in response to emergencies based on known successful strategies. Cales and Heilig (1986), Page (1979) and Trunkey (1984) all agree on this point. For maximum success, there needs to be a comprehensive, progressive, system design that constitutes an organized pattern of emergency response that is comprehensive in approach, provides for progressively improving medical care, and possessing the characteristics of centrality, linearity, continuity of care, and having singular focus and intensity of effort. These characteristics will be discussed further below.

An additional conceptual framework (operated in tandem with the above) that could be usefully employed would be one that relies heavily on certain familiar concepts of quality assurance. That is, using a standard I-T-O model; Input - Throughput (or Process) – Output model focusing on Input Controls (setting up the EMS service), Process Controls (operating the service), and on Output Controls (the results one achieves in lifesaving). There are varying degrees of difficulty in measuring each area, yet it is possible to address them using known tools and methods, particularly standards and resources.
The Evolution of EMS Concepts

In order to understand the movement toward Emergency Medical Services systems, it is helpful to place the idea in its historical context. While this brief history of EMS does not do justice to the whole topic in its own right, it should suffice for our purposes of tracing the origins of prehospital care as an idea, the development of Emergency Medical Services as a separate discipline, and the development of certain specific concepts of prehospital care service provision that are important to this work.

There has been an evolution of concepts in EMS which began with several independent, but like-minded, physician researchers. This evolution began with a) underlying philosophies of care that progressed to b) general operating approaches (not quite doctrines), then to c) specific plans and policies, detailed procedures and regulations, and eventually to d) evaluation and feedback. This evolution has resulted in the determination that there are certain characteristics of EMS services and systems that are important for quality medical care and effective service delivery. This evolution seems to have four broad phases, along two distinct tracks.

Trauma is the older of the two tracks and generally has a military origin. Advances in prehospital medicine and coronary care seem to be more as a result of the
work of individual physicians. Advances in prehospital trauma care seem to result from the efforts of physicians working within the military organization. Greater resources, including the power of organizational "doctrine" were available to them. Their advances tended to be institutionalized more quickly, providing a foundation for future progress. Medicine is the younger of the pair and has a mixed, though mostly civilian, origin. The medicine track does not really begin until "modern science" and drugs appear on the scene in the late 1800's (Boyd, 1982).

It is possible to postulate that each track has the four evolutionary stages mentioned above; each of which began at different times in history and slowly converged in the modern era. During the present age, due largely to recognition of the value of each of them, plus the benefit of many modern research institutions, the two tracks have converged (both chronologically and conceptually) and are pursued rather simultaneously.

The first stage could be described as the "thinking stage;" the time period during which "bright ideas" in EMS were being conceived and tested, usually by physicians (Pantridge, 1966, Grace, 1969 and 1974, Copley, 1977, Eisenberg, 1979). This began with the work of several independent, but similarly motivated researchers. "Meta-theories," or pre-theory ideas were being formulated and subjected to some early clinical and operational tests during this post war era. Individual physicians began to probe the problem of emergency field (prehospital) care of the sick and injured patient (Boyd, 1982, Trunkey, 1984). There were many investigators and many interesting successes;
too many to be related here. However, there are three who are of special interest to us: Dr. Frank Pantridge in Belfast, Ireland, Dr. William Grace in New York City, and Miami physician Dr. Eugene Nagel, an electrical engineer who decided to become a physician.¹

During this first phase, ideas such as fluid resuscitation, use of oxygen and other medicines, newly developed CPR and most importantly, defibrillation, were tested in the field; first by physicians on ambulances, and later by non-physicians. While based on medical knowledge and "hunches" of physicians, often science or theory did not immediately support these ideas, or supported their use only within the hospital; they were too new. It was their use in the pre-hospital phase that had not been established. These tests usually lead to the formulation of some tentative theories, or at least pathways for further exploration. In some areas, these ideas were perused, expanded, implemented, and popularized to a significant degree.

Dr. Pantridge (1966) worked to see if in-hospital techniques of cardiac resuscitation could be improved by early, aggressive care of the dying heart (the advent of the "Coronary Care Unit"). Then, having done that, he investigated whether or not that care could be extended outside the hospital by use of a mobile unit. He found that both answers were "yes" and that prehospital mobile coronary care was effective in saving lives.

Similarly, Dr. Grace (1969) in New York City demonstrated that prehospital intervention by mobile coronary care units (MCCU) could save lives that would
otherwise be lost. At this point in the evolution of EMS, the concept of prehospital care was still that of care provided by the physician, rather than non-physicians.

Dr. Nagel (1970) undertook a prehospital care program using fire department personnel. Using seed money from the American Heart Association, Nagel assembled a collection of cardiac monitors and related equipment. For a biotelemetry system, Nagel worked with a California-based radio company ("Biocom") and managed to develop a workable, portable, bio-telemetry radio. The technology used was similar to that used by NASA, which was intended to monitor the heart rates and rhythms of astronauts while in orbit. Using these, he patched together a remote EKG/Biotelemetry system for fire department personnel and the hospital-based physician to use with prehospital emergency patients. With this equipment, the hospital-based physician could diagnose and treat cardiac dysrhythmias utilizing the fire department personnel in the field. The system was put in operation in March of 1967 (Page, 1979). Dr. Nagel published his results in 1970 and this was one of the first works that not only established the value of prehospital EMS, but also demonstrated that non-physicians operating under physician supervision could accomplish it.

These pioneering physicians were successful in demonstrating several concepts that were not widely accepted at that time. Acceptance came only later when live patients started arriving at the hospitals where dead ones had arrived previously. In addition, although Nagel’s prehospital EMS system was largely intended as a cardiac
treatment system, it possessed certain significant characteristic that related to trauma care.

Drs. Pantridge, Grace, and Nagel established that early intervention in an emergency can be very useful for the purpose of reducing morbidity and mortality. In discussing success in prehospital efforts, attention is usually focused on the number of people who lived or died (Boyd, 1982, Trunkey writing in West, John G., M.D., 1983, Stewart, writing in Cales and Heilig, 1986). While this is of obvious interest and certainly is the easiest aspect of a program to measure, it often distracts attention from another beneficial aspect of the effort--perhaps the most beneficial aspect--which is the reduction of injury to a patient who probably would have survived the illness or injury anyway. In cardiac patients, this means reducing the amount of cardiac tissue that dies, even though the patient ultimately lives (this time). In the trauma patient, it may mean reducing the amount of brain tissue that is damaged or dies. It is significant because cardiac tissue death and brain tissue death are irreversible. Neither regenerates to any appreciable degree (McIntyre, 1983). There is a finite limit to the amount of tissue that can be destroyed without precipitating the death of the patient. If cardiac or brain tissue death occurs with the first attack or injury, it is no longer available to survive a second attack or injury. In some cases, it is possible to prevent any such damage at all, and this is obviously the preferred outcome. However, this success often goes unnoticed by officials and the public, as it is a very difficult area of success to measure. Further, it does not hold the real-life drama potential that a cardiac arrest and attendant resuscitation efforts seem to have with the public.
These researchers, especially Nagel, also established that this intervention can be accomplished successfully by non-physicians. This demonstrated the "physician extender" concept used so successfully since then (Page, ibidem). This becomes, for all practical purposes, the practice of medicine by "physician extenders." This was not an accepted notion at that time, nor is it today in all places (Page, ibidem).

It was also determined that pharmacological intervention (prescription drugs) was often useful in this prehospital intervention, and could be of significant benefit to the patient. Further, it also could be accomplished effectively by non-physicians, although presumably only on the basis of radio communication with the physician at the hospital.

Field use of both biotelemetry radios and EKG's for the purpose of informing the hospital-based physician of the patient's condition, were demonstrated to be successful in both concept and actual field practice. It was successful for "extending" the physician's care into the field, even though the equipment was initially cumbersome. This allowed the physician to remain in the hospital (presumably also treating other patients), while the paramedic became the "eyes and ears of the physician" (Nagel, op cit, Page, op cit and West, op cit).

It would emerge that "success" could be defined as a reduction in the mortality of prehospital care patients, and such success or lack of it could be directly measured in the
emergency room by body count. The question of morbidity reduction would follow along later.

Independent of its patient care application, the biotelemetry radio became a tangible instrument of medical control, and its use created a specific control point on the medical aspects of the prehospital operation. This became one of the more obvious operational consequences of prehospital clinical care.

From an operational perspective, it was learned that all of this could be accomplished by mobile units operated by some entity other than the hospital, providing it was under the medical control and general supervision of the physician in charge. This was the finding that allowed prehospital care to emerge from the traditional medical professions and be disseminated into the field.

Examples from the trauma track are somewhat different, due to its military origins and longer history. Advances in prehospital medicine and coronary care seem to be more as a result of the work of individual physicians. Advances in prehospital trauma care seem to result from the efforts of physicians working within the military organization (Boyd, op cit, Trunkey, op cit, West, op cit). Greater resources, including the power of organizational "doctrine" were available to them for prompt implementation. Their advances tended to be institutionalized, providing a foundation for future progress.
The origins of prehospital trauma care are quite old and typically have a military orientation. Although one author has credited the Romans with the development of field hospitals for wounded soldiers, (Donald Trunkey, writing in West, 1983) and ambulance use was reported in the Siege of Malaga Spain in 1488, most have credited the French during the Napoleonic wars with the concept of organized battlefield care of the injured, specifically Baron Jean-Dominique Larrey, Napoleon's Chief Surgeon (Ronald Stewart, writing in Cales and Heilig, 1986). In particular, two developments were of special importance to us: small, lightweight, ambulance carts ("ambulance volante" -- flying ambulance) to withdraw the wounded from the battlefield, and the use of surgeons (as distinct from physicians) to make prompt and presumably lifesaving "operations" (usually amputations) on the wounded in order to stop excessive bleeding, prevent infections, and (unknowingly) reduce shock somewhat. Surgeons at the time were not regarded as highly as physicians. They were specialists in emergency surgery and rather like today’s paramedics in that regard. They were also more expendable than “real doctors” (Steward, ibidem).

While mortality rates were still high by modern standards--twentyfive percent--this was still regarded as successful for the times (Cales and Heilig, 1986). More to the point for our purposes, two concepts were "battlefield tested:" 1) that of rapid evacuation from the source of injury by non-physicians (thus not exposing the physician to enemy fire) and; 2) that of moving the patients to a collection point that was as close to the battlefield as feasible, for the purpose of prompt, definitive care within the bounds of the technology of the day. Here again, medical technology generated an operational
imperative. It had already been noticed that there was an association between prompt
treatment and survival rate (Cales and Heilig, ibidem) and this approach seemed to
provide the wounded soldier with improved chances of survival. Despite his other
contributions to history, Napoleon unwittingly contributed substantially to prehospital
care with these two steps alone.

Subsequent military engagements during numerous wars in that bloody era
provided opportunities to improve the mechanisms of transport for wounded soldiers.
The concept of treating wounds and transporting to the rear for "definitive care" was
continued throughout the era. But there seem to be few significant medical advances
during the remainder of that century, at least as far asprehospital medical care was
concerned. Attention was focused essentially on the same aspects of care as during the
Napoleonic Wars--stopping bleeding, the splinting of fractures, amputation of wounded
limbs, and elementary infection control using now-primitive antiseptics. Little attention
was focused on the organized delivery of care – perhaps because there was no more care
to deliver (Stewart, ibidem).

Despite the advent of truck-type field ambulances during World War I, the time
lag from injury to surgery was still twelve to eighteen hours. While this was probably an
improvement over previous years, the overall mortality rate was between 8.5 and 18.0
percent (Cales and Heilig, ibidem). This again highlighted the linkage between operations
technology and mortality, this time for the British and American officers, as well as the
French. The lesson was not lost, but the technology was limited.
The ability to replace blood loss by the transfusion of whole blood was developed by the British during this era. Although it was not a major factor on the battlefield, this was a significant development that would improve mortality rates in future wars (Stewart, op cit, and Trunkey, Donald, 1984). However, the introduction of a simple device, the Thomas (whole) ring splint, did reduce mortality rates from femur fractures to twenty percent by the end of the war. Aside from the reduction in mortality, one of the significant aspects here is that this represents the first statistical data supporting the idea that improved early care (in this case, stabilization of a dangerous fracture) favorably influences patient outcome (Stewart, op cit.).

In World War II the value of the non-physician, non-surgeon, field medic was clearly established. While not as highly trained as his successors would be, the field medic was specially trained to render emergency care to wounded soldiers in order to stop bleeding, prevent infection and prevent shock. To combat shock due to blood loss ("hypovolemic shock"), medics attempted to replace the lost blood with whole blood. Almost exclusively, land ambulance or other land vehicles accomplished evacuation as soon as possible (Stewart, writing in Cales and Helig, opt. cit, and Trunkey, Donald D., 1984).

Although the helicopter had been invented, it was not yet in use and would have to wait for another war in order to be used to full advantage. It took an average of ten hours to get a wounded soldier from the time of injury to definitive medical care. The
mortality rate was between 3.3% and 4.5%, considerably lower than in previous wars (Cales and Heiling 1986, opt cit, and Boyd, David R., 1982).

During the combat action in Korea in the early 1950's, the military's experience from World War II was put to good use. The proven value of field medics was supplemented by improvements in medical care and rapid evacuation from the field. Evacuation was usually accomplished by means of helicopters, rather than slower land vehicles. These patients were transported to special mobile army surgical hospitals (MASH)--bypassing closer battalion aid stations--where battlefield triage, followed by emergency surgery, were performed. Average time from injury to definitive care was two to four hours. The mortality rate declined to 2.4 percent, an improvement over the record from World War II (Trunkey, Donald, writing in West, 1983).

Among other things, it was learned that whole blood was not necessary for combating hypovolemic shock. Simple blood plasma (the non-cell fluid portion of the blood that could be stored in a frozen state) would work. The link between operational technology, medical technology and morbidity was becoming stronger and better understood (Stewart, ibidem and Trunkey, ibidem).

In the civilian world, several trends were underway during this same period that would ultimately culminate in an explosion of progress. The American College of Surgeons formed a "Committee on Treatment of Fractures" in 1922. This later became the "Committee on Trauma." Although little progress occurred during the next three
decades, this committee focused efforts on the needs of orthopedic trauma victims, later including multiple injury patients. Perhaps the most important contribution was that it focused the attention of individual physicians on the problem of traumatic injury. This would result in a collection of individual research efforts that would subsequently coalesce into important information presented in useful forms (West, opt. cit., and Cales and Heilig, op cit.).

One of the other important developments that occurred over this time were two methods for identifying preventable deaths; clinical and autopsy audits, using both premortem and postmortem records to assess the quality of care that was rendered to the trauma patient. It was an organized effort to answer the question, "could this death have been prevented?" and it was to become a highly useful tool in the effort to determine the need for a better way to treat trauma patients. Initially, it asked the question in the context of available care. That is, could the death have been prevented by skillful use of all the medical care available at that time in that location? Increasingly, though, the question began to be addressed in the context of optimal care. Could the patient have survived if he had received optimal care that is available at the larger hospitals?" (Cales and Heilig, Ibidem).

It was an important question; one that lead ultimately to trauma centers and systems. These ideas were implemented, expanded, and popularized in the civilian arena to a significant degree, sometimes before the underlying theory was established to the satisfaction of the entire medical community.
The second phase of the evolution in EMS constitutes what might be called a "preliminary structuring," or "operationalizing" of the concepts discovered (or invented) in the first phase. The linkage between operational technology, medical technology and morbidity were becoming ever better understood and “framed up” into operational theories. This was important because it was the first significant ordering of individual theories into a coherent whole, and one that took account of both the medical and trauma tracks. It had the effect of taking what was known at that time and organizing it into a meaningful bundling of concepts; a "package" of important concepts that should be implemented as a systematic response to a medical or trauma emergency.

During the Vietnam War, the lessons learned from the relatively successful previous wartime experiences were carried through to their logical extensions. Military medics became even more highly trained technicians than their predecessors. Rapid evacuation by helicopters was the norm, but wounded soldiers were flown one step further behind the lines than previously, skipping both the battalion aid stations and the MASH hospitals of previous times, and going all the way to Corps surgical hospitals (Stewart, op cit). Doctors learned that blood loss could temporarily be compensated for by simple fluid replacement, and that this fluid replacement could be accomplished successfully with only normal saline or lactated ringers solution (sterilized, mild salt solutions which mimic the normal chemistry of human blood) instead of whole blood or plasma. This discovery made supplying the fluids much easier (Stewart, op cit, and Trunkey, op cit).
Further, physicians learned and successfully demonstrated that a newly developed device known as "military anti-shock trouser, or "MAST," could be used to accomplish the restoration of a wounded soldier's blood pressure to acceptable levels. This was believed to be due to a process commonly called "auto-transfusion," (Trunkey, 1984 opt cit) and the combination of intravenous fluid infusion plus MAST was buying time for wounded soldiers until they could get to definitive medical care--in this case, surgery. Still, rapid evacuation followed by accurate triage and prompt surgery remained the key to success for wounds inflicted by trauma. The average time from injury in combat to definitive care in a Corps hospital was eighty-one minutes (Trunkey, 1984, op cit). The mortality rate was reduced even further, to fewer than two percent (Cales and Heilig, op cit.).

One of the major advances in the civilian world occurred in Maryland through a combination of farsightedness and courage on the part of one individual, Dr. R Adams Cowley, and the unexpected, but very timely misfortune of a high state official. One might call it a "serendipitous emergency."4

A better understanding of the exact pathophysiology of death was being sought as researchers struggled to determine how to save lives. In particular, immunobacteriologic and biochemical responses to shock, especially the role of ischemia and hypoxia (the decrease or absence of oxygen at the cellular level), was under study in several places around the country.
In 1963 a grant was awarded to Dr. R Adam Cowley and the Maryland Institute for Emergency Medical Services (“MIEMS”) for, "The construction of a model facility devoted exclusively to the critically ill or injured patient." It was to become known as the "Shocktrauma Unit." Construction was completed in 1969 (Boyd, 1982). The Shocktrauma Unit was a highly specialized trauma center that was intended to receive only the most severely traumatized patients from throughout the area and state; motor vehicle accident victims, burn patients, traumatic amputees, victims of shootings, and so on. In this specialized unit they would receive intensive care throughout their stay by multi-disciplinary teams of physicians and nurses who used the latest of medical techniques and concepts. In return, the victims became the subjects of very careful study. They were closely monitored and their physiological responses to traumatic insult were recorded in detail. They were not guinea pigs, being subjected to experimental operations or efforts, but they were definitely research subjects, every advance or decline in their medical condition being closely watched and recorded. The efforts of Dr. Cowley and his associates led to certain medical and operational discoveries that soon became imperatives for trauma centers everywhere (Boyd, ibidem, Trunkey, op cit, Franklin & Doelp, op cit).

Through their work at this center, Dr. Cowley and his colleagues were instrumental in discovering, among other things, the direct relationship between the passage of time from injury and the probability of death. This had the result not only of putting precision on a relationship observed during the Napoleonic Wars, but of identifying useful treatment and transportation strategies for the injured patient as well.
(Boyd, op cit and Cowley & Dunham, op cit). Simply put, it was determined that a seriously traumatized patient had to receive definitive medical care (almost always meaning surgery) within one hour from the time of injury, or the probability of death would increase rapidly to one hundred percent, *even though* this death would often take place days or weeks later and not be obviously related to the initial emergency treatment! This was due to the discovery of details of the relationship between oxygenation of the body's tissue and the body's own defense mechanisms that were operating in response to the traumatic insult to the body. This was to become known as "the Golden Hour" concept, and it remains valid today as an important rule in trauma treatment (Boyd, David R, op cit. See also footnote 4).

This work was important because it represented a combination of clinical medical research on shock therapy as well as field operations. This was one of the strongest linkages yet discovered between medical technology and operational imperatives. Both the Vietnam experience and Cowley's work constituted significant and well-known forerunners of the preliminary structuring which was about to occur at the Federal level.

The second phase, that of a preliminary structuring of EMS systems was accomplished and popularized by Dr. David Boyd. Boyd, formerly one of Dr. Cowley's assistants, established the first statewide trauma system in Illinois, and later became the first and only Director of the Division of EMS at the then U.S. Dept. of Health, Education and Welfare (now the Department of Health and Human Services) (Page, 1979, op cit). Building on the momentum generated by the National Academy of Sciences-National
Research Council (NAS-NRC) report issued in 1966 concerning the sad state of emergency care in the nation (Page, ibidem). Under his leadership, the Department of Health, Education and Welfare began an effort to organize EMS systems throughout the United States. With him, EMS was carved out as an area of federal responsibility. There would be a strong federal role in establishing standards of care, service level provision, technical standards, information exchange, and general leadership in the field. Boyd was determined to build EMS systems that would implement the linkages discussed between medical technology and operational imperatives (Boyd, op cit, Page, op cit, Trunkey, op cit).

In an attempt to replicate nationwide the success of leading programs in Miami, Pittsburgh, New York City and elsewhere, Dr. Boyd identified fifteen essential components to EMS systems and "bundled" them into what has become known as "Boyd's Fifteen Points of EMS." These works eventually were enacted in the form of the Emergency Medical Services Systems (EMSS) Act of 1973 (PL 93-154). Amendments were subsequently enacted in 1976 (PL 94-573) and 1979 (PL 96-142) (Boyd, op cit).

The intent was to identify all the components of a systematic EMS response, and then to encourage states and localities to build such systems. Millions of dollars were poured into state-level and sub-state-level regional programs in an attempt to create 15-component EMS systems with minimum standards of care nationwide (Boyd, ibidem, Trunkey, op cit, Page, op cit).
Boyd attempted to build EMS systems nationwide, issuing grants for regional EMS programs such as RMP in Rochester. As valuable as these were, though, these points were no more than a collection of items to be addressed; a "checklist approach" to system development. This act identified many of the important components of EMS, but did not provide architecture for the systems that were supposed to be built. It was something like delivering to the construction site truck loads of material; lumber, blocks, mortar, nails, etc., but no plan for construction into an actual building. That would have to be made up by the locals on the site. There was no overriding vision or "system architecture" presented. This would have to await further development.⁶

Although the federal money subsequently dried to a trickle, leaving state and local programs very much on their own, certain contributions to the field were established. They included the establishment of federal minimum standards (albeit voluntary standards) for ambulance personnel training, ambulance vehicles, EMS service levels, and EMS service responses (Boyd, op cit, West, op cit., Cales, and Heilig, op cit, Page, op cit, Cowley & Dunham, 1982). This was still a definite step forward, since it constituted the first comprehensive look at EMS. The primary significance of this was two-fold; first, the idea was put forward that EMS systems should be developed. That is emergency responses should be planned in advance and organized responses undertaken in a systematic manner. Second, that these response patterns should constitute "complete packages" of care, beginning with the citizen-intervener, and "ending" with a
In 1971, a plan for a statewide trauma care system was submitted to then-Governor Marvin Mandel for the purpose of providing trauma care to the whole state. The effect of this plan was to convert the whole State of Maryland into a trauma care system. Cowley was later to report a progressive fall in mortality from 50% to below 20% for very seriously injured patients flown to the ShockTrauma Center (Boyd, op cit). Although the first statewide trauma system was actually established in Illinois (Boyd, ibidem), Maryland soon became the premier trauma care system of the country. This success and acclaim were due to several factors, not the least of which was the discovery of the "Golden Hour" concept. However, there were other, better reasons. First, there was a statewide system; second, there was a specialized trauma center built to receive patients, rather than a regular hospital that treated trauma patients as an add-on service. This trauma center clearly possessed expert personnel and resources. Third, there was original research going on at the MIEMS to learn more about the science of what was to be called "resuscitology." And fourth, the fact that both a book and a movie were made about it didn't hurt (Franklin & Doelp, op cit).

The military experience was thus reaffirmed in the civilian world. Rapid evacuation from the scene of a trauma emergency, followed by prompt surgery followed by intensive, intensive care could definitely save lives in a demonstrable, measurable way. It was further demonstrated in Maryland that the prehospital component of civilian rehabilitation service following hospitalization: Complete service for the EMS patient from "A" to "Z."
EMS could be accomplished successfully by non-physicians, contributing to the work of other leaders in the field. In addition, it was demonstrated that, to be successful in meeting the one-hour time frame, evacuation nearly HAD to be done by flying the patient from scene to trauma center. The linkage between medical technology and operational imperatives not only had been made, it was reinforced by legitimate research.

Although there were several good EMS programs being built around the country, it was Los Angeles County and "the Paramedics" who soon got the limelight. This was largely responsible due to the proximity of Hollywood and the efforts of a particular producer, Jack Webb. The television program "EMERGENCY!" was the product, and soon became a staple of the living room theater for seven years, beginning in 1972 (Page, op cit).

Interestingly, the publicized success of the SHOCKTRAUMA unit, plus the televised success of the Los Angeles County Paramedics ("EMERGENCY!") introduced a new characteristic into the EMS scene: public expectations and the ability of television to shape them. Previously, prehospital EMS had been the domain of the participants and the physicians. The patient was the subject of attention, but the public was little more than a sideshow. Now there were paramedics in the living room every week. Similar to the impact that television coverage of the Vietnam War had on public opinion and expectations, television exerted an influence on the public that would help shape expectations (Page, ibidem). The importance of this was to be four-fold:
First was the display of a new idea to the public at large. This had the effect of asserting and reinforcing the viability of the whole concept of non-physician paramedics, plus inserting and reinforcing the notion that patients could survive certain accidents and illnesses if only they could reach proper medical care in time, via the EMS system's paramedics. Second, the idea was REAL; the TV program was based on the actual operating model and experiences of the Los Angeles County Fire Department's paramedic program (Page, ibidem). Third, the television program promoted the advent of Mobile Critical Care Units as a treatment concept; intensive observation and early intervention by highly trained technicians, rather than rapid "horizontal taxis." This was a combination of prehospital "stabilization" efforts and rapid transportation that was deemed optimal for patient survival. And fourth, there was a growing recognition that the best way to accomplish speed without haste was to fly the patient to the trauma center, usually via helicopter.

The third phase of EMS evolution is what might be called "Post-Boyd." That is, in the time period of the early and mid-nineteen eighties during which federal funding dwindled, EMS was essentially abandoned as a federal responsibility. In some areas, local and state organizations picked up the slack. During this time period, many of the tentative theories and ideas presented earlier were reviewed, tested and often improved upon by motivated local physicians or scientists. In some cases theories were reversed. In others, they were confirmed. In still others, they were refined.
Perhaps most important was the work of Dr. Leonard Cobb of King's County (Seattle), Washington. Building on the work of Dr. Lund in Oslo, Norway, in what is now known as "citizen CPR," (Lund, I., Skulberg, 1976). Dr. Cobb's work, now adopted by the American Heart Association, demonstrated that cardiac arrest patients have the greatest chance of long term survival if they can receive CPR within four minutes following cardiac arrest, followed by paramedic care within an additional four minutes (total of eight minutes from arrest). Further, he demonstrated that a practical way of accomplishing this was to have the citizenry trained in CPR so that it could be started promptly after a cardiac arrest. This was followed by a tiered response of BLS ambulances and ALS paramedic units. Dr. Cobb reported a successful resuscitation rate of 43%, remarkable by most standards (McIntyre and Lewis, 1983). This and other clinical refinements of oxygen therapy, high dose epinephrine, emergency cricothyrotomies, early defibrillation, MAST use, endotracheal intubation, external cardiac pacing, and so on, have lead to some improvements and refinements in the theoretical approaches to EMS that awaits a new "bundling" into a significant system architecture. However, Cobb’s experience in Seattle clearly demonstrated that a tight linkage between state-of-the-art medical technology and planned, systematic operations reduced morbidity in the real world, as well as in theory.

The fourth phase is one that has been emerging in the 1990’s and is not fully developed. Due to the work of the previous phases, certain aspects of a new EMS system architecture are beginning to emerge. This phase uses recently researched medical
information in combination with field operational requirements to yield theoretical guidance for actual system construction.

Two works are of particular interest in this matter. First, the work of Dr. Mickey Eisenberg, (also of Seattle, Washington) established that a "tiered response" EMS system which uses EMT-D First Responders, followed by paramedic level personnel, can provide the optimum level of prehospital care likely to occur, and can provide resuscitation survival rates that are markedly improved over those of other approaches (Eisenburg, Micky, 1990).

Second, the work of Dr. Richard Cales and Dr. Donald Trunkey has demonstrated that organized trauma care systems can save lives (Cales, 1984, and Cales & Trunkey, 1985). This builds on the work of Dr. Cowley because it demonstrates that the organization of the care is important, not merely the quality of the trauma center to which the patient is taken. While the exact shape which this work will take is not yet clear, this author thinks it represents the beginnings of a second "bundling" of concepts into a theoretical "architecture for EMS." The linkage between medical technology and operations is being studied and refined. These represent conscious attempts to link medical technology and operations strategy for improved patient outcome.

The result of this evolution of EMS concepts is that an array of "expert-developed" national standards has been developed for many aspects of EMS service provision, including both clinical care and organizational and operations response. All of
these can be used to guide the planning, construction and evaluation of a comprehensive EMS system. All of this has led to some improvements and refinements in the theoretical approaches to EMS that await a new "bundling" into significant system architecture.

Summary Points of Medical and EMS Literature

At this juncture, it is useful to review some important summary points from the medical and EMS literature. These include the following:

1. Individual patients were helped by medical advances, but populations were helped by linkages between clinical medicine and operating doctrine. Real progress came when improvements in medical technology were linked in a planned way to operating methods, guided by a strategy and a planned response doctrine. That is, the construction and utilization of a “system architecture” that was focused on patient needs, rather than provider needs, was oblivious to political boundaries and involved coordinating many service agencies, as well as the public response.

2. A thorough review of the medical and EMS literature yields the observation that there should be a systematic response and that this response system includes two important concepts for quality in EMS. These yield distinct, but related pathways to effective EMS service provision: 1) a clinical pathway -- that of quality clinical care provided on both the trauma and medicine tracks, and 2) an operations pathway -- that of
operating effectiveness: timely operations that deliver quality care to the patient and the patient to definitive medical care. These two tracks emerge with a similar continuum, differing somewhat in resources and time constraints.

These are distinct in requirements, construction and operation, but must be closely coordinated since they share common resources. Both can be subdivided into medicine and trauma tracks, but must be further coordinated as the same resources must be used for each, though in somewhat different combinations and at different times. Each continues from the field into the hospital phase, but that is beyond the scope of this work. To be effective, the response in each pathway must be systematic, planned, predictable, reliable, and repeatable. There are few decision points on either pathway – protocol dominates decision making during actual operations. As with any chain, all links must be equally strong. A breakdown in one pathway preempts progress in the other. Both pathways are time sensitive.

3. To be effective, the linkage between medical technology and operating doctrine ultimately must lead to a conceptual framework that yields a continuum of care. This continuum must be constructed in such a way as to provide maximum opportunity for the patient to live, or at least survive with the lowest possible degree of injury. Such a continuum has important and distinct phases and steps. Each step or phase would or might require differing or supplemental resources and skills to be applied. These construct a patient handling sequence that is unilinear, unidirectional, hierarchical (always leading to a higher level of care) and coordinated between both the prehospital
and hospital phases of patient care so that there are no gaps in care. All of this must, of course, be implemented in a timely way. Such a continuum could be diagramed thus:

**Pre-Hospital Phase**

![Diagram of Pre-Hospital Phase]

The hierarchical (and sequential) arrangement of treatment is of value in providing quality patient care. The chief value of hierarchy lies with its contribution to linearity of design and continuity of care, as well as progressively improving medical care. It should provide for an unbroken chain of skilled observation and expert care.

4. “Quality service” became defined by successful patient outcome in the form of declining morbidity and mortality, as distinct from a dedicated, but possibly hopeless response effort. Certain input and throughput characteristics or factors were identified that reliably and predictably contributed to improved patient outcomes. They included recently trained personnel, modern equipment, and modern vehicles among other input
factors, and state-of-the-art treatment modalities, usually controlled by medical standards
documents and/or online medical control, among other throughput factors.

5. Though “quality” was becoming identified and defined, actual delivery of
quality service by the local provider required certain actions to occur, often in advance of
the actual emergency event. The literature reveals that there are further, more specific
elements of quality that can be identified as necessary prerequisites for quality service
delivery. These include: information, knowledge, attitudes and inclinations about the use
of the above, power (to act or not to act), opportunity to act, and implementation skill.

This leads to some key questions: Are the ideas concerning quality care and
operations linkages known to the local providers? Are they incorporated into their
response plans? Is the continuum of care present? Is it present in an unbroken and
reliable way? What are the consequences of this incorporation? Are they “embedded” or
“institutionalized” into the organization and how was that done?

Given the failure of leadership and paucity of resources at the state level, what
then determines the quality of service delivery at the local level? Are there specific
factors that determine what level of quality exists and who gets it?

At this juncture, it is useful to review some important summary points from the
general literature. These include the following:
Maintain a method to exert control over “the troops”—the people who are making the day-to-day decisions and carrying out the implementation of strategy and policy. More to the point, have a strategy for success in the first place. Success cannot be achieved if you cannot define it and don’t know how to recognize it when you see it.

Have a process for pre-thinking of the larger problem. This is necessary for the development of a sound technical theory that is needed for success.

Any successful policy implementation strategy must include a careful delineation of the role of power in the organization, as well as the wise placement of that power within the organization so that it leads to success.

A careful analysis of the nature and division of labor has implications for, and should lead to, certain elements of structure for the organization. This structural arrangement should be conducive to success.

The organization should have a team-based structure. This team should represent a mixture of complementary knowledge and skills so that the “team is greater than the sum of its parts.”

The successful organization needs a solid data collection and feedback process so it can learn and adapt quickly to the changes that are occurring in its environment. This data feedback requires an organization to have an effective analytical process.
All of this must take place within a context of authority, lest it all be ignored.

Be mindful of the complexity of joint action and maintain an operating doctrine to “Keep it simple.”

Also be mindful that there is a propensity of local agents to “turn” higher echelon policies and programs to serve the wishes and goals of the local agents, rather than the original goals.

The Learning Organization: Feedback & Change

Data collection, analysis and reporting are functions that have been consciously articulated as an important organization function at least as far back as Frederick Taylor’s *The Principles of Scientific Management*, published in 1911. Although the degree of detail and daily frequency of review Taylor advocated is not necessary for this purpose, the point is very similar. To understand whether or not the larger goals are being met, a regular process of data feedback – a surveillance system -- must occur, and must occur in conjunction with an effective analytical process that can make some sense of it. This should then be coupled with a process that allows for a comparison with the organization’s clear goals and the modification of the organization’s efforts to improve the chances that the goals will be achieved.
For the EMS council system to be an effective learning organization, the state level council would appropriately collect and analyze data on such things as basic operating facts (how many providers, responding to how many calls, how often, where, when, and so on), and patient care data to answer the question: “how are the patients being cared for?”

In addition, the organization should logically want to obtain data on its own activities, particularly training. This would include knowing how many courses were undertaken, how many students began and completed the courses, the success rate on exams, the turnover of field personnel, and similar data to monitor the cadre of trained personnel available to provide the service to the patient. This would facilitate work force planning efforts at the state and regional levels, as well as monitoring quality control within the training function.

Although many authors advocate that organizations obtain information from the external environment, perhaps Peter Senge (1990) and Joyce Wycoff (1995) are most adamant that an environment of change be provided for within the organization. Sometimes described as a “culture,” the essential point is that organizational learning, change and adaptation is more than happenstance. Not a singular event or a grudging giving–in to something. Rather, it is a planned response of the organization to changes not yet anticipated, for the purpose of helping the organization to survive, prosper, and meet its long term goals.
In the particular case of the EMS councils, this could allow adaptation to external changes (e.g. unexpected Federal programs or mandates) and groundswells of public opinion that should not be ignored. Such a design might look like this:

Each relationship (line) would be a two-way line of communication. The state health department staff would perform the routine monitoring functions that require regularly available staff to perform including data gathering and statistic generation. The “project group” would tackle non-routine tasks or challenges, including analysis of statistics and information gathered. Membership would be constructed on an ad hoc basis according to need.
Angela Browne and Aaron Wildavsky (1983) writing in Pressman and Wildavsky (1984) state that evaluation must be aimed at generating data that can lead to improved implementation. Specifically, they cite three major problems with evaluation processes that can stymie effective implementation. These are 1) weak methodology, 2) irrelevance and 3) under utilization. A methodology can be weak due to lack of validity in the first place or credibility in operation. Evaluation can become irrelevant if it is untimely, or insignificant --merely evaluating the wrong things. Evaluation can be useless if the information is not disseminated to those who could use it, or, if disseminated, not used by those who receive it.

If the organization, in this case the EMS council system, has an analytical capability, these characteristics permit an understanding of a problem and/or the options available to the organization. This provides the organization with the ability to translate information into reform and effectiveness.

At the local level, the role of external information is uncertain, particularly as it may influence decisions about the level and degree of quality provided by the local service. In theory, a data feedback mechanism could be constructed to provide the local service with performance and patient care data. This, in combination with continuing medical education and national level information, should combine to improve the quality of care and service provided. This could be accomplished with the State PCR (Prehospital Care Report) system. However, such reports being sent down from the State often generate the impression of supervision by the State, and this tends to run counter to
the interest of the local EMS officials. It is possible for it to have a negative effect rather than what might be intended. In addition, reports from PCR data are running two or three years behind. The actual effect is minimal.

To summarize, an organization can get better over time if it has a learning mechanism that includes: a) a clear identification of goals, b) an effective surveillance ("feedback") system to capture information and bring into the decision makers in a usable way, c) an analytical capability to understand the problem, information being provided and identify or formulate options, and d) possess the ability to translate information into reform and goal achievement.
<table>
<thead>
<tr>
<th>Literature Type:</th>
<th>Main Contribution:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic Management and Policy:</strong></td>
<td>Have a strategy for success in the first place – identify goals and pathways to goals. Articulate in words and numbers what must be accomplished. Identify critical environmental problems, select the right organization, identify critical tasks and technologies to be mastered. Place power in areas favorable to policy development.</td>
</tr>
<tr>
<td><strong>Organization Design:</strong></td>
<td>Five main elements of structure Must possess needed functions for critical task accomplishment Structure must be conducive to effectiveness &amp; efficiency. Team-based structure – mix of complementary knowledge &amp; skills.</td>
</tr>
<tr>
<td><strong>Implementation:</strong></td>
<td>Develop a good technical theory. Complexity of joint action. Four alternative classes of instruments for implementing public policy. “Solution space” is always moving. Implementation is evolutionary with control &amp; interaction.</td>
</tr>
<tr>
<td><strong>Learning Organizations:</strong></td>
<td>Must have: clear identification of goals, surveillance system, analytical capability and ability to translate information into reform and goal achievement.</td>
</tr>
<tr>
<td><strong>Emergency Medical Care:</strong></td>
<td>Quality standards are fundamentally science-based, not regulation-based. Two parallel tracks: (trauma and medical) with four evolutionary stages Pre-hospital care is effective and can be done by non-physicians. EMS response should be systematic – a complete package of care Individuals are helped by medical advances -- Populations are helped by systems. EMS systems must have a “system architecture” that provides both a clinical pathway and an operations pathway. Linkages within the EMS system must yield a continuum of care. Quality care” is defined by successful patient outcome rather than by dedicated effort.</td>
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Research Hypothesis

The research hypothesis that emerges from this information consists of three related questions:

1. The first question is; does EMS service provision in the Rochester Region of New York State meet national quality standards on a consistent basis? Does the Rochester Region meet the standards determined by leading researchers or other experts, to be essential for providing meaningful and effective emergency medical care? Are these standards met uniformly throughout the entire region, twenty-four hours per day, seven days per week?

2. If the answer to the first question is “no,” then the second question becomes: What is the primary reason the region does not meet national standards on a consistent basis? How does the “system architecture” that the State constructed compare to important structural and functional characteristics recommended by pertinent organization design and EMS literature? Was the EMS Council system a good choice or a poor one?

3. The third question is why any progress was made at all? Is progress in quality EMS service provision in the Rochester region the result of State policy and the EMS
Council framework (e.g., according to State policy)? Or, is progress the result of local, pioneering leadership, or some other reason?

Notes


2. The story is best described by the book SHOCKTRAUMA, by Jon Franklin and Alan Doelp, 1980.


4. This story and clinical explanations are best told by Jon Franklin and Alan Doelp in their 1980 work, Shocktrauma.

5. According to Dr. Boyd, writing in the Critical Care Quarterly in December, 1982, these are: 1) provision of human resources, 2) training of personnel, 3) communications, 4) transportation, 5) facilities, 6 critical care units, 7) use of public safety agencies, 8) consumer participation, 9) accessibility to care, 10) transfer of patients, 11) standard medical record keeping, 12) consumer information and education, 13) independent review and evaluation, 14) disaster linkage, and 15) mutual aid agreements.

6. A review of Boyd, Trunkey Page, Stewart, and Cowley provide interesting and important clinical insights, and a few operational imperatives, but no coherent plan for constructing a system of emergency medical operations. The closest was Cowley’s trauma system in Maryland, but even this was a one-center operation (vs. a multi-center operation) and did not address issues related to medical or cardiac emergencies.
CHAPTER III

METHODOLOGY

In reviewing the background and evolution of EMS in New York State and the Rochester Region in particular, and in reviewing the expert literature available in the field, certain important research questions are crystallized and constitute important lines of investigation.

New York State is chosen for this investigation for several reasons. First, it is a large state, so whatever happens here involves many people. Second, it is one of the many northeastern states that relies heavily on volunteer ambulance providers, so that what happens within New York State may have lessons that are transferable to many other states of the nation, perhaps all. Third, it has a mixed collection; some say a “crazy quilt,” of ambulance service types, or “corporate homes” (i.e., volunteer, commercial, municipal and industrial). Some lessons may be learned about the benefits or drawbacks of using certain service provision models or, at least, of a particular mixture of models. This may also have lessons for the rest of the nation to emulate or avoid.
The Rochester Region is selected because it is a large region that is roughly typical of the larger state, has a reasonable degree of urbanness, high-speed roads, spatial considerations for ambulance transport, and a wide range of hospital quality. Further, it has a significant mix of ambulance service corporate homes: independent volunteer, fire department based, municipal based, corporation based and commercial ambulance services that mimics or mirrors the mix at the state level.

Lastly, New York State is the state in which the writer has many years of actual field experience in fire rescue and EMS service provision; the view from “the ground up,” as it were. This experience can serve as a tempering agent for the many theoretical approaches and models offered by management gurus and academics that may have no “hands-on “experience in the field of EMS. The unique characteristics of the EMS system are best understood and assessed by practitioner/academic who have “subject matter expertise” developed through experience.

The spatial boundary of this investigation is the nine county Rochester Region of New York State. This region is used by the health department as an administrative unit, and has also served as the operating unit for successive regional EMS programs and the three regional EMS Councils.

The temporal boundaries of the analysis are about 1974 to about 2004, with the main focus on the more recent period. 1974 is about the time frame of what might be called “the awakening” of the national medical community to the tragedy of inadequate
emergency care. The year 2004 represents an approximate end point, due chiefly to data limitations. EMS data was not collected before that time frame for financial and political reasons and may not be collected or reported after 1990 for similar reasons.

In pursuing this investigation, an historical foundation will be developed for the discussions to follow by establishing a picture of the "EMS landscape" as it has developed in New York State. This is done by reviewing briefly the current policy environment and how it evolved, as well as the historical and human foundation of EMS in New York. This includes a review of the legal and structural foundation for EMS in New York, the role of municipal governments, and certain financial considerations that are pertinent. The development of the national EMS situation will be considered for any pertinent facts as well.

Certain fundamental characteristics of quality have been identified and recognized nationally, and discussed in the professional literature of the time. From these, more specific concepts and standards that constitute "quality" in EMS will be discussed, as well as the derivation of these quality concepts. That is, whether they are "data driven" (e.g., research based) or based on the informed opinions of experienced, expert authority.
Research Tools and Techniques

The method of investigation for this work is primarily one of qualitative, rather than quantitative investigation. Good data are hard to get in a state and region where little is recorded and less is reported. A mixed methodology with a dominant – less dominant study approach, with qualitative approach with quantitative embedding, is used to explore the problem. This allows multiple tools to be brought to bear on the topic in order to tease out of the situation as much information as possible (Tashakkori and Teddlie, 1998).

This study of EMS in New York State and the Rochester Region is not entirely appropriate for a manomethod research effort. Specifically, there is no independent variable and little, if any, experimental variance is possible. This work is essentially a field study (Tashakkori and Teddlie, ibidem). It contains elements of a descriptive case study, rather than a laboratory experiment. It occurs within the natural environment, not a controlled setting, so there are no controllable variables. There is no variable that can be manipulated in this natural environment. A mixed method investigation provides greater opportunity for causal inference as well (Tashakkori and Teddlie, ibidem).

This study is both confirmatory and exploratory in order to explore the topic of quality EMS care provision, to confirm that it is (or is not) provided uniformly in NY State and the Rochester Region, and to explore why that is the case. It uses both confirmatory and exploratory methods, depending on which question is being addressed.
Each question will require a somewhat different mix of methods in order to elicit from the situation the most informative picture possible. This will allow the widest array of indicators possible, given the natural setting in which it occurs. Qualitative indicators will include; examples from the field, either reliably reported or observed, suitably reliable anecdotal record, self-reported observations or comments from local officials, official reports or statements and directly observed facts or events. Quantitative indicators include; official New York State and EMS Council data and reports, EMS provider service records, where appropriate, self reported data or summary statistics, and U.S. Census data.

Appropriate data will be used to illustrate certain points. However, the problem is largely one of policy, organization design and implementation, and local attitudes, not one of math. The quantitative aspects of this work are minimized due to the paucity of meaningful data and because normal statistical methods imply a greater precision or validity than may exist in the field, or can be proven. Certain interesting statistics emerge from the investigation and these are explored as reinforcements for points or arguments made in the text. Of particular interest are the methods involved in making determinations that lead to the local service levels and standards of quality. These are often highly subjective and arbitrary determinations. The exploratory nature of most of this work leads us to choose those explanations that best explain the outcomes we see in the field. Pinning down causal relationships is difficult, but may be possible using inferential information and field observations.
This work is not value free. That is, implicit with the discussion of the topic is the idea (value) that quality emergency medical care is a good thing. Further, that all residents of any given geographic or political area are entitled to equally good care, therefore, uneven or otherwise inadequate service provision represents an undesirable situation.

When describing the analysis, a theory triangulation approach will be used (Tashakkori and Teddlie, ibidem). Specifically, three particular perspectives, or “lenses” will be used to approach all these explanations. These three perspectives are largely drawn from the professional literature:

1) Organization Design – when approaching a particular question, one must ask; for the decision that was made, is the existent EMS administrative or policy structure (e.g., EMS councils and fire service organizations) contributing to the decision and its effective implementation, or is it cumbersome, an obstacle or otherwise detract from effective implementation? Specifically, do the size, composition, core expertise and resources of the EMS system permit and encourage success, or are they obstacles to progress?

2) Implementation Considerations -- are the State and Regional EMS councils’ efforts strangled, “turned” or otherwise defeated by the other “players” in the EMS environment? Are there particular characteristics or facets of the EMS “system architecture” that allow or encourage this to happen?
3) Clinical Emergency Medicine considerations, including both clinical and system aspects. – When approaching a particular question, one must ask; for the decision that was made (or not made), what was the effect on the patient in terms of the clinical care that was provided or not provided. More specifically, was “the system’s” action or inaction good for patient care in actuality?

Important Research Questions

The first issue is the question; does EMS service provision in the Rochester Region of New York State meet national quality standards on a consistent basis?

“Quality standards” the author does not mean regulations. Instead, it refers to the standards determined by leading researchers or other experts, to be essential for providing meaningful and effective emergency medical care, whether or not these have been codified into regulations. By “consistent basis,” the author means that these standards are met uniformly both geographically (throughout the entire region) and temporally (twenty-four hours per day, seven days per week). Do some places meet the standards some of the time, but not all of the time? Do other places not meet them at all, at any time?

The first question is essentially confirmatory in nature. The working hypothesis is that New York State and the Rochester Region in particular, do not meet national standards. The task is to confirm or reject this hypothesis. A corollary question then
becomes “how it failed?” How it does not meet standards on a consistent basis. This is then pursued in some detail using important indicators described below.

This question uses an element of deductive reasoning. Specifically, it frames the question thus: “If the EMS system in the Rochester Region were good (meeting national standards), then you should expect to see…”’X”… and then compare the deduced state versus the actual situation on the ground. The data needed for this work would include measures of input quality and operating quality, specifically a measure of the ability of an EMS service to deliver appropriately trained personnel to the scene in a timely way, as well as the ALS availability and response times.

The data available are less than perfect or not available at all. This necessitates the use of a more inferential approach. This includes reviewing 1) EMS personnel training levels, as a measure of clinical competence and a crude measure of advance preparation, 2) NYS ambulance certification status, as a measure of input standards, an historical leadership position, and because failure to meet this standard is a significant shortcoming. 3) Schedule coverage, to measure if the service has the ability to respond at all, 4) Field response time, to determine whether the four and eight minutes clinical response requirements are being met, and 5) ALS delivery; to know if it is even available and, if so, is the clinical response time suitable. The specifics of each measure are reviewed in the next section.
This investigation will be pursued by using official State and EMS Council reports, official data, and survey returns. The State reports were generated by the Department of Health during the 1980’s using grant money to gather data from prehospital care reports (PCR’s). The EMSDP generated reports and other information from them that were distributed to interested parties, including this author.

The State Health Department continues to collect PCR data, but has limited funds to generate reports from them. Indeed, simple data reporting is running about two years behind and few, if any analytical reports are generated at all. Those reports and listings that are available to the public via the State’s public web site will be used. A similar situation is the case for the state and regional EMS Councils. Information and listings available from their public sites will be used as well. Standard census data available from State sources will round out the data picture.

Two surveys of EMS providers in the Rochester region are available for use. One is from 1980 and one conducted in 2004. The 1980 “survey” began as an ambulance directory. This directory was an early attempt by the then regional, multi-county EMS agency Empire Nine, the successor agency to the former federal EMS program, RMP (Rochester Medical Program). Until that time, there was no listing of ambulance services per se, no listing of first responder agencies, and no listing of ALS services. ALS services were so few in number that they were known to the regional leaders, as they could be counted on one hand. The State had no such listing and State officials admitted to this author they had no idea who was providing first responder services, or where they
might be. The nearest thing State officials had to a state listing was the radio directory that listed all services and hospitals that were given HEAR radios during the most recent federal grant.

By means of this directory, Empire Nine leaders attempted to establish a baseline of information – a “snapshot,” if you will, concerning EMS agencies, both first responders and ambulance services. The 1980 directory relied on voluntary response to survey attempts, so the response rate was poor. Still, that information, subsequently confirmed and improved by first hand knowledge of Empire Nine staff, allowed a rudimentary baseline of information to be created, and that information is used herein.

The EMS providers in the region were surveyed in 2004 to confirm some baseline information, and to determine their responses to certain additional questions regarding schedule coverage, information sources and organization decision-making. The survey was sent to all ambulance services, registered first responder services, and advanced life support services, even when they were part of an ambulance service. The population (“N”) of the survey is 231. The survey was mailed to all EMS provider services listed on the official State website using the addresses as known to the State. The responses are analyzed in the context of a fairly broad experiential record and a reasonable measure of professional judgment was used.

The survey first seeks to confirm the current type and level of service, as well as the level of quality standards embraced by the EMS provider service (see Appendix B,
“EMS Survey Results”). The purpose is to confirm or correct State provided information. Further, the survey seeks to determine what level of schedule coverage the EMS provider agency claims to present. That is, are they able to cover 24 hours each day, 7 days each week? Or, do they cover something less?

Next, the survey asks for the sources of outside information used by the EMS provider service from a selection of those commonly available in the Rochester Region of New York State. The survey requests the number of trained and certified personnel by level of certification. Lastly, the survey seeks to determine who decided the type, level, and quality standards embraced by service.

The first line of investigation will be pursued by using official State and EMS Council reports, official data, and survey returns to determine if there are significant areas of the region to which quality EMS is not provided. The availability of these quality factors will be displayed across the region to determine if there are limitations on the provision of high quality EMS service.

“Quality EMS” in this context is characterized by five factors: EMS service personnel training levels, NYS certification status, service response coverage (hours per week of availability), field response time (the 4 and 8 minute standards) and, lastly, the capability to deliver Advanced Life Support services in at timely way. Getting at these factors requires using inferential data (Tashakkori and Teddlie, ibdem and Krathwohl, 2004, Chapter 7, Causal Inference and Internal Validity).
Of these five factors, the first is important because it implies a minimum level of clinical competence on the part of the EMS personnel, and is a crude measure not only of advance preparation and commitment to quality care, but also is one of the few process controls that exist in the region. EMS provider survey returns will be reviewed to determine the relative level of training for the EMS providers in the region.

The second (certification status) is important because it indicates a certain official measure of input standards. Unofficially and informally, it also denotes a measure of commitment to quality that is not a guarantee, but a good indication of leadership that quality results would follow. This is a bit circumstantial, but put in combination with field observations, seems to bear out. This characteristic is most useful chiefly in an historical context when ambulance services were not required to meet these standards. Nevertheless, even though a recent requirement, a service’s failure to meet these standards would be a significant negative factor. Certification status will be obtained from the 1980 and 2004 surveys.

The third (coverage hours per week) is important because it gets at the fundamental question of whether the EMS service can deliver any service at all in a time frame that is useful. This is not necessarily the same as the fourth characteristic (response time) but is related in the sense that poor schedule coverage typically leads to long response times. Scheduled coverage implies that a response is possible and one can infer that it will likely occur in a timely way. It is a necessarily inferential because
specific schedules and specific response times are not reported to anyone, but the author will attempt to get at this issue with the 2004 EMS survey, using self reported schedule coverage.

The fourth characteristic (field response time) is particularly important because of the discoveries of time sensitivity and cardiac death revealed by numerous researchers from Pantridge & Geddes (1966) to Eisenburg et al (1979). Unfortunately, response time is not reported and is not required to be reported. The above mentioned schedule coverage, supplemented by a map reconnaissance of the region, can get at this issue inferentially. For BLS response, this will show the possible driving time for the response, from which one can infer a minimum response time that may or not meet standards. This same approach will show the number and location of ALS units available to respond. While not a specific indicator of response time, the absence of ALS services in some regions will clearly foreclose that option entirely. This section overlaps with the fifth characteristic below.

The fifth (ALS service provision) is used because it alone can deliver the advanced level of care required to meet the expectations created by the above-mentioned research and codified in the American Heart Association ACLS standards (McIntyre, 1983). Further, in order to operate in New York, an ALS service must be built on a relatively (though not perfectly) solid BLS base. That is, it does not operate in isolation. Ergo, if ALS exists, certain quality standards have already been met by the BLS services
in the ALS service’s primary service area. This is not a guarantee of BLS quality, of course, but it usually represents an improved situation.

The existence of an ALS service implies the possibility of response, and ALS schedule coverage implies the possibility of timely response, as above. Information concerning ALS coverage of the region is provided by official State and EMS council reports, as well as both the 1980 and 2004 EMS surveys. This will be displayed on a map to illustrate improvements or shortcomings of that quality factor.

If the answer to the first question is “no,” then the second question becomes: What is the primary reason the region does not meet national standards on a consistent basis? How does the “system architecture” that the State constructed compare to important structural and functional characteristics recommended by pertinent organization design and EMS literature? Was the EMS Council system a good choice or a poor one?

The second question is more exploratory. That is, not how the Rochester Region does not meet standards, but why it does not meet standards. This requires a bit of inductive reasoning. This second line of investigation will be pursued by reviewing the structure, composition and function of the EMS councils and their larger network with its attendant rules. In particular, the size and composition of the membership will help reveal whether the EMS councils constitute an impediment to fundamental progress in some areas by protecting the status quo of EMS providers. This information is drawn
directly from Article 30 itself, the EMS council websites, and from the professional literature reviewed in the previous section.

These three characteristics of organization design will be compared to designs or characteristics found in the professional literature in organization design, strategic management and implementation. The specific intent is to identify from the professional literature those characteristics of organizations or their design that facilitate successful goal accomplishment, obstruct goal accomplishment, or cause or allow obstruction, obfuscation or “turning.” The ultimate purpose is to determine whether the EMS council system shares characteristics with recommended designs, or whether it possesses characteristics that the experts have determined to be sources of problems.

Analysis of this section requires establishing the important characteristics of effective organizations based on the professional literature reviewed previously, comparing this with the actual situation in the field, and then assessing the significance of the presence or absence of these characteristics. The role of inference here is key, as it requires the reader to infer an ideal state of EMS system design that is then used as a basis for comparison with the actual conditions in the field.

This topic of investigation is a bit more ephemeral and subjective, but not without foundation. National and international level authors have identified important characteristics of successful organization or implementation. These can be compared to the State EMS system architecture as described in Article 30 and as actually occurs in the
field. Further, the EMS provider survey will help identify the locus of control for decision-making.

The third issue to be examined is: Given what is reviewed above, a pertinent question is why any progress is made at all? Is progress in quality EMS service provision in the Rochester region the result of State policy and the EMS Council framework (e.g., according to State policy)? Or, is progress the result of local, pioneering leadership, or some other reason?

The third question is also exploratory and explanatory. That is, how did any progress happen at all? It will be pursued by tracing the growth of State Certified ambulance services and ALS services geographically and temporally, and by using examples of success and the accompanying limited anecdotal record. This question is, perhaps, a bit more subjective and certainly requires a more historical perspective than the other two. However, the author believes this is an important component of the question of quality in EMS in the Rochester Region, and that he can get at this question by using the historical record. This record will be supplemented by using official State reports and the EMS survey results from the providers. Field experience and observations in this region will contribute to this section.

In particular, two measures will be used as indicators of the growth of quality in EMS service provision; state certification and ALS service provision. The growth of state certified services will be followed before the statutory requirements of 1999, as well
as the growth of Advanced Life Support services. In this way, it will be determined if progress is the product of State policy as implemented by the EMS council system architecture, or by a few pioneering individuals in specific geographic areas, or by other factors.

Further, the 2004 EMS survey returns and field observations will show that the six points associated with quality EMS service provision allow for -- but do not guarantee -- quality care provision. The EMS survey results will allow investigation of whether many providers have access to outside information about quality, and whether this translates to meeting the national standards for care provision.

Limitations of Data

There are certain cautions for the reader concerning limitations of the information sources. Due to the way that the State categorizes EMS provider agencies, there may be duplications in the listing of certain ALS providers. As one example, an ambulance service that also provides ALS service with a separate vehicle may be listed twice. There appears to be one first responder service that was erroneously listed as being in the Rochester Region that is probably more correctly placed in the Buffalo region, even though it may interact with services and hospitals in the Rochester Region. It also seems very possible that there are functioning first responder services out there in the field that
are not known to the State, particularly those that might be located within private businesses (see discussion in Chapter 2).

There are some addresses that appear to be duplications due to bureaucratic categories. For example, there are some ambulance services that also provide ALS services. These would be listed twice, so are surveyed twice, once for each category. Or, there are ALS services that are listed as first responder services, so may also be listed twice, once for each category. So, there is a little “slip” to the categories, hence the results from them.

Some of the confusion stems from the fact that the state lists record all official mailing addresses, regardless of the facts on the ground. In this vein, six surveys were returned by the Postal Service as non-existent or with “wrong town” noted. Two surveys were returned by the services with clear statements that they do not provide EMS service, even though they are listed by the State as doing so. Their chiefs, who ought to know, signed their denials.

Thus, statistics resulting from State sources are “official” but not entirely accurate and must be regarded as having a substantial margin of error. A quantitative analysis was avoided for primarily this reason. Field inspection and survey returns are required to be certain of the identity and service levels of the EMS providers.
The 1980 “survey” was masked as a directory that would be universally available to the provider services. The first goal was to find all the ambulance services in the region and sort them out. One important part of this was to identify the “primary service areas” that were claimed, and actual. Those no longer in the ambulance business (e.g. Wolcott Fire Department) were so identified. A second purpose was to elicit contact information from the ambulance services for networking purposes. Up to that point, no one really has a complete listing of who was in charge of what, and who should be contacted for any reason. A third reason was to elicit cooperation for long distance patient transports and vehicle refueling options, then regarded as pressing needs within the volunteer community.

This directory also served to take a rough inventory of the ambulance fleet in the region, both in terms of numbers and types, which the State had not done. All of this created a rough starting point for knowing what was out there to work with, and a rather rudimentary needs analysis. Many services did not respond to the survey, so Empire Nine staff fleshed out much of the information by personal contact.

Some additional facts contribute to the overall confusion. There is one commercial ambulance service that has a subsidiary service literally around the corner from the primary service. This subsidiary service operates with the same staff using the same dispatcher and support services, yet is technically a second distinct ambulance service. Also contributing to the confusion, all non-ambulance ALS provider services are listed as registered first responder services. This is because, using the tiered response
method of operation, they sometimes arrive at the scene prior to the BLS ambulance owing to the fact that their vehicles are staffed while the BLS services may have off-base staffing. Hence, they are equipped as first responder services and render BLS first responder care until the ambulance arrives, then switch to ALS care. Since the State has no list for “ALS Only” services not part of ambulance services, and does not recognize “third responders,” these are listed as Registered First Responder (ALS) services. To complicate matters more, some ambulance services run an internal tiered-response ALS service that is also listed as a Registered First Responder service, so the same company (or volunteer service) may actually be listed twice: once as an ambulance service, then again as a first responder (ALS) service.

This constituted an array of services that were approximately 52% first responder services, 2 & 1/2% of which were ALS only first responders, and about 48% ambulance services. Also, 58 of the 111 ambulance services (52%) operated within the fire service, as were nearly all of the first responder services except five ALS-only first responders who were either independent volunteer or hospital-based services.

In the 2004 survey, there were 93 responses comprising about 40% of the whole number surveyed. In addition, six surveys were returned by the post office as undeliverable, even though the addresses were taken directly from the NY State DOH official listing. Two surveys were returned from fire departments that said they provided no EMS function, even though listed by the State as registered First Responder services.
So, there are probably only about 217 actual EMS providers on the ground of one sort or another (this means provider services, not necessarily the number of vehicles and sets of equipment). The official landscape is more than a little confusing and the reader can only take solace from the fact that the people on the ground have it all worked out, even if the State bureaucracy doesn’t quite.

All that said, all listed providers were surveyed. There were 120 first responder services (including ALS only services) and 111 ambulance services included. The survey sought responses from officer level personnel for authoritative response. The survey instrument was designed to be completed quickly in order to enhance the return rate.

Of those 93 EMS services that responded, 31 were self-identified as first responder services, 44 were self-identified as ambulance services (including ALS and BLS providers) and 5 were categorized as “ALS only” services, meaning that they provided Advance Life Support Services to patients, but did not directly provide ambulance transportation of the patient. These services were coordinated with adjacent BLS ambulance providers. The State would include these as first responder services, since they do not have a category of “third responders,” meaning ALS services operating in a tiered response mode with first responders and ambulance services. 13 services did not identify their level of service, so this created an unplanned fourth category of respondent – “no I.D.”. Inspection of the contents of the returned survey suggests that about half of these were probably ambulance services and one, at least, may be an ALS service. The remainder were probably first responders. It is believed that most were
ambulance services, but the pattern of responses does not always clearly distinguish them as such with any certainty, hence the fourth category of “No ID.”

The survey sought to get at certain factors of quality identified in the literature. Specifically, the survey requests information regarding: a) input standards & preparation (e.g. the level of service intended, number of appropriately trained personnel, and extent of weekly coverage), b) access to outside, new information about EMS (e.g. contact with outside professional associations, conferences or information networks) and c) who makes the important decisions concerning type and level of service, and level of quality offered by the service (officers, general membership or outside authority)? Because we cannot get at internal values and attitudes regarding such questions, knowing who made the decisions may be as close as we can get. Copies of the survey instrument are available in the appendix.

The survey did not attempt to determine the preexisting values of the decision makers. This was in part because there is no information about when such decisions were actually made and, in part because many decisions are so old that current officers would not be aware of the discussion when it occurred.

The survey also did not attempt to get at the important issue of response time chiefly because this data is not always recorded and certainly is not reported. The level of effort to accomplish that would be a thesis unto itself and was beyond the scope of this work. Inquiring about response time introduces an element of accountability that even
the State does not explore. It is this author’s belief that investigating the question of response time is so politically charged that merely asking for it would reduce the likelihood of the survey being returned at all. Similarly, no attempt was made to determine patient outcome as a result of the EMS services, as that is extremely complex and beyond the scope of this work.

ALS units are listed as first responders when operating in a tiered response system. This is a bureaucratic convenience, not a true reflection of the system on the ground. In terms of how they operate, they are more accurately described as “third responders” in most cases.

Lastly, what policy implications emerge from this investigation and what issues remain to be explored? Are there reasonable inferences from the results that might instruct us concerning comprehensive systems of care delivery, an administrative "architecture," or financial schema? Issues that are unaddressed, or pertinent questions remaining to be investigated, will be identified.
CHAPTER IV

ANALYSIS

Having reviewed the history of the Rochester Region and considering some of the professional literature in the area, it is important to delve into the main questions and determine what the facts on the ground say to us about them. This situation is very much like a jigsaw puzzle. The picture that emerges will be the product of many small pieces that, hopefully, fit together to produce a larger, understandable picture. Nevertheless, because sampling is involved and because EMS services are not required to report much of anything, there will be many gaps in the larger picture. The pieces that do exist will give us a good grasp of the whole.

Question 1: Does EMS Service Provision in the Rochester Region of New York State Meet National Quality Standards on a Consistent Basis?

“Quality” is always something of a nebulous concept that is difficult to get one’s arms around even in the easiest of investigations. In this case, “national quality
standards” mean those standards of care provision identified by the leading experts in the field as essential or most efficacious for preserving life in the context of an emergency situation. Specifically, it includes the standards set by Cowley, Trunkey, Cobb and Eisenberg in their previously cited works as a consequence of their pioneering research, and adopted by national professional organizations as the standard of the industry. In particular, this includes the provision of BLS services to patients within four minutes of the onset of a cardiac arrest, followed by ALS services within four additional minutes. In the case of trauma patients, it includes reaching definitive medical care within one hour or less.

Although an ideally designed EMS system might make these national standards easier to identify, measure and evaluate, the reality in the field is not so neat. In the setting of the Rochester Region of New York State, the application of these standards manifests in the form of the five factors mentioned in Chapter III: 1) EMS personnel training and certification levels, 2) N.Y.S. Ambulance Certification status, 3) ambulance service schedule coverage, 4) field response time and, 5) the capability to deliver Advanced Life Support services in a timely way, or at all.

Of these five factors, the first (training and certification levels) is important for several reasons. It implies the existence of some level of personnel clinical competence, although it is not a guarantee that such competence will be delivered on that day. It also serves as a crude measure of the provider service’s advance preparation and commitment to quality care. It also is one of the few process controls that exist in the region since it
creates standardized treatment modalities that guide decision-making during the 
emergency. Perrow (1986) would likely consider the training program to be an 
“unobtrusive control” mechanism that, ironically, is not seen as a control, but as a benefit.

The second (Certified Ambulance Service status) is important because it indicates 
a certain official measure of input standards. There are few input standards in N.Y. State, 
but those that exist are generally summed up into the Certification status. To meet this 
status, the ambulance service in question must meet certain specific vehicle, equipment 
and supply input standards not previously required of volunteer services. There are some 
additional administrative requirements, but these are insignificant from a patient 
perspective. Unofficially and informally, it also denotes a measure of commitment to 
quality service provision that has been a good indication of local leadership, implying, 
but not guaranteeing, that quality service provision would follow. This characteristic is 
most useful chiefly in an historical context when volunteer ambulance services were not 
required to meet these standards. Even though fairly recent developments have made this 
a requirement for all ambulance services, failure to meet these standards would still be a 
significant negative factor.

The third characteristic (hours per week of schedule coverage) is important 
because it gets at the fundamental question of whether the EMS service can deliver any 
service at all in any time frame that is useful. This is not necessarily the same as the 
fourth characteristic (field response time) but is related in the sense that poor schedule 
coverage typically leads to long response times. Specific schedules and specific response
times are not reported to the State, but the author will attempt to get at this issue with the
2004 EMS survey, using self-reported schedule coverage. Some limited response time
data is provided to the EMS councils coincident with the PCR (Prehospital Care Reports)
system, but the EMS council review is mostly for clinical efficacy, not operational
efficiency. In any case, this is inconsistent between EMS councils and of limited
reliability. Where possible, it will be used.

The fourth characteristic (field response time) is particularly important because of
the discoveries of time sensitivity and cardiac death revealed by numerous researchers
from Pantridge (1966) to Eisenburg (1979 and 1990). Unfortunately, response times are
reported only secondarily to the PCR (Prehospital Care Report) data system. This system
receives PCR’s from ambulance services and then processes them through the regional
council system, then to a key-punch contractor, then to the State for whatever analysis
occurs and then distribution back to the provider services, the counties and EMS councils
according to the protocol established in the “Medics” report (Gilbertson, 1985).
According to the State EMS representative in the Rochester Region, this system is
running at least two years behind in reporting. According to the Southern Tier EMS
Council staff, it is running at least six years behind for Southern Tier calls. Some
counties do monitor response time as a result of their 911 systems, but not all counties
had 911 systems until 2005. According to the same Southern Tier EMS Council staff,
Steuben County did not implement a 911 system until just this year.
The Southern Tier council area did conduct a manual spot check of response times for Steuben County EMS services for all of 1998 and three months of 2004, in response to a request for information from that county government. This sampling showed an average response time of 9 minutes for all EMS agencies in the region for 1998, improving to 5 minutes for 2004 (“Average Response Times – Steuben County,” internal document, STREMS, 2005). The samples are not entirely comparable, since the major commercial service was not included in the 2004 sampling. However, these represent the only sampling available from that area. The apparent improvement in response times is unexplained, though it was noted that Steuben County only started 911 in 2005, suggesting the improvement is due to faster dispatch and record keeping. More to the point, this represents only a one-time sampling. Response times are not monitored on a progressive basis and there is no particular consequence if any agency seems to be slow.

The above-mentioned schedule coverage, supplemented by the limited data available and a map reconnaissance of the region, can get at this issue inferentially, if imperfectly. This will show the number and location of ALS units available to respond. While not a precise measure of response time, the long driving times required in some areas of the region, and the complete absence of ALS services in other areas, will serve to demonstrate that effective BLS service is diminished and the ALS option is effectively foreclosed in many parts of the Region.
The fifth (ALS service provision) is used because it alone can deliver the advanced level of care required to meet the expectations created by the above-mentioned research and codified in the American Heart Association ACLS standards (MacIntyre, 1983). The emerging deployment of EMT-D units and public access semiautomatic defibrillators is not an effective substitute, as will be discussed below. Further, in order to operate in New York State, an ALS service must be built on a relatively (though not perfectly) solid BLS base. That is, it does not operate in isolation. Ergo, if ALS exists, certain quality standards have already been met by the BLS services in the ALS provider service’s primary service area. This is not a guarantee of BLS quality, of course, but it represents an improved situation.

To review the first factor (training and certification levels), information is available from the EMS providers themselves, as reported on the 2004 survey.

The certification levels provided by the State DOH are not exclusive, but are the only official certification levels recognized by the Health Department as appropriate for providing emergency medical care on a regular basis. There are certain other organizations that train and sometimes “certify” individuals in specific tasks at specific levels. These include the American Red Cross, which provides (among other courses) CPR, basic and advanced first aid, and ACLS courses. The American Heart Association also teaches a somewhat different version of CPR. The DOH recognizes either version of CPR as “appropriate” for EMS personnel, but then incorporates yet further CPR training within the context of the basic EMT course. The fire service, particularly through the
Office of Fire Prevention, provides instruction in various rescue and safety course, but does not certify individuals. The instruction with which this work is concerned is limited to those accepted by the DOH as appropriate for EMS personnel and listed below.

The State DOH spent many years trying to move ambulance service personnel away from the Red Cross training toward the DOH EMT course. It was regarded as more appropriate for ambulance personnel, as well as being more comprehensive and a good foundation for advanced EMT work, e.g. paramedic level training. Although resisted adamantly by the DOH staff, the legislature finally mandated that the DOH provide a “bridge course” from Advanced first aid to EMT. This was done to satisfy the demand from numerous fire service ambulance units trained in the former and unwilling to repeat that training in the context of an EMT course. However grudgingly, the DOH complied and the net effect was to accelerate the trend toward acceptance of EMT as the appropriate training for ambulance personnel.

A similar contest emerged with the EMCFR course versus the Red Cross advanced first aid course and the “remedy” was the same. The DOH, under instruction from the legislature, constructed a “bridge course” from EMCFR to EMT. The fact that NYS troopers were taught (though not certified) in EMCFR at the State Police Academy went a long way to legitimizing the training for field personnel.

This constructed a hierarchical array of training and certification levels provided by the DOH for EMS personnel, except for the CPR-only courses. Typically, new EMS
personnel would begin with a CPR course and, if still interested at the end of that course, would be encouraged to move on to EMC FR or basic EMT course. CPR refresher courses were conducted for existing personnel when possible, as the DOH wanted their EMT’s to remain currently certified in CPR. However, this “requirement” was often ignored in view of the fact that CPR was included within the EMT original and recertification classes. Once individuals completed the basic EMT course and gained some field experience, some individuals expressed interest, or were recruited, to move up further to the ALS ranks.

The purpose of this explanation is to point out to the reader that the distribution, or “spread,” of training or certification levels has less to do with a coherent ideal plan for the organization than it does the relative newness of the personnel and the limits of their interest. It is entirely possible that a Certified Ambulance Service with a low call volume may have only one, or possibly, two certified EMT’s. Similarly, there are ALS providers operating in the Rochester Region with only one currently certified ALS technician, no matter what the training level of the other members of the organization.

Although it is difficult to construct an “ideal” training picture for EMS personnel, one could reasonably expect that first responder agencies would likely have a preponderance of personnel trained at the EMCFR level or higher, with a few personnel having a higher level of training and some (likely drivers) with a lower level of training. An ambulance service that provided only BLS service could be expected to have the bulk of their personnel trained at the basic EMT or EMT-D level, with a few higher and very
few lower. An ambulance service that provided ALS service would likely have a similar
distribution of training levels with considerably more personnel in the higher certification
levels, reflecting the presence of paramedics. An “ALS only” service would likely have
ALS certified personnel almost exclusively, possibly except for trainees.

The EMS providers in the Region were surveyed as described in the preceding
section. The responding services’ taken as a group show a distribution of certified
personnel as follows;

- CPR only: 21.9%
- EM CFR only: 8.9%
- Basic EMT: 5.3%
- EMT – D: 46.2%
- Intermediate EMT (ILS): 2.7%
- Advanced EMT Category 3: 3.3%
- Advanced EMT Category 4: 11.6  %

Thus there are clusters of personnel in three training levels: CPR only, EMT-D
and Advanced EMT 4 (full paramedic). That so many personnel are trained at the EMT-
D level instead of the Basic EMT reflects a State-level policy favoring that certification
level. It is also a function of advancing technology in that semi-automatic defibrillation
units are now so advanced and, relatively, lower in price that it is an easy addition to
basic EMT instruction and field equipment in ambulances. New York is in the process of
transitioning all Basic EMT’s to include EMT-Defibrillation. According to the DOH Rochester field representative, the Basic EMT class has been modified to include use of the semi-automatic defibrillator, and the recertification classes have been similarly modified. A similar statement could be made for Advanced EMT Category 4 versus the Category 3 as more hospital clinical time has become available for training purposes. According to former EMPIRE Nine officials, historically this has been the limiting factor in the Rochester Region for training paramedics, necessitating the more abbreviated training of the Category 3 personnel.

This is an unusual tri-modal distribution of responses that may reflect the essentially two different types of service levels: first responder, and ambulance services. Further examination is required to see if this is the case.

One curious item is why there are so many personnel who are only marginally trained at the ‘CPR only’ level – fully one fifth of all personnel. This is something of a mystery. This may reflect a cadre of drivers who merely assist other personnel, or may reflect a cadre of local dispatchers or new recruits who have not yet been able to avail themselves of other training. The survey instrument does not allow us to get at this question with precision. However, parsing the responses a bit further may be informative.

If one looks only at the First Responder services, one finds they reported a distribution of certified personnel as follows;
This represents a tri-modal distribution skewed somewhat toward “CPR only” and more toward the EMT-D level of training. Having personnel who are CPR-only trained is something of a surprise for a first responder service, though, again, this may represent a large cadre of drivers for those personnel who are First Responder certified. If true, this implies that many first responder organizations are arriving at the scene with only one medically trained person, an occurrence that is relatively common in rural service areas.

The substantial number of EMT-D certified personnel is larger than one might expect from the percentage of services claiming that level of service. However, it is interesting to note that this means that half of the most usefully trained personnel are in only one third of the services. That is, only one third of the first responder services claimed EMT-D capability (use of semi-automatic defibrillators), yet have half of the EMT-D trained personnel. This, of course, means that the other half of the EMT-D trained personnel are operating within services that do not provide that service and cannot use that skill. If the goal is to compensate for long ambulance response times, the most
useful level of training is provided by only one third of the services. The other two thirds of the services may respond quickly, but do not provide what may be the most important level of early response care.

Following on from the first responder services, the responding ambulance services reported (as a group) a distribution of certified personnel as follows:

CPR only: 15.6 %
EMC FR only: 1.9 %
Basic EMT: 4 %
EMT – D: 48 %
Intermediate EMT (ILS) 4.5 %
Advanced EMT Category 3: 5.6 %
Advanced EMT Category 4: 18.9 %

Again, there is a tri-modal distribution -- a clustering of personnel in the categories of EMT-D (48%), Advanced EMT Category 4 (about 19%) and, as with the first responder services above, a curious clustering of personnel who are only CPR trained. One can explain the AEMT trained personnel easily by the fact that a number of ambulance services are also ALS providers. However, for the CPR-only trained personnel, one can only have the same speculation as that mentioned above. Given that two-person crews are not unusual in this region, this implies that even an ambulance service may be arriving with just one medically trained person on board.
According to State DOH officials, the State intends that all ambulance services be EMT-D capable, by virtue of the trend toward EMT-D training. However, this does not mean that the State will buy them a semi-automatic defibrillator, hence the certification level and the service level are not to be confused as the same.

Parsing the survey responses a bit further, one finds that the responding ALS-only services reported a distribution of certified personnel as below. Note that these are in addition to the numbers reported for the ambulance services above. That is, although the ALS-only services are distinct from the ambulance services, these personnel would not act in isolation during a call, rather in conjunction with the ambulance service personnel:

- CPR only: 0 %
- EMC FR only: 1.7 %
- Basic EMT: 37.9 %
- EMT – D: 2.5 %
- Intermediate EMT (ILS ) 2.5 %
- Advanced EMT Category 3: 4.3 %
- Advanced EMT Category 4: 49 %

As one might expect, this reflects a continuing trend toward Category 4 (“real paramedic”) level of training while revealing that some Category 3 services remain. There is still a large number of Basic EMT’s reported within these services, and one can
only presume from field experience that they are the drivers and helpers for the paramedic level personnel. Given the low number of responding services (4) this may not be terribly significant, though it is curious.

There were eight returns that did not identify the service level they provide. On balance, their responses closely parallel those of the other groups. The training level responses favor CPR Only and EMT-D training levels, suggesting that these are essentially BLS ambulances or First Responder services.

CPR only: 25 %
EMC FR only: 5 %
Basic EMT: 11.3 %
EMT – D: 49.1 %
Intermediate EMT (ILS) 2.4 %
Advanced EMT Category 3: 3.9 %
Advanced EMT Category 4: 3 %

This repeats the bi-modal distribution favoring CPR only and EMT-D that easily allows the inference that the respondents were approximately evenly divided between first responder services and ambulance services.
Summary comments about the training levels of EMS providers:

While one would expect to see a substantial portion of CPR-only trained individuals amongst the First Responder agencies, it is rather disappointing and a bit disconcerting to find so many within the ranks of the ambulance services. One would expect to find the vast majority of ambulance service personnel as EMT’s or EMT-D’s, yet this is not the case. While a majority are trained at some level of EMT (basic or advanced), nearly twenty percent are not.

Also, given the recent popularity of semi-automatic defibrillators for attempting to reduce the ultimate mortality rate from sudden cardiac death, and given that the State has included semi-automatic defibrillation in the certified first responder course as well as the EMT course, it is somewhat surprising to find that fully two thirds of the responding First Responder services do not provide that treatment modality.

Similarly, for ALS-only organizations, one would expect to find AEMT-3 or 4’s almost exclusively, yet this is not the case. Curiously high percentages of the membership are in lesser-trained categories, either CPR-only or EMT/EMT-D’s.

The second quality factor (Certified Ambulance Service status) is revealed from the EMPIRE Nine Ambulance Directory (survey) of 1980 and the official NYS DOH reports for 2004. As mentioned, this characteristic is most useful chiefly in an historical context when volunteer ambulance services were not required to meet these standards.
The reader should note, however, that this requirement was put in place only in 1999, 25 years after Article 30 was first passed. It has been in effect only five years as of the time of this writing.

In the 1980 EMPIRE Nine Ambulance Directory survey, there were 102 ambulance services in the region known to be in operation. There was no listing or record of the number of first responder services in operation, even though it was well known that many fire departments functioned in that role. NYS had no idea who was providing that service, or where they were.

There were only 12 ambulance services that embraced the NYS certification standards. Six of these were commercial ambulance services that were required to do so under the law at that time. The remaining certified services were volunteer or municipal services that opted to meet this standard voluntarily as a commitment to quality service. All the remaining ambulance services were “registered” by the State, a lesser DOH category that meant only that the State recognized that the service was there and they had official permission to provide ambulance service. There were no minimum standards whatsoever.

There was complete geographic coverage in the region. That is, every person in every place had someone they could call for an ambulance. However, there were very long dispatch and travel times to many of the areas, especially rural parts of the region that limited the efficacy of the service.
The level of service was generally quite rudimentary. “Scoop and run,” as it was known then, was the norm. The level of training was usually American Red Cross advanced first aid. Some “MET” and EMT trained individuals rode ambulance, but many provider service members regarded this as a high level of training at the time, sometimes thought to be unnecessarily high.

The 2004 official listings of the New York State Department of Health web site list 231 EMS providers in the Rochester Region. Deduct one for an apparent erroneous duplication from another region. Of these remaining 230, 111 (48 percent) are ambulance services, an increase of 11 since 1980.

If one arrays the ambulance services on a map (see again Maps 2 and 3) one can see that there are few changes in the twenty-four years between surveys. There are a few relatively minor adjustments, but the pattern of providers was essentially fixed on the ground in 1974. This would guide ambulance service provision for the next thirty years. The array of registered ambulance services was fixed and it was nearly impossible for a new ambulance service to start up in competition with an existing service. The main hope for improving quality was to persuade that service to upgrade voluntarily to Certification status.

While ambulance services today must meet NYS Certification standards, these are essentially input standards, not performance, output, or outcome standards. State DOH
officials confirm that there is one requirement that the patient be attended by a certified EMT or AEMT while enroute to the hospital, but otherwise, there are no State-mandated performance standards.

This absence of throughput or output standards is true for provider service operations or outputs, or patient outcomes. The EMS councils usually write and adopt clinical standards at most levels of treatment (i.e., BLS, ILS, or ALS). Although intended for guiding clinical care, since actual care provision is rarely reviewed, it’s main use is actually for constructing training course content. As such, it has the tendency to direct the activities of the EMT or AEMT while treating a patient, thus serving as Perrow’s unobtrusive control method and creating some level of standardization of care. However, this is along the clinical pathway, rather than the operational pathway.

The significance of this twenty-five year old information is that it constitutes an indicator of leadership trends – trends that ultimately manifest in improved quality in various forms. These areas of early certification represent areas of leadership. If one checks Maps 2 and 6 for ALS providers, one would see that each of these early certified departments is also an ALS provider in 2004, directly, or as a member of a shared service. The reverse is not the case: Ironically, except for commercial services, those areas of early ALS service (see again Maps 2 and 5) did not become certified services until much later. One can only speculate that they did not feel the need to prove their quality.
There is no available listing of certified ambulance services for the time frame just before the imposition of the certification requirement. However, a Federal report from that time period reported that New York State Health Department staff believed that the number of ambulance services statewide that could meet certification standards at that time was approximately 90%. However, the number that actually were certified was less than 50% (Bothwell, et al, 1992, p. 13). If accurate, this indicates that after nearly two decades, EMS Council efforts, plus those of local leaders, had been successful in improving the training levels of many ambulance services and inspiring at least some to embrace State minimum standards. However, on the other side, it reveals that the EMS Council system was unable to bring all ambulance services to what is a fairly minimal level of quality standards.

If one compares the 1980 list of ambulance services known to be operating at that time with the 2004 list the State says are operating now, one can find only a few changes. Nine ambulance services known to be in operation in 1980 are no longer in business. Of these, one (Geneva) is known to have folded for financial reasons. Being a commercial service, it was already certified and collapsed in 1986 from financial pressures compounded by bad management decisions. The other eight services seem to have given up trying to meet the 1999-certification standards, each being a rather small service from the beginning. However, this is less than it appears. Two (Lakeshore and Seabreeze) in Monroe County were easily replaced by the two commercial services operating in the Rochester metropolitan area. One in Wayne County (Palmyra volunteer ambulance) – already a certified ambulance service -- folded after 1995 and its few remaining
volunteers went over to the competing fire department ambulance service, also a certified service and also an ALS provider. One in Ontario County (West Bloomfield) was certified, but finally gave up and closed its doors December 31, 2003. Its few remaining volunteers dispersed to parts unknown. The remaining four were in the Southern Tier, three in the county of Steuben and one in Chemung County. Of these, one (Arkport) collapsed and was replaced by the nearby Hornell Fire Department. This was essentially a trade of one fire department ambulance service replacing the other, though with a correspondingly longer response time. According to EMS Council staff, two others collapsed from internal difficulties prior to the State requirement, and were replaced by non-fire independent volunteer services that meet State certification standards. This resulted in something of a consolidation of existing resources, rather than putting them out of business. It does, however, represent an improvement in resources, at least as far as the input standards are concerned. The last service that collapsed was Chemung ambulance, in Chemung County. Its one EMT moved out of town and the service folded. The one commercial service in the county or, occasionally, an ambulance service from Pennsylvania, now covers its service area. The last two new services (Wayne and Tuscarora) in Steuben County represent genuinely new services. One is on the previously uncovered east side of Keuka Lake. The second is a town-level ambulance service that supplements, and to a certain extent duplicates, the nearby fire department ambulance service. Once again, there are two competing ambulance services within a stone’s throw of each other, competing for personnel, calls and financial resources.
There is some confusion about Barnard Fire Department ambulance. The Monroe-Livingston EMS Council staff stated that Barnard decided to stop providing ambulance service in 2003, reducing its service level to that of first responder, but upgrading its medical care to that of paramedic, becoming an ALS first responder service. However, the official NYS DOH listing of ambulance services continues to identify Barnard as an ambulance service.

There are nine other “new” ambulance services recorded in the 2004 list. These include four genuinely new ambulance services and five existing services now “captured” by the official reporting system. That is, they were in existence in 1980, but not recorded on the official listing of ambulance services owing, in part, to the political contest mentioned in previous chapters. The genuinely new services are: Irondequoit, Brighton and R.I.T. ambulance services--all volunteers--and “Mercy Flight” helicopter ambulance service based in Canandaigua.

The other “captured” services include the aforementioned Kodak and Xerox ambulance services, now part of the local EMS system, the V.A. Medical Center ambulance (not a primary responder anywhere), the Finger Lakes Race Track Ambulance (used only for special events at the track) and Beacon Ambulance, a tax write-off subsidiary of then National Ambulance (now Rural-Metro) which was literally right around the corner and in the same building as the parent company. Beacon, as National, was purchased by Rural/Metro and now does business in that capacity. That it exists as a
separate entity with a separate state provider code is essentially unimportant.

Functionally, Beacon and National are one operation (Rural/Metro).

The operative question, of course, is: did the State Certification standards force anybody in the Rochester Region out of the business? The answer seems to be, “Yes, but not many.” As mentioned above, some of the ambulance services folded for local, internal reasons. Yet, the EMT requirement was “on the horizon” even in the late 1980’s and early 1990’s and seemed to be a likely impending event, even though the arrival date could not be known. The impending requirement may have been one factor in the decision to close. Even after the certification requirement, at least two more services gave up and closed (Palmyra and West Bloomfield). Both of these had already met state certification requirements years earlier, yet simply did not have enough volunteers to continue the service. Thus, expanding the State certification requirement to all providers seemed to force fewer than five departments (of the 111 in the region) to “fish or cut bait.” Did this cause a subsequent improvement in quality? Possibly. At least, it seems to have caused a small improvement in input standards for the handful of services that modified their structure and consolidated their services. Whether this improvement came at the expense of longer response times from the new bases is unclear at this time, but anecdotes from the field suggest that it has.

One point that is important to note is that this was an action of the legislature, not the EMS council system, and – to the extent it is enforced at all -- it is enforced through the Department of Health administrative system, not the EMS council system. In the
twenty-five years of its existence (up to 1999), the EMS council system was not able to bring all services to certification status without the State legislature stepping in and altering Article 30 to require it.

The third quality characteristic (hours per week of schedule coverage) is important because it gets at the fundamental question of whether the EMS service can deliver any service in a time frame that is useful, or at all. This is not necessarily the same as the fourth characteristic (field response time) but is related in the sense that poor schedule coverage typically leads to long response times. Specific schedules and specific response times are not reported to anyone, but the author will attempt to get at this issue with the 2004 EMS survey, using self-reported schedule coverage.

Although all of the land area is covered by basic ambulance service, not all areas have effective coverage all of the time. That is, all the land area of the Rochester region has at least one ambulance service that claims it to be within their “primary service area.” However, that does not mean that each and every ambulance service is able to provide an ambulance crew on a consistent, 24/7 basis. This is even more the case for ALS services. Not all land areas are within a service area that claims to provide ALS coverage. Of those that are, not all ALS services can provide coverage on a 24/7 basis.

An examination of survey responses supplied by the EMS providers themselves reveals restrictions on their ability to provide high quality and timely service. In the 2004 survey of all EMS providers (without distinction by service type), a substantial majority
of the respondents claimed that they provided either “sixteen to twenty one eight-hour shifts” per week (full coverage) or claimed “24/7” coverage, often by means of “all call” page dispatch systems. This added up to 78 (84%) of the respondents essentially claiming complete coverage of the weekly schedule. Curiously, 22 did not answer this question. 25 responses indicated less-than-full weekly coverage. As the reader can see, this adds up to more than the 93 services responding, indicating multiple responses for some of the surveys. This was due in part to the question being asked for each level of service (BLS, ILS and ALS) separately and, in part, some creative survey completion skills on the part of the respondents. Some services claimed “24/7” coverage at the BLS level, but only limited ILS or ALS coverage.

The somewhat disparate numbers are less important than the three facts that stand out: First, 22 services chose not to answer the question, suggesting less than full confidence in being able to provide 24/7 coverage, or being held to account for it. Second, many services freely admitted they did not (and could not) provide ALS coverage all of the time. Third, nearly twenty percent of the respondents relied on an “all call” paging or siren dispatch system to staff their emergency calls. The important aspect of this is that neither the department officer nor the dispatcher knows at the time of dispatch whether they have any crew at all. Under protocols common to the area, it may take them three minutes to find out that they have no crew. In the Southern Tier region, a ten minute response time is allowed, according to EMS Council staff. Protocol then dictates that a second dispatch announcement is made and three (or ten) more minutes may pass before the dispatcher can determine whether there is a response or not.
Including the one minute it takes to receive an emergency call and select the correct department to dispatch, between seven and twenty-one minutes may elapse before determining that no one is responding.

When considering the first responder services specifically (both BLS and ALS), a clear majority (74%) of responses claim 24/7 coverage each week, though 26% stipulate tone dispatch (an “all call” system) as their way of achieving it. This claim is impossible to verify, though field experience suggests that it is generally true if you do not look too closely at response times. A very few services concede that they do not provide all services all the time, though it is usually ALS service that is not provided all the time. Such services proceed to claim BLS service the rest of the week.

When considering specifically the ambulance services, those services responding to the survey indicated mainly that two distinct levels of care were provided; EMT-D (16) and Advanced Life Support (12). There were a few Intermediate Life Support providers (7) and 9 did not respond at all. Of the responding services, 31 claimed 24/7 coverage per week, either by means of designated shifts or “all call” page dispatch. The veracity of these claims cannot be established.

When considering specifically the “ALS Only” (non-ambulance) group, there were only 4 responses, which is not really a surprise. The bulk of the ALS provider services are accounted for in the previous two groups. Of the responding four services,
three claimed 24/7 coverage per week either by means of designated shifts or “all call” page dispatch. The fourth service did not answer this question.

Probably the most telling summary result was that all services did not report full coverage. Although some did report full coverage, many services were clearly struggling with full schedule coverage. This confirms what is observed in the field; many EMS providers simply are not able to field a response in a timely way, if at all. Specific survey results are contained in the Appendix. This all adds up to a tremendous area of unmet need.

This scheduling difficulty is further complicated by the State’s approach of recognizing a “primary service area” for ambulance services. This is, in effect, an area of State-recognized monopoly in most cases. While this may appear to be an efficient way to use scarce resources, it also leaves the public somewhat at risk when an ambulance service cannot cover its full schedule. If the schedule is empty, there is no regular mechanism for incorporating that uncovered area into the service area of an ambulance service that does have a crew available. If an “all call” approach does not yield a crew at the moment of need, there is only the mutual aid system as a back up. As mentioned above, that involves considerable delay in response. In short, the “primary service area” often yields a “primary non-service area” instead.

The fourth characteristic (field response time) is particularly important because of the discoveries of time sensitivity relative to cardiac death revealed by numerous
researchers already mentioned in this work. Unfortunately, actual field response time is not always reported. Although the State PCR system does capture response times (if completed by the EMS crew), it feeds that time up through the system in raw form and the State then reports it in summary form back to the provider service – and no one else. Any response time reports that go to the county or EMS council are “washed” into aggregate reports that conceal the identity of the particular provider service (M. Gilbertson, “Medics” report, 1985). The State speaks to the issue of operation standards only in that there is included in the recently revised Article 30 a provision requiring each EMS service to have a plan for dealing with slow or absent service response (that is, dispatch and response times). However, the law does not say what that plan must be, only that there must be one. Nor is there any mention of response time standards, or what might constitute an acceptable response time. This leaves the door open for each Council area to choose its own standards, as discussed above. There is no recognition in any statute or regulation, of any of the nationally recognized time frames such as the need for a 4 minute BLS response and an 8 minute ALS response popularized in Seattle and incorporated into the AHA ACLS training. Certified personnel are individually aware of these time frames, but this knowledge is not generally incorporated into the organizations’ response patterns, rules or procedures. There is no evidence of it in EMS Council or State regulations or discussions.

The above-mentioned schedule coverage, supplemented by a map reconnaissance of the region, can get at this issue inferentially, if somewhat imperfectly. This will show the number and location of ambulance services available to respond, as well as normal
driving times from the base location to typical call locations. While not a specific indicator of response time, this may be as close as researchers can get to the issue without actual provider service reports.

The specific method used here is to check normal driving times using commonly available software for route planning. These methods calculate travel times based on the most direct routes using the posted speed limits. It is easy to concede that emergency vehicles are allowed to travel faster than the legal posted speed. However, traffic conditions, foul weather and bad road conditions can all conspire to reduce the actual speed to something close to the posted speed limit. EMS vehicles cannot exceed the laws of physics. Further, even if an ambulance “running red” could shave a minute or two off the driving time at the posted speed limit, one must still add about four minutes for the dispatch and “out of service” times of the particular ambulance service. Therefore, it is reasonable to assert that these travel times closely approximate what one would find in actual practice, though it is only an approximation, not a precision calculation.

Given all that, an examination of the Rochester Region reveals numerous examples of rather long travel times from the ambulance base to selected locations within the coverage area. Certainly, one would expect this problem in the more rural parts of the region and map reconnaissance bears this out.

While this is hardly an exhaustive list from the region, there are some examples of long driving times for BLS responses from several of the counties in the region. In Yates
County, for example, an ambulance run from the village of Penn Yan (which is the base of Penn Yan Ambulance) to Keuka Park, home of Keuka College with thousands of students, faculty and staff will take 12 minutes to travel the 4.9 miles involved. Since the college does not advertise (nor does the EMS Council list) a first responder program, this represents both the BLS and the ALS response times. Even though they are provided by separate services, both would come from Penn Yan. Even if the ALS provider arrived first, it would have to provide BLS until the ambulance service arrived to take over (see figure 4.1).

Similarly, an ambulance run from Penn Yan to Branchport, south and west along Keuka Lake, would require 15 minutes to make the 8 mile run. Since there is no registered First Responder service in Branchport, this would also represent the BLS as well as the ALS response time (see again figure 4.1).

Another example comes from the north and on the east side of the Rochester Region, in Seneca County. The North Seneca Ambulance base, located on Route 414
north of the intersection with historic routes 5 & 20, is located centrally to some of the more populous sections within its service area. However, it is situated off-center (to the north) of its service area, so may suffer long response runs to the southern portion of its service area. For example, from downtown Waterloo to the center of the town of Fayette is at least 15 minutes to travel the approximately 9 miles (see Figure 4.2).

Because the ambulance base is actually somewhat north of downtown Waterloo, the actual trip time would likely be a bit longer. Since Fayette does not have a formal first responder program, this would represent both the BLS and the ALS response times. Similar examples could be made for other locations south and west of Waterloo.
South Seneca Ambulance, located in Ovid, faces a similar situation. Although central to a large village, coverage to the rest of its service area faces long travel times. For example, from Ovid to Caywood in the southwest part of the county requires at least 13 minutes to travel the 8.8 miles. Since Caywood does not have a first responder service of its own, this would represent both the BLS and the ALS response times for that location (see again Figure 4.2).

In Ontario County, in the north center of the Region, a response by the Naples ambulance to Bristol Springs, a popular summer home and winter ski area, would require 11 minutes to travel the 7.4 miles involved. Since Naples does not have ALS, this represents the BLS response time. From Naples to the Seneca Point development area requires 21 minutes for the 12.8 miles. At least here is a formal first responder organization. But the Naples response will be only BLS service, as the nearest ALS service is still Canandaigua, some 18 minutes and 10.2 miles away to the north see figure 4.3).
Even the more populous and fast growing parts of Ontario County do not escape this problem. From Holcomb to Ionia would require the ambulance to travel 9 minutes to run the 4.2 miles involved and, here again, this would be the BLS time (See again Figure 4.3).

In the more rural and less densely populated Steuben County in the very southern part of the Rochester Region (but home of some of the pioneering ALS providers), an ambulance run from Painted Post (covered by one of the commercial ambulance services) to Lindley, near the Pennsylvania border would require 14 minutes to travel the 11 miles for a BLS response time (See Figure 4.4).
Since the commercial provider does not station an ambulance in Painted Post, but responds from Corning instead, the travel time would likely be a bit longer. The arriving ambulance would likely be by an ALS provider, but it is unlikely that any BLS would have been started by the time of its arrival.

From Bath, in the center of the county, to Savona would require 11 minutes for the 6.5 miles. At least Savona has a registered First Responder service, but the arrival of the Bath ambulance would provide BLS transportation only. If Bath ambulance were unavailable, the next nearest response would be from Painted Post; 16 minutes and 12.9 miles (See again Figure 4.4). Although the above-mentioned spot check of response times seems to indicate that actual response times are better than this, it is important to note that the study mentioned was of very limited time-duration and limited in the scope
of participants. It did not include the commercial service that would respond in these examples. Further, the EMS Council staff did not know and could not produce the actual response times from 2005.

Another example in Steuben County would be from Hornell to Arkport, former home of the now closed Arkport ambulance. It would take 9 minutes to travel the 5 miles for both BLS and ALS response. So losing the local ambulance service resulted in somewhat longer response times for Arkport residents (See again Figure 4.4)

On the west side of the Rochester Region is Livingston County, a fairly rural county with a long history of resisting improvements in EMS. This county, located directly south of Rochester, is not immune to the problem of long response times. If one has his heart attack in Scottsburg, one will find that the BLS response time from Dansville Ambulance to Scottsburg is 12 minutes for the 7.9 mile trip. Again, one would need to add whatever time it takes to muster a crew. If they are busy, Mt. Morris Ambulance could response, but that would be 11.5 miles and 18 minutes driving time (See Figure 4.5).
What is equally interesting is that these long response times are not limited to the more rural counties of the Region. Two of the more densely developed and populated areas of the region provide examples of rather long response times.

Wayne County, not far to the east of Rochester and heavily suburban Monroe County, provides several examples of long BLS response times. Wolcott Ambulance, in the more rural easterly part of the county, to East Bay, a popular summer time residence and recreation area, is 7 miles, but a troubling 20 minutes drive -- after the crew negotiates its way through the village. And this is for BLS response. Alton Fire Department to “nearby” South Sodus is only 3.1 miles, but a full 8 minutes for a BLS response time (See Figure 4.6).
In the more populated western part of the county, the Williamson ambulance responding to Pultneyville, a popular summer time recreation area, would have to drive 3.7 miles, but 8 full minutes after it musters its crew. This would be both the BLS and the ALS response time. There is a fire department in Pultneyville, but it is not a planned first responder agency. Another example would be from Lyons to the nearby hamlet of Alloway, a mere 3 miles, but 9 minutes driving time (See Figure 4.7).
A few miles to the west in the town of Ontario, the response time from the Ontario ambulance base to the nuclear station on the shores of Lake Ontario is 4.8 miles and a full ten minutes for a BLS response. The nuclear plant may have its own first response team, but this is not evident from the State records and it does not appear to be integrated with the EMS council system. An ALS response would have to come from either Williamson, an additional ten minutes drive to the east, or from Medic 90 in Monroe County to the west (see again Figure 4.7).

Even in the more densely populated Monroe County, where ambulance services are rather numerous (see again Map 2), there are important areas of the county where the EMS system cannot deliver an ambulance response in a timely way. If the unfortunate victim is located at Hamlin Beach State Park on Lake Ontario, he will have to wait a full 16 minutes for the Hamlin ambulance service to drive the 9.3 miles to his location. And
this is for a BLS response. ALS would take much longer, as Hamlin does not provide this service (See Figure 4.8).

Similarly, an emergency in Bergen would have to wait a full 8 minutes for the Churchville fire department to drive the 3.6 miles to its location. An emergency in North Bergen would require a 19-minute wait for a 9-mile drive (See again Figure 4.8).

Similarly, an emergency in East Penfield would require a 9-minute wait for the Penfield ambulance to drive the 5 miles from the ambulance base on Jackson Road to East Penfield. This would be for a BLS response. The reader may wish to note that Penfield Ambulance is not an ALS provider, although the Medic 36 “flycar” from the Southeast Quadrant ALS organization is based there. Medic 36 would be dispatched separately, if it were available. It is not knowable in advance where it would be at the
time of dispatch, though it is possible it would be at the Penfield base. In this event, the 9 minute response time would be for both BLS and ALS (See again Figure 4.8).

Even in the City of Rochester, response times are not what they seem. Even though the fire department engages in first response activities, the practice for all EMS providers is to call “at scene” when the arrive at the scene address (curbside) instead of when the arrive at the side of the patient. Particularly in an environment with such relatively large or tall buildings, the actual response time to the patient’s side may be greater than the recorded response time (by the curb). Hence, reported response times, even if they could be obtained, are somewhat deceptively short.

Ontario County monitors response times and claims an actual average response time that is 97% compliant with their county standards. The problem is that, according to County officials, their county standard for response time is 8 minutes to get an ambulance enroute. The claimed average “at scene” time is 11 minutes and 50 seconds.

Numerous other examples can be found around the region; too numerous to attempt a complete list here. The object here is not to find all possible examples of long response times, only to show that many exist throughout the region. It may be unreasonable to expect fast response and driving times from all ambulance services to all points in a large region. However, such long driving times put a premium on citizen involvement programs (particularly citizen CPR) and active first responder agencies, so
as to shorten the actual response time to within those time frames identified at the national level as being important to patient survival.

The importance of this exercise is to demonstrate that the two first links in the chain of EMS response -- citizen response and organized First Responder units-- are completely missing in many parts of the Rochester Region. In fact, they are missing in most parts of the Rochester Region. Citizen training, a hallmark of Eisenburg’s success in Seattle, is almost non-existent in the region. A review of the State listing of registered first responders reveals there are few organized first responder units within industry, commercial or government employers, including the many school districts in the region.

All of the examples cited could benefit from the services of an active citizenry and enthusiastic wide-area first responder agency, yet only Seneca County claims one. The Seneca County Sheriff’s Department is listed as a formal first responder agency for all of this rather rural county. This listing is less than meets the eye. According to EMS Council staff, their first response is limited to cardiac calls and their service level is primarily that of FR-D, that is, use of a semi-automatic defibrillator. They are dispatched only to a limited set of calls. Still, that is an advantage for the most critical of EMS calls and serves to reduce actual response times for many of the emergency incidents. Certain localities may employ first responder units for smaller areas, but this is the only example of a functioning wide-area first responder service. According to Finger Lakes EMS Council staff, the Ontario County Sheriff’s Department is currently commencing a similar service, though not all cars are equipped with the defibrillators. The efficacy of
this service is not established, but it is at least a good start. Not even the State Police, who are trained in first responder care at the Academy, provide this service on a regular basis.

This exercise demonstrates that, in most cases throughout the region, the first emergency medical care a patient will receive will come from the ambulance crew. The first EMS providers arriving on the scene will likely be those provided by the ambulance service. In too many cases, they will arrive late. Here again is a tremendous area of unmet need.

The fifth characteristic (ALS service provision) is used because it alone can deliver the advanced level of care required to meet the expectations created by the above-mentioned research and codified in the American Heart Association ACLS standards. Further, in order to operate in New York, an ALS service must be built on a relatively (though not perfectly) solid BLS base. That is, it does not operate in isolation. Ergo, if ALS exists, certain quality standards have already been met by the BLS services in the ALS service’s primary service area. This is not a guarantee of BLS quality, of course, but it represents an improved situation.

There were 9 ALS services in the region in 1980, all operating at the AEMT Category 3 “generic paramedic” level. Of these, most were in the Monroe-Wayne County area discussed previously. The two ALS services in the Southern Tier areas
(Corning and Elmira) were both commercial services and, not coincidentally, the dominant players in the EMS game there.

There was no regular helicopter ambulance service available, although the NYS Police helicopter was becoming available under certain, very limited, not very helpful, circumstances. Therefore, rapid transportation to the hospital was not readily available, so enhanced on-scene or enroute treatment was all the more important.

If one arrays the ALS services in 2004 on a map (see again Map 2), one can see that most ALS services are concentrated in the northern area, primarily in the Rochester metropolitan area and in Wayne County, primarily the southern portion of the county. This is consistent with the early origins of ALS in the region, even with the changes that have occurred since.

The northeastern portion of Wayne County experienced an explosion of ALS services during the 1980’s as a product of EMPIRE Nine’s ALS development programs. North East Wayne ALS (a/k/a “Medic 88”) began operation in 1986 as a demonstration project promoted by EMPIRE Nine. Based in Wolcott, it covered first three, then four BLS ambulance districts. It has since changed its operating base to Sodus and is one of the services rejected by the Postal Service as “wrong town.” Ironically, the DOH field representative is aware of the location of the operating unit, even if the official listing is not. This discrepancy is discovered only by field investigation, which may explain why the State official listing does not have it right. Both the nearby Rose and Red Creek Fire
Departments formed ALS services as offshoots of, and in competition with, N.E.W. ALS, as local politics (e.g. “who’s in charge”) dominated the service delivery decisions.

This is less ALS than meets the eye, since these services all competed over essentially the same service area, with one larger service area being fragmented into several smaller service areas. The move of Medic 88’s operating base from Wolcott to Sodus, some ten miles west, spurred ALS service growth in the Sodus area, but left a gap in service in the northeastern corner of the county that neither the nearby departments of Rose nor Red Creek could readily fill. Staffing limitations, particularly during the daytime hours, left the entire northeastern corner of the county uncovered as often as not. “Mutual aid” response from more distant towns attempted to fill the gap, but response times of ten to fifteen additional minutes were excessive (Actual response times are not reported. This figure comes from anecdotes from EMS personnel, plus the author’s observations). The area was so poorly served that the County finally had to step in to fill the vacancy with an ALS “fly car” (“ALS First Responder vehicle”) staffed by paid county employees. This put Wayne County into the ALS business for the first time. On the official DOH reports, this would appear to constitute growth in ALS providers. In fact, it was merely a “stop loss” measure put in place to avoid losing the gains that the original volunteer program had accomplished.

Ontario County experienced growth in ALS services as another EMPIRE Nine demonstration project came on line in Canandaigua, in the western part of the county. Based at the local hospital, Ontario County ALS (a/k/a “Medic 60”) operated an ALS
“fly car” First Responder Vehicle using volunteer staff that would respond in a tiered response manner to meet incoming BLS ambulances. This service had no specifically defined “primary service area,” as it was not an ambulance service. Nor was it part of a preexisting ambulance service, though it had strong connections with Canandaigua Rescue (a volunteer ambulance service). Because the response times were so great, its usefulness depended entirely on being able to intercept BLS ambulances while en route to its base hospital (F.F. Thompson hospital in Canandaigua). This was only by the request of the incoming ambulance service, and the short-term goal was to provide some limited ALS coverage where none had been provided before. It did not have dual response arrangements with all neighboring ambulance services, so ALS response was still delayed beyond those of the national standards. This model was later emulated in Penn Yan, Yates County, to extend ALS coverage to that rural community as the one and only ALS unit in the entire county.

The Monroe-Livingston area saw additional ALS units brought on line as a general expansion of services in the suburban Rochester area. The availability of regular training courses and hospital-provided drug boxes made starting an ALS service much easier than in previous years. These were logical extensions of trends underway in Monroe and Wayne Counties in the early 1980’s that were initiated or propelled by the EMPIRE Nine Regional EMS organization. The paradigm for setting up and operating an ALS service had been established by the EMPIRE Nine staff. The door had been opened by the pioneers and several ambulance service leaders walked through it, making expansion of services relatively easy compared to the early days.
This expansion of ALS services extended into Livingston County to the south of Rochester. The paradigm developed and refined in Monroe County was applied to interested services in Livingston County using a classic “paradigm fit” operating model transfer. Two of the newer services (Avon and Caledonia) were undertaken by ambulance services that had a history of leadership in EMS and also had a location very near Monroe County, as well as a strong focus on Rochester hospitals as their main destination. As one moves further into this very rural county, ALS services become fewer and farther between. One is in the most southerly of towns (where, not coincidentally, the only Livingston County hospital is located), the other two are in towns of modest size rather more toward the center of the county. Interestingly, the town with the greatest population and the only State University College in the area (Geneseo), with five thousand students in residence, does not have ALS services available.

There is a second clustering of exactly four ALS services in the Southern Tier Region, three of which are generally along State Route 17, that has changed little since 1980 (see again Map 2). Two of the three Southern Tier ALS services are commercial services, providing primary ALS service to the two largest communities in the Southern Tier; Corning and Elmira. Since these are paid, commercial services, they are able to offer 24/7 coverage, something the volunteers are not able to guarantee. These two ALS services also claim broad geographic coverage, though it is not clear how they maintain timeliness standards in these areas. As established provider services in the areas, they are able to use certain sections of the law to protect their exclusive territory from potentially
competing ALS services. More on that below. Since 1980, exactly two additional ALS services were formed in the entire three county region; one in Hornell via the paid fired department (the same department that was a leader in becoming a certified ambulance service twenty years before it was required), and one in Watkins Glen. The former is one of only two ALS services in the rather large Steuben County (the other being in Corning) and the latter is the only one in all of Schuyler County.

There has been a sprinkling of ALS providers in between these two clusters. Seneca County has three ALS services covering its more populous communities, but this is a very rural county with long travel times, discussed above. Similarly, Yates County has exactly one ALS provider located in Penn Yan. This unit, modeled on Medic 60 in Canandaigua, also relies primarily on an intercept strategy for ambulances inbound to the one hospital in that county, rather than a strategy of reaching the patient’s home within the requisite eight minutes. Despite these relatively new ALS services, not all the land area of the region is covered.

This leads to inconsistencies in care provision that occur both geographically and temporally. That is, some places are able to meet the national standards some of the time, but not all of the time. Some other places do not meet them at all, at any time. Because response times are not reported, it is nearly impossible to determine the exact number of calls that do not meet the four and eight minute response time standards. We must come at this question a bit inferentially, by comparison. As one example, Wayne and Steuben Counties have approximately the same population size (93,000 and 98,000 respectively),
yet Steuben County has over twice the land area and, of course, half the density of population of Wayne County. Yet, Wayne County holds twelve ALS services, while Steuben County has exactly two. Although much of Steuben County’s population resides in the Corning/Painted Post area, making coverage of those persons somewhat easier, this means that most of the rest of the county (except for the City of Hornell) is essentially unserved by ALS in any time frame that could be meaningful.

Similarly, Chemung County has some 91,000 residents and two-thirds the land area of Wayne County, yet has exactly one ALS service for the entire county. In fact, there is exactly one ambulance service for the entire 408 square miles of the county. Similar, though not as dramatic, examples can be made for Seneca, Yates and portions of Ontario and Livingston counties.

Some specific examples of ALS response times around the region serve to illustrate these points.

In Steuben County, most patients requiring ALS care would find that the nearest ALS unit was in Painted Post or, more likely, nearby Corning. From Painted Post to Addison would be a 15-minute drive to cover the 9.7 miles. Along the same route, but to the more distant Greenwood, a patient would wait 57 minutes to cover the 36 miles. Even if Greenwood called Wellsville in the next county to the west, it would take 28 minutes for them to drive the 17.4 miles. In truth, the BLS ambulance would not wait this long. Rather, they would head for the hospital and intercept the ALS unit enroute.
This driving time, plus response and scene time, are far in excess of national standards (See Figure 4.9).

In a similar situation, an ALS unit response from Painted Post to Savona would be 16 minutes for the 12.9 miles. Fortunately, Savona has a first responder unit, but no further care would be arriving until the ALS unit ambulance arrives 16 minutes later. Even if effective CPR is administered to a patient in cardiac arrest, the arrival time for ALS intervention is far outside of ACLS standards.

If Bath ambulance decided it needed an ALS unit, it would take 25 minutes for Rural/Metro (nee: Corning Ambulance) to drive the intervening 18.7 miles. A second unit responding from Hornell would take 35 minutes to drive the 26 miles. As it happens, the commercial provider in Corning (Rural/Metro) often positions an ALS “flycar” in the
Bath area. However, since it is the only one there, it is often pulled away for calls. If it transports a patient to Corning, it is often kept there for the duration of the shift if the need is deemed greater at that point. This, of course, leaves Bath unprotected for that time. Still, it is some coverage instead of no coverage at all. Clearly, ALS response times in the southern tier are not even close to national standards (See again Figure 4.9).

Another example returns to the west side of the region, Livingston County. The BLS response from the Geneseo Fire Department to the campus of Geneseo State College is a respectable 2 minutes. However, even though Geneseo is one of the largest communities in the county and the County Seat, the Geneseo Fire Department does not provide ALS. If a student is having a medical problem requiring an ALS unit, or if a faculty member were experiencing a stroke or heart attack, the nearest ALS unit that can respond (Mt. Morris) is no fewer than 6 miles and 9 minutes driving time away, plus their own local response time for the off-quarters crew. If this crew were not available for any reason, the next nearest (Livonia) is a full 13 minutes and 9 miles away, plus its own out-of-service time (See Figure 4.10).
If an unfortunate tourist has his heart attack in Nunda in the southern part of the county, the fastest ALS response would take 20 minutes to drive the 14.2 miles from Dansville to Nunda. If it were unavailable, or needed a backup ALS unit, the hapless victim would wait 24 minutes for the 11.2 mile trip from Mount Morris. Additional examples can be uncovered in this fairly rural, but heavily touristed area (See again Figure 4.10).

In Ontario County, a resident or tourist in Naples who experiences a cardiac problem will wait 31 minutes for Medic 60 to drive down the 20.9 miles from Canandaigua. Even if the Naples ambulance begins traveling toward Canandaigua to employ the intercept strategy, this could reduce the delay by only a little, due to the scene time required in Naples. Residents of Seneca Point will wait 18 minutes for the 10.2
miles trip. Similarly, a resident of Bristol Springs will wait 21 minutes for the 13.9 mile trip.

Even nearby Shortsville residents will find that the ALS response from Clifton Springs will take a full 10 minutes for the 4.5 mile trip – if the ALS unit is available. If not, they will wait 15 minutes for the 7.8 mile trip from Canandaigua for Medic 60 to respond. A resident of Honeoye will wait 24 minutes for the 16 mile trip for medic 60 to drive over from Canandaigua. Similar examples could be made for other parts of the county, but the point is the same (See Figure 4.11).

In Yates County, approximately central to the region, an ALS response from Penn Yan to Middlesex (which has its own BLS ambulance service) would require 23 minutes for the 13.6 mile trip. With such a delay in mind, the Middlesex ambulance may abandon
the effort and head for Canandaigua instead. A heart attack patient in Dundee would have to wait 20 minutes for the 12.3 mile trip with no similar option (See Figure 4.12).

As with BLS response times, even the more heavily populated and developed counties can have problems with ALS response times.

In Wayne County, a cardiac patient in Wolcott will wait at least 15 minutes for the nearest ambulance service (Red Creek) to drive the 5.6 miles, after it consumes some number of additional minutes for its out-of-service time. The next nearest ALS service would be the County flycar, based in North Rose, to drive the 6.4 mile trip in 17 minutes. The actual total time might be reduced somewhat due to the fact that the County car is staffed by paid personnel who are more quickly available. Even if the third unit in the area were summoned from Rose, it would require 19 minutes to travel the 6.9 miles to Wolcott via the most direct route (See Figure 4.13).
An ALS patient in Savannah would wait 16 minutes for the 6.3 mile trip from Clyde, after the usual 4 minute out-of-service time. An ALS patient in South Butler would wait 20 minutes for the same unit to drive the 7.9 miles from Clyde to South Butler. The next nearest unit (Rose Fire Department) would take 21 minutes for their one ALS technician to respond the 7.3 miles (See again Figure 4.13).

A similar example can be made for Ontario Ambulance to respond to the previously-mentioned Ginna Nuclear Plant in Ontario. The ALS response would have to come from either Williamson, some 9.6 miles and 16 minutes to the east, or from Medic
90, circulating somewhere in the northeastern portion of Monroe County to the west (See Figure 4.14).

In heavily populated Monroe County, even though County officials claim that all the land area of the county is covered by ALS, a cardiac patient in Hilton would wait at least 17 minutes for the nearest ALS unit (Greece) to respond the 7.5 miles. The next nearest unit, Brockport, would require 25 minutes to respond the 12 mile distance. After that, Gates would require 26 minutes to travel the 14.7 miles. A patient in Scottsville would wait 13 minutes for the nearest ALS unit (Caledonia) to respond from the next county over the 7.9 miles to Scottsville. The next nearest unit (Chili) would take 17 minutes to drive the 7.8 miles from that base. Similarly, a medical emergency in Rush, in the southern part of the county, would wait 9 minutes for Henrietta ambulance to drive
the intervening 4.8 miles. The next nearest unit would require 13 minutes to respond the 6 miles to Rush (See Figure 4.15).

This is ironic in the county that was in the forefront of ALS service provision in 1975 and which has the most ALS units even today. This demonstrates that, although individual services are improving, the system of providing emergency medical care, such as it is, still has not been fully developed and has gaping holes in it.

There has been some effort to compensate for these shortcomings by using first responder programs, particularly by adding the use of semi-automatic defibrillators with first responders. If one reviews the State listing of first responder services, there is an apparent explosion of organized first responder care. These services were not identified in the 1980 EMPIRE Nine survey, nor by the State. Field observations reveal that this is
not truly a plethora of new services as one might at first think. Most of these are fire
departments that pre-dated the first survey and have historically provided "first aid
service" to community residents on an informal basis. The real difference now is that the
state actually knows who and where they are -- approximately. The degree of
involvement in the EMS councils is not clear. The level of personnel medical training, or
their ability to deliver their trained personnel to the scene of an emergency, are not well
established, as evidenced below, and, according to State DOH officials, are not subject to
health department supervision.

There is an inconsistent approach to organized first responders. Police
involvement as organized first responders is highly variable from county to county.
Some are dispatched as a part of the ambulance call dispatch procedure. Others are not
dispatched automatically and merely respond if requested. The involvement of industry
as organized first responders to the workplace is similarly inconsistent. A few industries
have model first response teams. However, this appears to be the exception, rather than
the rule. Field experience and observation confirms the map reconnaissance that there
are often very long BLS response times due, in part, to this paucity of organized first
response that meets national standards.

Using First Responder agencies to compensate for long ambulance response times
is an incomplete response, at best. In the first instance, there are not first responder
agencies in all areas where needed. Left entirely uncovered are most of the numerous
employers in the region, including the many school buildings in this populous region. In
the second place, where there are first responder agencies, these services themselves reported difficulties with providing full crew coverage throughout the week (above). So, they “own” a piece of the response time problem. Third, using a first responder service is only effective clinically if it is staffed and equipped to provide the necessary BLS and early defibrillation services that national standards (e.g., ACLS) require. Although the First Responder course now includes a section on use of semi-automatic defibrillators, not all services have them. Finally, there is some doubt among the medical professionals as to the efficacy of semi-automatic defibrillators (see footnote 8) in the context of first responder services as substitutes for full paramedic services.

One additional item of note is that of public access defibrillators. Some public venues now have such devices. New York State required all school districts to purchase semi-automatic defibrillators. The State Health Department has a policy (DOH web site) to require that such operations have a medical director and to follow set protocols for use. However, there is no requirement that the school (or business) operating such a defibrillator have a plan to summon an ALS service provider for transportation to the hospital when used on a patient. This creates a situation where the critical patient, once defibrillated, may not be provided with anti-arrhythmic, vasodilating, or pain reducing medications, and could re-fibrillate at any time. Since the repetition of electrical shocks provides diminishing returns over a short time, this represents a shortcoming in care for the patient. Further, a frequent consequence of defibrillation is asystole. This cannot be treated by semi-automatic defibrillators or first responders and requires full paramedic
level care. This may explain their limited usefulness in controlled studies (see again footnote 8).

In reviewing the 2004 survey responses from the self-identified First Responder Services, one can make certain summary statements and observe some trends of the respondents. Responses were from officers of the organization--chiefs, captains, lieutenants, and directors of operation – all in a position to know and speak authoritatively. A clear majority (27 of 31) self-identified as providing BLS, Basic EMT or EMT-D services. This, by itself is not a surprise, since the intention for having first responders is to provide prompt BLS care. What is important about this is that about half of the responses (17 of 31) are in the latter two categories: Basic EMT or EMT-D and the last category represents 11 of the 31 responses. First responder services are not required to provide EMT-D level care. While at first this appears to be a creditable improvement over the State minimum expectation, when one considers the work of Cobb in Seattle and the AHA ACLS standards, what may be more significant, is that the other 20 do not provide that lifesaving level of care.

The survey did not distinguish one EMS Council area from another, but review of the returned surveys and their comments suggests that there is one Council area (the Southern Tier Regional EMS Council – “STREMSC”) that is making a big push for EMT-D services in their region, while the other two are not. Such variations among council areas is further evidence of the “crazy quilt” pattern of service provision with the
region and the state. Even so, if one reviews the geographic distribution of first responder services in just the Southern Tier (see Map 7)
one will see clearly that many areas that suffer from long BLS response times also do not have first responder programs to shorten them. Further, STREMSC staff reported that first responders are sometimes not even dispatched if the responding ambulance service reports an estimated time of arrival of less than ten minutes. This is because the expected (and allowed) response times for both first responders and ambulance services is ten minutes. Hence, one finds an ironic situation in which the first responder is not summoned because the second responder (ambulance service) may get there first. EMS Council staff confirm that the policy of simultaneous dispatch of both the first responder and the ambulance service is not used.

Although all of the land area is within a claimed ALS service area, part of this is only by way of mutual aid from another location. In fact, ALS is not provided in a timely way everywhere (geographically) or all the time (24/7). Whether or not you get ALS care depends heavily on when and where you happen to have your emergency. While the primary service areas would imply that most of the land area is covered, there are still broad areas of several counties that have either no primary ALS coverage, or very late-arriving coverage. When ALS is provided, wide areas of the region still rely on the AEMT Category 3 “generic paramedics” level, which is not recognized nationally.

Field inspection reveals that there is a bit of an incongruous situation. There is more ALS than meets the eye. The shared, tiered response system may make ALS available in a town that does not appear to have it based on map inspection. This has the result of providing some level of ALS service in areas that might not otherwise have it.
Coverage is thin, however, as a second ALS call in the same shared area would go uncovered until the first call is concluded.

There is also less ALS than meets the eye. Although claimed by many, there is often less than full time ("24/7") ALS coverage due to a shortage of volunteers trained at that level. When it is provided, it may be only for the first call. The depth of ALS coverage is thin in most areas. A second call around the same time may not receive ALS services at all, even though it occurs in a service area that claims it. There is some measure of unmet need existing in the Rochester Region that has not been determined or is even being studied and is beyond the scope of this work.

There is a growing EMT-D movement, sometimes in combination with ILS. While this might at first be applauded for responding to the need for urgent defibrillation, this has the drawback of providing the appearance of ALS with paramedics without actually having true paramedics. Both public and service members may believe they have the benefits of ALS while, in fact, they do not. EMT-D plus ILS is not a substitute for full paramedic level ALS.

It is easy to conclude that there is a pattern of inconsistent EMS service levels and care throughout the state in general, and the Rochester region in particular. In both first responder and ambulance service organizations, there remain significant numbers of only marginally trained individuals. ALS service is yet another area of unmet need. Both first responder and ambulance service scheduling rosters are frequently deficient, not being
able to maintain true 24/7 availability. Both BLS and ALS response times are frequently beyond the standard range regarded as necessary for saving life. An apparent attempt by the Southern Tier EMS Council to compensate for long ALS response times by substituting first responder agencies with EMT-D capability is incomplete at best and may not even be efficacious.

Question 2: What is the Primary Reason the Rochester Region Does Not Meet National Standards on a Consistent Basis?

When the New York State legislature decided to respond to the growing issue of providing emergency medical care to its residents, curiously, it chose to bypass its own administrative structure. It could have acted through the existing health department structure, or through the state Department of State,⁹ by modifying either department, or by using some other department or agency that seemed appropriate for the task. Instead, it chose to create an entirely new organizational structure to address the issue of emergency medical care, the previously mentioned Article 30. In doing so, they ventured into uncharted territory.

The new administrative system they created--the EMS Council System--more closely resembled a mock legislature than an administrative system. The structure of the system created a two-level hierarchy of large committees-- one at the state level and one at the regional level -- that were supposed to be broadly representative of their respective
regions, though carving out large percentages of the membership seats for EMS providers. Presumably, they also were supposed to be comprised of individuals knowledgeable in the medical field and motivated for high quality service.

They also were formed by local subscription. That is, there was no particular plan for how many regional councils there would be (though there was an upper limit on how many there could be), how they would be comprised, or what particular geographic areas or hospital “catchment areas” might be included. In fact, there was no provision for including hospitals at all. Local groups could propose their own regions based on whatever rationale they wanted. There was no particular similarity to the then-existing health department administrative regions, and no particular rationale for including the hinterland counties with any particular large city, if any. Natural transportation routes from rural areas to major hospitals (i.e., regional referral hospitals and future trauma centers) were completely overlooked in the erection of regional councils.

The relationship between the State-level and Regional-level councils was clear: the former was superior to the latter, and members of the regional councils partly comprised the state level council. But, the relationships between either Council and the State health department was not so clear. Article 30 did state that “the Commissioner” (meaning the Health Department) would provide secretarial services to the EMS Council, and sometimes other support if requested, but the broader relationship was unspecified. Certainly there is no suggestion that the health department staff reported to the EMS council, nor the reverse, nor was there any hint that the health department was obligated
to enforce any decisions of the council. Nor was there any expressed relationship
between the councils and other departments of the state or local governments, particularly
the Office of Fire Prevention and Control, or the Division of State Police (see again
Figure 1.4).

The regional-level councils closely resembled that of the state level. Certainly, in
the Rochester Region, the three Regional EMS councils followed that pattern: A main
council, an executive committee, then several lesser committees that varied in name, but
always including a training committee and a medical advisory committee (see again
Figure 1.5).

The main identified functions of the State Council were to establish minimum
standards for EMS providers and EMS systems, establish minimum standards for EMS
training and personnel certification, and establish methods for determination of public
need for new EMS agencies (not just ambulance services).

At the regional level, the councils were charged specifically to “coordinate
emergency medical services programs within its region, including but not limited to, the
establishment of emergency medical technician courses and the issuance of uniform
emergency medical technician insignia and certificates.” The word “coordinate” was
never defined or elaborated upon. Also, regional councils were given the responsibility
to make determinations of public need for the establishment of additional EMS,
ambulance and invalid coach services (Article 30, sections 3002 and 3003). Note that the
state level council set procedures for determining the need, but it was the regional councils that actually made the determinations. The state council would then handle any appeals from the regional council, but could not control the original decision. The councils were to “coordinate” EMS services, run EMS courses, issue patches and certificates, and make determinations of whether or not new EMS or ambulance services were needed, but only upon application by a potential new service.

The larger goals of the act were very broad – some would say vague -- even while providing some very specific goals for lesser issues. The legislation provided the state council with authority to establish minimum standards for EMS systems (the plural form “systems” was used in the law, implying that there would not be one state-wide system), but was vague about whether the council should create the system itself (versus some other entity), what the system would contain, or how to do it. Certainly, no resources were made available to do this. In one sentence the council was authorized to adopt minimum standards for ambulance services, but then another sentence in the same paragraph stated that no standards could be adopted for volunteer services (which was most of them). It was a built-in contradiction. The state council was authorized to review determinations of public need for new ambulance services, but gave no guidance on how to determine “public need.” Similarly, the regional councils were given no guidance on what constituted “public need.” The Act did not set the premises for decision making on this question, leaving the door open to any premise a council might adopt.
As importantly, section 3009 and 3010 established the concept of “usual territory” for ambulance services (later called “primary service area” by the health department), “grandfathered” all existing services, then required any proposed new service to prove that there was a public need for a new service in order to gain approval. Whether or not mere competition for service was sufficient to prove “public need” was left to the regional councils (separately) to decide. Since all existing services were “grandfathered” in place with registrations and “usual territories,” the preexisting pattern of service provision on the ground in the state was ossified and protected. Proposing a new service required an affirmative “proof…of public need” and success in such a venture would prove to be beholden to serendipity.

The act did set some limited and specific goals, including mandating the creation of minimum standards for training courses, equipment and personnel certification. The Act did permit a body of regulations to be created (known as “Part 800” regulations) that the health department staff devised to detail these requirements. This was mainly limited to input regulations for certified ambulance services.

This EMS Act of 1974 seemed to be based on a somewhat unusual and unstated technical theory. The technical theory that emerged seemed to presume that, if you get all the right players in the room, have them meet often enough, then the right topics will be discussed and success would undoubtedly emerge somehow. How “success” would be defined or recognized if it happened was left entirely unaddressed. Although “the problem” had been generally identified in the Academy report of 1966, it was not well
defined in specifics pertinent to New York. Absent a cogent analysis of the problem in New York or the Rochester Region, it would prove exceedingly difficult for this group or any other to put in place an effective solution to this undefined problem.

The Act provided few resources. While the commissioner was authorized to make expenditures to support local ambulance services, no money was allocated for that purpose, or (initially) to fund the EMS councils or their work. There was not even any money to pay the mailing expenses for the notifications required by the determination of need process.

The Act did establish a constituency, however. The EMS Act set the State Council size between 13 and 31. Initially, the Commissioner could appoint the first 13 (until replaced by a method to be determined by a future set of bylaws), at least one of whom had to be a “representative of the interests of the general public.” However, the others were to include representatives from the various EMS services, hospitals and physicians. Seats were reserved for members from the regional councils, which could become as many as 18. It was a mini-legislature with a constituency in para-medicine, primarily from the existing EMS providers, most of whom were exempted from minimum standards by this same Act. *It was, in essence, limited regulation by the protected unregulated.*

The Regional Councils (to number no more than eighteen) were to have memberships of 15 to 30, and were to reserve fully one third of the seats for
"representatives of ambulance services.” This would, by itself, guarantee the single largest voting block on the council to those with the greatest stake in non-regulation. The remaining two thirds of the seats could be filled by representatives of ambulance services and other groups, most from the general medical community. “The general public” was named last in this list (Article 30, sections 3002 and 3003). In practice, most of these were filled by additional ambulance service members. Both of these sections created mini-legislatures with memberships solidly within the EMS community that it was charged to regulate.

As importantly, the Act did not address either specifically or by implication, any of the power relationships with other governmental agencies or non-governmental organizations. There was little statutory authority for the State Council and no other method of providing actual power in its dealings with other players in the field. Was the State Council a part of State government? Was it an agent of the State? Did the State Council have enforcement powers? When the State itself operated ambulances (as with the State Police), did this fall within the jurisdiction of the EMS Council? Was the Council on a par with the Office of Fire Prevention or the Division of State Police? It was not a department, nor a division. It was not a bureau and certainly not an Authority.10 What was it in the State Table of Organization? These and other similar questions had no answers then, nor do they today. Further, Article 30 omitted any discussion or connection with Article 28, the governing law for hospitals. Article 28 is most assuredly enforced by the health department staff in many ways, yet there is no connection with Article 30 or the new EMS council structure it devised.
Put another way, the EMS Act of 1974 created an EMS Council system that had no power, little authority, no resources and was controlled by the very people it was supposed to regulate, but couldn’t. What did they think was going to happen?

All this created a certain “system architecture” for EMS in New York State. A review of the pertinent organization design and EMS literature discussed in Chapter 2 will help one determine more specifically whether it was a good choice or a poor one. In establishing this system architecture, the legislature committed many of the sins identified by Pressman and Wildavsky in their study of Oakland in 1971, which was available to New York legislators by 1973.

The legislative mandate to the Council was vague in all the important areas and specific in all the unimportant areas. Article 30 set structure, not standards. It provided formalities, not function. This was, essentially, mimicry of a legislative structure, not an administrative structure. An unproven (and ultimately unsound) technical theory was used as the basis for creating the entire council system. Given the tentative and unproven nature of this new approach, one might have expected a trial period or a planned review process to evaluate whether things were working as hoped. None was provided for.

There was no identifiable strategy for success (Elliott Cohen, 2002). Indeed, “success” had not even been defined in terms of specific, achievable goals, nor was the EMS council mandated to produce any. This was not a “blue ribbon commission” to
study the problem and report back a proposed solution. This was supposed to be the solution.

*There was no clear method for implementing state policies.* The system of committees that was created was not an administrative system, and certainly not a program. The councils could approve anything, but there was no administrative system to enforce it and no sanctions for failing to follow it. In short, at the BLS level, the EMS providers could simply ignore the EMS council with impunity, and many did. Even today, EMS Council staff confirm that one first responder service in the Southern Tier region simply refuses to submit Prehospital Care Reports to the State, as they are required to do. This refusal is routinely reported to the State, yet nothing happens.

*There were no clear resources provided.* Certainly there was no money provided initially, nor access to anything of value. Not even “in kind” services from other departments. The secretarial services identified by Article 30 that the health department was supposed to provide did not translate into any such services at the Rochester regional council level. The regional office of the health department offered no such service, nor did they ever provide it.

*There were vague or absent power relationships between state and council, council and providers, council and interest groups.* As importantly, the relationship between the various regional councils and cities, towns, villages or county level governments was entirely omitted.
There were no key performance indicators identified, created or even talked about so that the legislature, health department, or even the state-level council could know if they were being successful or not.

There was no other feedback mechanism (other than voicing opinions at the state council meeting) to know what was happening in a detail and scale that might be useful, or in a time frame that was useful. At the time of adoption and for ten years following, there was no formal method or effort at data collection or analysis.

There was no planned review process to see if the whole thing was working, nor any venue whereby one might be created or impelled by “activists” within the ranks.

Article 30 created an administrative mechanism that was easily “turned” by street level providers toward their own purposes, as they were put in charge of it.

Although Article 30 did mention the phrase “EMS Systems,” it was in the context of adopting minimum standards for them. There was no method established for creating them.

The EMS council system that was put in place had some specific structural problems. It was a two-level hierarchy of mostly the same people, since a significant percentage of the members of the State EMS council are representatives from the
regional councils. Henry Mintzberg (1983) has posited an “ideal structure” as one that has five functional areas. These are intended to provide the organization with a certain flexibility, adaptability and general responsiveness that gives it the ability to handle more than one core function at a time. One of these sections was the “core” of the organization that handled the day-to-day and week-to-week functions that were the core of the business that this organization said it was in.

The State council was a singular entity; one council. There were no departments, no bureaus, no staff – one large committee. Although there were, and are, various subcommittees to work on specific topical areas, there is no working core, as Mintzberg envisioned it, to do the work that the EMS council said it was in business to do. All the members are volunteers who have regular jobs at something else and are able to devote only a few days a month to Council business. Even when participating in subcommittee work, the number of days a month that can be spent on council business is limited. In essence, there was no staff, paid or otherwise, to do the routine core work. To a certain extent, the paid “core staff” that existed were all over at the health department doing their work under the direction of the Commissioner. This might or might not be the work of the EMS council.

At the regional level, again, there was also no working core. There was a large committee structure that included subcommittees, but the same problem applied there. These people all had other jobs to do, so time spent on Council problems or proposed solutions was inherently limited.
This has changed somewhat since 1974, but not greatly. Absent at the inception of the EMS councils, but present today in many regions, including the Rochester Region, are numerous “program agencies” that provide staff to carry out certain identified functions of the councils, chiefly arranging for training courses. Yet, these are funded by and work at the direction of, the State health department. Although funds may flow through the Councils, and the EMS councils may exert nominal supervision, they work to State DOH requirements. Even so, the number of staff is very low, the funds are sparse and the work is essentially confined to EMS training course logistics, one of the two core functions of the councils, yet the one largely controlled by the DOH staff.

Even so, these are what Mintzberg (op cit) describes as “support staff,” not core function workers. These are the people who arrange and coordinate training courses, coordinate EMS instructors, loan, retrieve and inventory training equipment, process course paperwork and generally provide clerical services – that is to say, support staff. These are not the people who would analyze and determine minimum standards for EMS services, build EMS systems, refurbish poor quality ambulance services or introduce ALS services to a previously unserved area. By whatever title, they are clerical staff.

Another structural shortcoming of the Council system was that there was no analytical framework or “techno structure” (Mintzberg, ibidem, page 18) for special projects or creative work, except to ask for more time from the same volunteer members.
Hence, the section that might have worked on strategic planning, EMS system design, operations research and other critical thinking tasks was not created.

A significant structural problem for the council system leading to a functional problem, is that it was mostly the same people, both at the state and regional level. Although the law allowed for as many as two thirds of the council to be drawn from a broader base of expertise, it allowed provider services to dominate the membership, thus repeating the same sets of knowledge, skills and experiences many times over.

For example, the State EMS Council currently consists of 30 members (NYS DOH website, EMS council membership – 2005). Of these 30 members, fully 18 (60%) represent the regional councils. Of these 18 members, 15 are from EMS provider services --- 50% of the whole membership (the remaining three are physicians). However, another five seats are reserved for the fire service (represented by various associations) and two more are held by EMT association representatives, and one other EMS provider member. That totals 23 members from EMS provider services – over 73% of the membership. The remaining seven members are M.D’s (five) or R.N.’s (2). There is no representative from the public.

As an example on the regional level, according to EMS Council reports, confirmed by staff, the Monroe-Livingston EMS Council has 24 members. Of these, 12 hold seats representing EMS provider services (either ambulance services, first responders, or ALS providers), fully 50% of the council seats, not the one third anticipated by Article 30. However, that is not the full story. Of the “non-provider”
seats, four of these are filled by members of ambulance services in another guise, bringing the EMS provider representation to 67%. The remaining eight seats include two RN’s, two MD’s, 1 hospital administrator and 3 county representatives (EMS and EM coordinators) who, presumably, represent the public’s interest. Yet even closer inspection reveals a further bias. Within the council membership there are three current or former employees of one of the commercial ambulance services, the owner of which was vice-chair as of the most recent year reporting, bringing a four-vote block to the table. This may not seem like much, but one is also the State EMS Council representative, providing undue influence for one vested interest.

The importance of this becomes clearer when one considers the ability of the EMS Council to approve or deny Certificates of Public Need (usually abbreviated “C.O.N.”) for new – and potentially competing – EMS services. According to a series of articles from the Rochester Democrat & Chronicle newspaper in 1999, the City of Rochester Fire Department advanced a proposal (sponsored by its employee union) for the fire department to supplement its first responder program by commencing ambulance service -- transporting patients to the hospital after treating them at the scene. This would have the effect of taking away from one of the two commercial providers a significant block of business reported to be at least 3.7 million dollars. If approved, the proposal would have to go to the EMS council for a C.O.N. before services could commence. Sitting as vice-chair of the EMS council at that time was the owner of one of the two competing commercial ambulance services. If the proposal had been approved by the City and formally placed before the EMS Council, it would have arrived just about the
time this person became chairman of the council. The chairman appoints the members of
the committee that would review the application. Although her commercial service did
not hold the city contract at that time, it had in the past and could again in the future. The
entry of a third competitor into this lucrative arena could not be good for her business.
The mayor eventually rejected the proposal as too expensive and likely to be a financially
loosing operation, so the C.O.N. process was never commenced. However, the potential
for “turning” the public need process to private interests is clear.

In yet another example, a review of the Southern Tier Regional EMS Council
membership reveals that all 29 members are from EMS provider services, including the
hospital emergency departments. The two members distinguished by staff as “not
EMS’r’s” happen to be the owners of the two commercial ambulance services. They
were distinguished as non-EMS personnel because they are not currently certified and
have desk jobs instead. So, at STREMSC, the EMS providers have a complete lock on
the Council. This puts the existing providers, especially the commercial providers, in a
position to block any competition for business that might threaten their own operations.
Given the long response times and limited ALS coverage, and given that competition was
successful in improving EMS operations in other areas, such competition could be a real
benefit to the public if it could be implemented.

Hence, not only was the membership not what Robey described as a team
representing a coordinated and complementary set of knowledge and skills, it was a
“team” that allowed a handful of individuals to dominate. That the council system was a
volunteer system opened the door to the most ambitious individuals who had the most
time to devote to it (such as paid employees), not necessarily those best trained or most
knowledgeable. This allowed ambitious individuals to populate not only council member
seats, but officer seats as well. In these positions, they could appoint themselves to key
committees and subcommittees in order to extend their influence down into the lower
levels of committee work, thus controlling the premises of decision making at the early
stages of any issue.

Further complicating this complexity of joint action identified by Pressman and
Wildavsky (1984 op cit) is the simple fact that the EMS councils are committees just too
large to be effective at decision making and certainly too large to be effective at
administration.

Another fundamental structural problem with the EMS council system was that
this was a parallel organization. If one views the EMS council system in conjunction
with the state health department hierarchy, one can see that they are essentially structural
duplications of each other. The DOH has lawful authority and some resources, the EMS
Council does not. The narrow range of knowledge and skill backgrounds from which it
could draw automatically limited its effectiveness. The amount of time the members had
to devote to council business was limited by their volunteer status. The lack of core staff
and “techno-structure” rendered it impotent as a prime mover in EMS system
development or other strategic issues. In short, there really isn’t much structure at all
because there just isn’t much organization there. It is largely an empty shell of an
organization. Since the EMS council system had little to offer, it is hard to see how it ever could have been effective in the first place.

When considering functionality, one should remember Charles Perrow’s 1986 discussion concerning controlling the premises on which a decision may be made. If one can control these premises, then one effectively controls the decision, or, at least, the set of possible responses that can be made. Article 30 created an organization design that did not set the premises for decision-making on anything except, possibly, the determinations of public need for new EMS services. In that case, it ossified the existing system and set the bar high for any challenger. Even in doing that, it did not identify or facilitate what the premises could be for such a decision to be made. Instead, it delegated that question to the regional council without guidance on the issue. In no other matter did it provide any guidance on how to process or manage information or analysis that might contribute to decision-making. Considering that the regional councils were charged with responsibility to coordinate such matters as setting minimum standards for EMS services or establishing EMS systems, both complex questions, this was a significant impediment.

Another functional handicap was that the role of municipalities and “minor civil divisions” is unknown or vague. The relationship of these local governments to the EMS council was an unspoken issue. This is particularly problematic because every county has a fire coordinator and some legal authority in rescue matters, yet their relationships to the EMS councils were virtually ignored. Between half to two thirds of the ambulance services in the Rochester region counties were within the fire service. Cities, even small
ones, have statutory obligations to their residents to provide critical services, yet any role
the municipalities might play in determining quality, standards, service levels or
availability was unaddressed. Some cities adopted the practice of providing a contract for
service, usually with commercial ambulance services, in order to assure availability of
service. There were some attempts, mostly in Rochester, to specify availability and, to a
lesser extent, response times. Yet they had no role in determining or even influencing
service level choices (e.g., BLS, ILS or ALS) or quality levels. No role, no voice, no
definition. Not even a seat at the table.

The regional EMS councils had two specific functions: coordinate EMS training
and provide for determinations of public need for new EMS (read: “ambulance”) services. In both these matters the councils had their strongest degree of statutory
authority. EMS training is the clear mandate of the councils, yet this is the one that the
state health department specifically took away. As described earlier in this work, the
DOH specifically and deliberately assumed the role of preparing EMS course content,\textsuperscript{12}
written certification examinations, and practical examinations. Further, as described
previously, the State assumed exclusive rights to train, certify and retain EMS instructors
and to certify EMT’s and Advanced EMT’s. In fact, the DOH not only assumed the role
of training instructors, it preempted the field, forbidding the EMS councils to do it any
more, as they had been doing for ten years. The regional councils have been reduced to
the role of providing glorified clerical function for arranging the logistics of the classes,
and no more. This loss of function from the EMS councils to the DOH can be attributed
directly to the councils’ lack of power in any form. Even though given specific authority
under the law, it did not have the power to resist this bureaucratic grab and has never been able to get it back.

Although Article 30 gave responsibility to the EMS council system, the law gave it little authority. EMS councils had clear authority to make determination of public need for new services, but not to create any new services pursuant to it. This was strictly a permissive authority. The council could permit a new ambulance service, but not require or create one, even if the need were pressing and obvious.

Further, it had no authority or functional responsibility over existing services. The functional relationship of the EMS Councils to this broad array of different corporate homes was left unaddressed. Although Article 30 mandated the councils to “coordinate” EMS services, the existing services were all created pursuant to other laws (chiefly General Municipal Law or corporate law), registered with the Secretary of State and had fully legal bylaws, and their own boards of directors or commissioners. In the case of fire department ambulance services, these were created within the context of special purpose utility districts or municipalities that were recognized in law quite separate from Health Department Law. They were not about to take orders from an EMS council that had questionable authority in such matters. If an existing service were absolutely terrible, failed to provide service, failed to provide timely or quality service, or otherwise simply was not a good ambulance service, the EMS council was powerless to do anything about it.
This failure to define the relationship between the EMS Councils and the various corporate homes lead to confusion, denial and outright resistance by some ambulance services, as described in Chapter I.

To sum up, the councils had clear mandate to set up training courses (though no money to do so), but little more. EMS councils had no authority to create EMS systems, set standards for response times, require ambulance services to meet certification standards, open a new service or close an existing ambulance service, set standards for suitable coverage areas, merge duplicating services, expand good ones or shrink bad ones. It could not create ALS services or compel a BLS service to take on the ALS capabilities. It could not compel organizations to enter the First Responder business, or get out of it either, for that matter. It had no operational authority at all.

There is another source of authority, of course. That is “expert authority.” Robey (1986 op cit.) identifies one valued characteristic of a team as developing and maintaining a mixture of complementary knowledge and skills. If, as Robey posited, the EMS Councils had developed a “body of expertise” (perhaps as originally envisioned), it might have developed influence and (expert) authority beyond its statutory authority. Armed with that body of expertise, it might have been able to engage in skilled observation, cogent analysis, critical system development and skilled implementation. This was not to happen. Instead, the councils emerged with the same people possessing the same knowledge base, skill set and experiential record, and with the same
organizational interests. These organizational interests effectively maintained the status quo. It was not a culture of change.

Timely feedback is a requirement of a learning organization that was recognized at least as far back as Frederick Taylor in 1911. Yet, EMS data are not quickly available for planning or adjusting responses. The most recently available field data are from 2002 and in some regions, earlier than that. This is certainly not what Taylor had in mind for planning the next day’s work. Analysis is not the EMS council’s forte and there is no timely feedback that would make is possible.

One important change that has occurred since 1974 is the development of a network of “program agencies” to serve as staff to the EMS councils. These, in essences, are funded by the State through budget allocations on a contractual basis. They report to the state only in that they must meet contractual obligations. The bulk of their work is logistical arrangements for training courses.

These program agencies do provide what might be called a “permissive opportunity.” That is, if a local EMS service wishes to improve, of its own volition, such a program agency may assist it in making progress possible. It can do this by advancing the availability of training courses, providing information about ALS services and requirements, and generally being a clearinghouse for information. However, as discussed above, these are fundamentally clerical staff, not the “techno-workers” that Mintzberg (1983, op cit) described.
Further, a review of the structure of the EMS council system design (with its attendant rules) as well as the size and composition of the membership, will reveal it constitutes an impediment to fundamental progress in some areas by protecting the status quo of EMS providers (see again Figure 1.5). Perrow (1986) described the “power view” of organization design that allowed the transfer of control from the originator to the recipient. The EMS councils were “turned” by the EMS council membership from EMS system building to protecting the status quo of the existing ambulance services. In addition to the usual difficulties of getting a large, infrequently meeting group to be productive, the specific instruments for obstruction were: a) the certificate of public need requirement and 2) chronic indecision. EMS councils were easy to frustrate and paralyze.

Question 3: Given What is Reviewed Above, a Pertinent Question is Why Any Progress Was Made At All?

Clearly, some progress has been made in the Rochester Region. There are more certified ambulance services in 2004 than in 1980. There are more ALS units in 2004 than there were in 1980. Is progress in quality EMS service provision in the Rochester region the result of State policy and the EMS Council framework? Or, was progress the result of local, pioneering leadership, some combination of the two, or some other reason?
For reasons described above, the EMS Councils system could not provoke, cause or control positive change in the network of local EMS providers. However, it could allow positive change— if it chose to. This was a permissive system in the broadest sense that could respond to individual leadership if it occurred spontaneously, which it did in some places.

Still, positive changes required local initiative and persistence. Such change, when it occurred, required the individual leader to have information about new ideas and trends in EMS, knowledge about how they could be applied and no small measure of motivation. Certain additional factors also bear on the subject of quality EMS. Based on the professional literature reviewed above, combined with field experience and observations, six quality factors can be arrayed as a process operating within the “input” stage, even though the process may occur unconsciously or unobtrusively. These factors, plus motivation and decision or indecision, become important determinants of quality in EMS. They are:

New Information -- chiefly from outside, mostly national-level sources,

Knowledge -- generally preexisting information that has been sorted by the holder according to his/her value sets,

Values -- usually previously held, that sort the information as it arrives and may mold it into decision bits,

Opportunity -- an event that spurs or allows a change, leading to a …..
Decision -- to act or not act, requiring …..

Resources -- particularly money, training and staff that yield a capability to act on a decision successfully.

These six factors combine in some fashion and lead to a decision about service type, level and quality. Knowledge, values and decision (or, perhaps more accurately, the internal quality of decisiveness) are internal to the decision-maker and are difficult for an outsider to influence or a researcher to know. The others -- new information, opportunity and resources -- can potentially be influenced by outside agencies, groups or trends. They are also more readily discovered by survey.

EMS survey returns and field observations show that the six points associated with quality EMS service provision allow for -- but do not guarantee -- quality care provision. EMS survey results will demonstrate that many providers have access to outside information about quality, yet only a few met the national standards for care or service provision. Why? Were these factors present in EMS provider services in the Rochester Region?

It is difficult to know if certain internal factors were present, particularly those of preexisting knowledge and values. However, the standards an EMS service embraces may at least reflect an awareness of outside information and standards, if not acquiescence to them. The willingness to meet more than the required minimum standards suggests the presence of a certain value assigned to quality service. These are
certainly crude and indirect measures of these quality factors, yet measures that can be
determined throughout the region.

Information about new ideas, things, treatments, operations and research in EMS
was generally available to all. The 2004 survey results showed that information has
become available to at least a majority of the EMS services’ officers in the region, and
probably more. Nearly all respondents claimed to have one or more outside sources of
new information regarding EMS. Note that the survey allowed multiple responses
regarding sources. The total number of responses in that group was 97. About one third
(30) cited the EMS council as the source of outside information. Slightly less that 20%
cited the fire coordinator as the source of outside information – a curiously low figure
considering the fact that easily half of the ambulance services are housed within the fire
service. One might infer from this that the leaders of the ambulance functions within the
fire departments recognize that they are somewhat “set apart” from the fire service in this
regard.

About 14% of the respondents cited State or regional conferences as a source of
new information. A nearly equal number cited subscriptions to magazines or journals as
their source of new information about EMS. While one might argue the relative merits of
each source of new information, the main factor that the survey attempted to get at was
that the service had some method of looking outward for and acquiring new information
about EMS, and this seems to be substantiated.
Although many respondents indicated that they received magazines and journals as sources of information, when asked to indicate to what professional associations they or their departments belonged, the response was almost nil. A few responses indicated membership in fire associations or chiefs associations, but few other responses.

When it came to progressive change in EMS in the Rochester Region, it is important to understand that the **locus of control was local**. The reasons for this related directly to the earlier review concerning the relative autonomy of EMS service providers historically and the absence of both authority and power on the part of the EMS council system. Neither the State nor the EMS Council system could make things happen.

Decisions about service types, levels and quality are basically up to the local officials. The answers lie in the responses to the 2004 survey. The survey attempted to get at the question of “who decides?” the important decisions of the organization. In particular, who decided what type, level and quality of service would be provided. Several respondents made two or more responses, indicating in their notes that the decision process was a multiple step process. These multiple responses (indicating a multi-step decision making process) skews the results somewhat, but the reader will note that results from even one of the three categories for local authorities (say, a decision by the board of directors) garnered more responses than that reported for outside authorities. The survey results will identify the locus of control for determining service level and quality level decisions.
For the “Type of Service” (first responder, ambulance or ALS-only service) chosen: 83% of the responses reported that the decision was a local decision. Only 14% cite “outside authority” as the source of the decision. Within the “local” responses, there was a decided preponderance of responses that favored the “general membership” category. That is, the decision of what type of service to offer the community was made by the general membership of the provider service, not the community or their elected representatives.

Similarly, the “Service Level” (BLS, EMT-D, ILS or ALS) was chosen by local decision in 81.9% of the responses. Only about 10% cited an outside authority as the source of the decision and the Regional EMS council was the chief source mentioned. Again, the preponderance of responses indicated that the general membership made the ultimate decision. That is, the decision of what level of service to provide to the community was decided almost exclusively by the people who would provide the service, not by the community of potential patients that would receive the service.

That the EMS council would be cited as the source of decision-making for service level is not a terrible surprise. Although there are few requirements placed upon ambulance services, one area where there has always been a somewhat greater degree of control and approval points has been ALS service. In order to begin functioning as an ALS service, one must gain approval from the “system” medical director, obtain drug boxes from the hospitals (or a prescription for your own) and make arrangements for on-line medical control. All of these necessary steps are controlled by the system medical
director who is usually affiliated with the control hospital. Neither will give permission to begin ALS services unless certain standards are met to their satisfaction. This means that EMS services that want to be ALS services must be certain minimum standards, and be a part of a functioning system. This places them, in effect, within the domain of the EMS council, to the extent that the medical director wants it that way. However, an EMS service that does NOT want to be an ALS service cannot be made to provide that level of service, and is not within the domain of the EMS council to any significant degree. Hence the variability in the survey responses and the pattern on the ground.

For the “Level of Standards” (state, national or “other”) chosen, there was a similar distribution of responses with one notable exception. Over 55% of the responses indicated that local authorities made the decision to chose the level of standards they would embrace. Nearly 18% cited external authorities as the source of the decision, nearly always citing the regional EMS council as the source of that decision. The reason for the EMS council being cited as the source of that decision is very likely the same as in the question above. Meeting national (i.e. ACLS) standards very likely puts the EMS provider service within the domain of the EMS council, at least for that portion of the service.

Over 26% did not respond to this question. Although a majority of responses indicated that the decision was made by local authorities, including especially the general membership, this one question (versus the two previous questions) had nearly twice the number of responses suggesting that the EMS officer had a larger than usual say in this
decision. It would appear that the role of that one individual was limited in choosing the 

service type or the service level. However, once chosen, the EMS officer would have a 
greater say in the standards that would be met when providing it.

Field observations and experience in this area lead to the conclusion that the key 
player in all of these decisions is the EMS officer. More than any other, this is the 
individual who will most likely be the one to attend meetings outside the locality 
(whether EMS council meetings, committee meetings, association meetings or some 
other) and return with the outside information. The local provider service then “sees” 
this information through the perspective of this one individual, sometimes bolstered (or 
refuted) by the impressions of another officer. Any new and important decision would be 
framed up and presented by that individual for group discussion and decision. The most 
typical process for the craftier EMS officers would be to present it to the chief level 
officers (or line officers) for an initial decision and recommendation, followed by a 
presentation to the general membership for a vote. The vote is not really the decision. It 
is more frequently a ratification of the decision already made by the officers, and guided 
by the EMS officer. However, in a membership corporation (which is the “corporate 
home” type for all ambulance services and fire companies), a vote of the general 
membership becomes the source of authority for all that follows. Not even the EMS 
council has authority to change it.

Although this gives the appearance of democratic decision making, the reader 
should note that each of these key decisions were made by the people who would provide
the service to the community, not by the community members themselves, or their elected representatives. The community would get whatever the providers chose to provide.

The role of pioneering individuals has been discussed earlier, and was key to the early successes in the Rochester Region, and remains key today. If one reviews the early progress of ALS (see again Map 5), one can see that it is entirely due to local leaders, mostly local physicians such as Drs. Mott, Kluge, Davis and Luria. If one reviews the early progress in ambulance service certification (see again Map 2) one learns it is largely due to local ambulance service leaders. These were mostly not physicians who took their lead from the regional EMS agency, Empire Nine. But, more is required for progress.

A necessary adjunct to the local leadership for change is that some quantity of resources needed to be available. First among these resources is training. It is costly (for the individual) and time consuming. Considering that the majority of EMS provider services are volunteers, there is a distinct limit on the distance they will drive for training after working a full day at their regular jobs. Information concerning the number of courses by type that have been available in the region over time simply is not available. Hence, the number of trained personnel is an indirect measure of resource availability in combination with the willingness to take the course.

The availability of resources to bring to bear on decisions of type, level and quality of service is one that is often cloaked in controversy and contention. There are
three main resources needed for improvements in service type, level and quality. They are willing personnel (even paid departments seek volunteers for advanced levels of training), training classes and equipment. Each would move forward in concert with the others. That is, no one would volunteer until a class became available. Money had to be made available (or credibly promised) to pay for the class, and few would do this if there would be no equipment available to use once the training was completed. This formed a “resource triad,” so to speak, that had to move forward together or not at all. Experience in the region showed that, if the classes were available, volunteers would step forward to take them. If volunteers were in class, somehow money would become available for equipment. Therefore, level of training and ALS service provision become direct measures of the availability of resources that the 2004 survey was able to determine.

Just as we used training levels to demonstrate a certain level of preparation as a measure of input standards, we can use this same indicator as a somewhat indirect and secondary measure of overall standards embraced. That is, while all ambulance services are required to meet the minimum standards, field observations tend to support the notion that those with more EMT’s tend to exceed the standards. At the very least, they are more able to deploy two or more EMT’s on a call instead of the minimum of just one. Variability in training levels allows the easy inference that there is variability in the EMS services’ level of quality.

The EMS services responding to the 2004 survey reported (in total) a distribution of certified personnel as follows;
CPR only: 21.9%
EMC FR only: 8.9%
Basic EMT: 5.3%
EMT – D: 46.2%
Intermediate EMT (ILS): 2.7%
Advanced EMT Category 3: 3.3%
Advanced EMT Category 4: 11.6%

There are clusters of personnel in three levels of training: CPR only, EMT-D and Advance EMT 4 (full paramedic). It is somewhat disappointing to see so many Category 3 (generic paramedic) personnel instead of Advanced EMT Category 4 paramedics. Although the trend has been toward more Category 4 trained personnel, the existence of this many Category 3 personnel thirty years after the introduction of ALS into the region suggests that there are still important limits on hospital clinical time available for training purposes. Recall that this has historically been the limiting factor in training paramedics, necessitating the more abbreviated training of the Category 3 personnel in the first place. This is a useful reminder that training resources remain finite and limited, even though they may have improved over time.
Why there are so many personnel who are only marginally trained at the CPR only level is something of a mystery. The survey instrument does not allow us to get at this question, but at this point in the investigation one can speculate without too much danger that his reflects a large minority of volunteers within the provider services who simply refuse to “move up” the hierarchy of training to a higher level, such as EMT or AEMT. This is possible within the ranks of even a good EMS provider service owing to the fact that one can volunteer or not volunteer. The result is to shift the burden of service provision to those few who do move up to higher levels of training.
This, plus field observation, strongly suggests that there is great inconsistency in the ability of ambulance services to field an EMT on every ambulance call. Whether this means they are handling calls without an EMT on board, or are simply not responding at all is a matter of speculation. Limited field observations suggest that it is both (at different times), but it is difficult to prove the absence of something.

A second resource available to EMS providers in the Rochester Region is the availability of now-proven “new” operating methods. This includes specifically the ALS demonstration projects mention earlier in this work that were not invented here, but imported from the outside and widely publicized and encouraged by the regional EMS program, Empire Nine. These projects provided high profile examples of a tiered response paradigm for first responders, then BLS and ALS services. It also provided examples of ALS services shared between fire department and non-fire department ambulance services. These successful demonstration programs provide proven operating paradigms for other services to replicate without too much difficulty. This replication includes not only the operating strategies, but sets of by-laws, policies, rules, regulation, procedures, dispatch protocols and so forth that complete the organizational package. Starting a new ALS service in the Rochester Region is now much easier than it was two decades ago.

One additional and major factor is that of money. Previously, funds for course tuition came from the student’s pocket, usually reimbursed from the ambulance service. However, the fire service was accustomed to having its training provided for free (that is,
tuition free) and did not like the idea of having to pay tuition. Lobbying at the state level eventually yielded funding to replace tuition costs with increased direct course support, making tuition unnecessary. The old payment schema was replaced by the new payment schema, however, this is less change than meets the eye. The course still received state funding, the student still received free training, but the State now controlled the funding vehicle and the course. It was a bureaucratic sleight of hand that pulled just a little bit more control of the training class from the EMS council to the Health Department staff.

The opportunity to act to improve type, level and quality of service has been present in parts of the region since before 1980, and in all of the region in the decades since then. The timing of the opportunity can generally be discerned by the adoption of the standards by neighboring services. That is, if one service chooses to take the opportunity to become a state certified service, that opportunity was also available to its neighbors and, presumably, rejected, if only by procrastination. If an EMS service becomes an ALS provider, that opportunity generally also is available to its neighbors around the same time. Yet the decision to act was taken independently by separate services and over a long period of time.

The status of certain EMS providers as certified services prior to 1999, or as ALS services today, provides a direct measure of the timing of a decision to exploit the opportunity. The opportunity to become certified clearly existed in the early 1980’s, yet not many services took advantage of that opportunity. So few, in fact, that the State legislature found it necessary to require it.
In response to the 2004 survey question concerning the quality standards they met, all the responding ambulance services recognized and reported that they met NY State ambulance Certification standards. Given that so many services embrace certification standards (albeit not voluntarily anymore), one would reasonably expect to see a high percentage of personnel trained at least to the basic EMT level. As reviewed above, this was not the case.

Examining the standards embraced by EMS services in the region may reveal to some degree the information received and the decision(s) made by the EMS service. In reviewing the responses from all provider groups taken together, one can make certain summary statements and observe some trends of the respondents. Although these are a bit of a gross measure and exploration of the sub-groups allows a somewhat more discerning picture, the results still offer some interesting facts.

The question concerning “What quality standards does your service officially meet?” should have been an easy one. The State places all EMS services into one of two categories: they were either First Responders Services (either BLS or ALS), or Ambulance services. The State has no other categories. In the first category, they must meet the quality standards of first responder services – of which there are few – or ALS first responder services. In the second category, they must meet ambulance certification standards, which include minimal vehicle, supply and equipment, and personnel standards.
State Registration as a first responder service means that the State knows where you are and that you are providing EMS service. There are few standards to be a first responder service at the BLS level. Those that exist are primarily rudimentary equipment requirements and one person trained at least as a first responder. There are standards to be a first responder service at the ALS level very closely aligned to those of an ambulance service that provides ALS service. That is, the vehicle ("flycar") must meet the BLS equipment standards, but once the ALS technician commences advanced level procedures, the ALS equipment and communications protocols kick in. However, these are all input standards. There are still no process or output standards that a first responder service must meet, and there are no standards for availability.

In this survey, there should have been 31 responses indicating that the respondent met First Responder Registration” standards, at least 44 responses indicating that the respondent met ambulance certification standards, and possibly up to 44 responses indicating that the ambulance services also met US DOT KKK standards by virtue of their relatively modern ambulance vehicles. There could have been additional responses indicating other standards met.

In fact, 33 services acknowledged that they met the state First Responder Registration standards, 57 respondents acknowledged that they met the state Certification standards (44 ambulance services probably plus the 13 “no ID” services) and 14 reported that they met the US DOT KKK standards. Since some of the “No ID” services appeared
to be first responders, these are curious results. One possible explanation is that these services had multiple vehicles (both an ambulance and a “rescue truck,” each of which met differing standards. The good news is that there was a plethora of services claiming to meet the appropriate minimum standards.

How many ambulance services meet more than minimum standards? As mentioned above, a few offered additional standards that they met, though this was the exception rather than the rule. One commercial provider meets CAAS, though in fairness, the application is prohibitively expensive for smaller services. However, there are six commercial services in the region. Only one of the remaining six reported that they had applied and expected to receive the CAAS certification.

A few ambulance services volunteered that they meet certain additional standards. One respondent noted that they were also certified in Pennsylvania, since they operate in that state as well. One commercial service noted that they meet CAAS standards. A second commercial service volunteered that they were seeking it and expected it soon. These were the rare exceptions. This leaves the four other commercial services (2/3) not claiming this standard. So, in short, the official State minimum quality standards for inputs were set by regulation and pretty much followed.

In response to the question concerning the quality standards they met, two responding services reported that they met NY State ambulance Certification standards (a curious response from an “ALS only” service) and one reported that they met the First
Responder registration requirements, which are different for ALS first responders than for BLS responders. One did not answer this question.

Conclusions

The EMS Council System could permit individuals to make progress and assist with resources, but could not provoke progress where local leadership was not present.

The EMS Council system could throttle progress via the Certificate Of Need process if it chose to, or if it were significantly manipulated by members with vested interests and substantial voting blocks. Despite widely available information and well known sources of new information, EMS “progress” in the Rochester Region was and is highly variable.

The training levels of provider service members, though improved, remains lower by percentage of personnel trained to the EMT level than one might expect for a service that needs at least one on every ambulance call. Category 3 (“generic paramedic”) survives thirty years after it was invented as an interim measure.

The number of First Responder services is low in absolute terms. Given the substantial distances in this predominantly rural area, there is a noticeable absence of effective first responder programs that might provide timely EMS response if implemented fully.
The number of ALS services is not 100% of all EMS providers, nor is there 100% ALS coverage of all “primary service areas.” Even where offered, effective ALS coverage is not always available universally due to staffing limitations.

The author infers from the responses that survey returns are probably disproportionately from the better, more active departments. If true, this would skew the results toward the high side (e.g., more involved beyond the local community). Not many responding services or individuals actually belong to professional organizations. They seem to rely on the EMS Council, conferences and magazines and journals for their new information concerning EMS. This deprives them of first hand, cutting edge information and leaves them with only the information that has been filtered down from the state level. The disadvantage of this is that it may mean they are always behind the curve on new information. The advantage would be that any information or technique that reaches them is already vetted for clinical and doctrinal acceptability.

There appear to be important distinctions between the EMS Council areas in terms of their focus, level of activity, and influence over the respective EMS providers. Specifically, the Southern Tier Regional EMS Council seems to have made a strong push toward EMT-D, while minimizing the growth of ALS services. On the other hand, the Monroe-Livingston Regional EMS Council seems to have made a strong push toward ALS services, possibly to the detriment of EMT-D. One cannot prove this with certainty because the format of the survey does not allow it, but the pattern on the ground plus numerous comments volunteered by the respondents strongly suggest this.
Inconsistency of service level remains a problem. There has been an increase in ALS service area coverage, yet it is incomplete geographically and inconsistent through the weekly schedule. There clearly is an area of unmet need here. Some individual ambulance services did get better. This individual progress did not create a system of response. Rather, it improved the individual nodes of the network, not the network itself. This progress did not lead to a transition to a true EMS system.

The basic knowledge of how to operate a quality EMS service seems to be generally present in the region. There is adequate exposure to outside and new information, plus mechanisms for sharing information within the region.

The values of the respondents are unknown and not within the scope of this work. Opportunity for change is sometimes provided by competition, as in the cases cited above, or the potential arrival of a new level of service such as ALS that provokes discussion and decisions.

The changes that do occur seem to be embedded in the organization by a vote of the general membership (providing legitimacy) followed by construction of new procedures to implement the decision. Much of this is incremental “institutional knowledge” that builds up over time with an accumulation of standard operating procedures and practices. It seems that the vote of the general membership was a ratification of a leader’s proposal, rather than an example of leadership itself. However,
the consequence is the same; the decision is embedded into the culture of the organization.

Resources seem to be there for input; money is often claimed as a shortcoming, but it always seems to be available for new vehicles either by traditional fund raising techniques, or by state grants.

What is really missing from EMS in the Rochester Region is setting this all in the I-T-O framework and conducting a systematic review of operations. The progress to date has been mostly on the input side. There appears little effort, or at least, few results in improving the “throughput” process or the output of the service and certainly little on the outcome of the patient. These remain areas for quality improvement.

Boyd (1974) has told us that EMS response is a continuum of response. It is important to note that not all points of the continuum are addressed effectively in the Rochester Region.

One salient point stands out: EMS service provision is controlled by the providers, not the public, nor the State. With some very limited exceptions, the local EMS providers are usually unregulated or marginally regulated monopolies controlled by their own internal boards of directors or fire commissioners. This fact, in conjunction with the cumbersome determination of need process for new services, virtually ensures an absence of meaningful competition in the field. It is very difficult for any other
ambulance service, or a prospective new service, to begin EMS service in any given area. With few exceptions, competition mostly exists only in areas where it existed at the time of the enactment of the original Article 30 in 1974. The exceptions display the value of competition – when it exists – can be a motivator for improvement in service level and quality. However, because of the determination of need process for new EMS services, competition actually has very limited usefulness for improving EMS service provision.

Notes

1. This specifically includes the American College of Surgeons Advanced Trauma Life Support (“ATLS”) standards and course, and the American Heart Association Advanced Cardiac Life Support (“ACLS”) standards and course.

2. Note: “training” and “certification” as used in this work are not identical. The State and other organizations provide EMS training that may or not have a corresponding certification. They “certify” certain training programs and those who complete them successfully, with exit exams, a card or certificate, and a registry of those who completed the training successfully. These certifications expire after certain time periods (usually three years) and may be renewed by specified processes.

3. In what might be a classic display of bureaucratic mismatch (some would say “too many cooks in the kitchen”) the three organizations involved in CPR training could not agree on either the proper technique for CPR, nor the appropriate certification period for it. The American Heart Association and the American Red Cross each insisted on their own correct method for performing CPR, and insisted that, to be certified, one must learn their way of performing it. Neither would recognize the other’s training course for certification purposes. Further, each organization insisted that the certification period must be only one year. This put them at odds with the three-year certification period for the Basic EMT certification used by NY State. EMT instructors, many of whom were also CPR instructors, found themselves “shopping” the Red Cross and the Heart Association for the best deal on CPR classes. Most instructors in the Rochester Region eventually sided with the Heart Association, partly because they felt the instructional method a little more appropriate, and partly because it was consistent with the material that many students would later work with in the AHA ACLS course taught to ALS personnel.

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4. These services were: National, Monroe, Walters, Geneva, Erway and Corning Ambulance Services.

5. These services were: North Seneca Ambulance, Hornell Fire Department (a paid fire department), North Rose Fire Department (a volunteer fire department), Newark-Arcadia Volunteer Ambulance, Avon-Rotary Volunteer Ambulance, and Lyons Ambulance (a paid Town ambulance service).

6. The ALS response is provided by a separate ALS “flycar” based at the local hospital in Penn Yan, but the dispatch location is relatively near the BLS ambulance base, hence roughly equivalent travel times.

7. The best example of this is the City of Rochester Fire Department, which trained all its line firefighters as Certified First Responders. The 911 dispatcher sends fire vehicles and firefighters simultaneously with the commercial contract ambulance service according to dispatch protocols.

8. There is some disagreement in the literature about the efficacy of semi-automatic defibrillators as measured by survival rates. See the Kellerman and Sweeney, et al articles in “Annals of Emergency Medicine” below for a discussion about the results of a controlled study regarding semi-automatic defibrillators.

9. The NYS Department of State is the department that not only houses the Office of Fire Prevention and Control, but also provides legal and administrative supervision of the state’s “minor civil divisions,” that is, cities, counties, towns and villages. When the State wishes to influence administrative rules or programs for localities, it can easily do so through this department.

10. New York State has a long and substantial history of creating special purpose Authorities that act as agents of the State, yet have their own boards of directors, management and administrative structure outside the normal state departments. High profile examples include the Thruway Authority, the Port Authority (for New York Harbor), Dormitory Authority and the Power Authority. Each is created by an act of the legislature and has defined powers, including certain financial (e.g. bonding) capabilities. The EMS Council system was not among them.

11. The most recent reporting year is 1999.

12. Although much of the course content for all EMS courses originates at the national level, particularly the Department of Transportation (DOT-NHTSA) courses, New York State has not always adopted the entire recommended curriculum. There are various reasons for doing so, but the main point is that the State determines what will or will not be in a certification course.
CHAPTER V

SUMMARY AND CONCLUSIONS

Review of Central Themes

The quality of emergency medical services was identified as a national issue as long ago as 1966. The American Academy of Science study: “Accidental Death and Disability, the Neglected Disease in Modern Society” reviewed the then current state of affairs of prehospital medical care in the United States. The information presented astounded the government and the medical community, prompting many efforts to respond to the findings of the work. Since that year, national and state policies were devised to provide direction, support and encouragement for the improvement of EMS systems and services. A collection of responses ensued, including expert-derived standards of care and service delivery. These were used as a basis for providing top quality emergency medical care to patients in some locations. This led to an array of service types and levels that includes: a) a choice of the type of service provided, b) a distinction between the levels of service, and c) choice of the degree of quality within the service level chosen to be provided.
The next logical step in the progression of standards and policy development was for each state to enact policies and take actions that would deal effectively with the problem identified. The implementation of statewide policies required many choices. The interplay of these choices would ultimately determine whether the outcome was successful or not.

New York State formulated a response to the Academy report, eventually enacting the Emergency Medical Services Act of 1974. New York State created a rough framework of law that would toss the problem to a loose network of newly created local, “regional” EMS Councils. Vague goals were adopted, but no resources were supplied to implement them, no timeline established to motivate them, and no monitoring provided to even know if they were successful at anything.

In formulating this response, the State undertook to address the problem without undertaking what James Q. Wilson (1989) would later note was especially important and useful for organizations to be successful -- analyzing the problem accurately and identifying the critical environmental problems to be overcome. Although the legislation identified vague goals to be accomplished, the critical tasks that needed to be mastered so these goals could be achieved were not addressed. In an attempt to succeed in achieving its goals, the legislature also failed to do what Wilson identified as essential to successful strategy formulation -- select the “right” organization to undertake the task and -- better still -- pick an organization that already knew how to identify the key core tasks and technologies needed to accomplish them, rather than make it up from scratch. The
The resulting organization (the EMS council system) would suffer (in Wilson’s view) a poor structure both in terms of traditional box and line structure and the people and culture within the structure.

Mintzberg (1983) described an organization structure that has five main elements based on the division of labor and the nature of the work to be undertaken. This is so the organization can provide for the routine delivery of routine tasks, yet can undertake unusual, unpredictable tasks. The differentiated structure allows differentiated functions to occur effectively and efficiently within the same organization so the necessary work can get done without the structure “getting in the way.” Better still, so the structure is actually conducive to getting the work done effectively and efficiently.

The EMS council structure identified in Chapter 1 would not meet Mintzberg’s idea of a design that possessed these needed functions for implementing core technology or accomplishing the critical tasks at hand. Nor would the organization design handle information or resource allocation effectively. Further, there simply was no ability to match the distribution of authority and control over resources essential to the critical tasks being performed, as Wilson tells us is so important. Put another way, the choice of the EMS council system meant that the State was unable to identify the critical tasks or implement solutions for them if it had.

New York State has a “crazy quilt” of EMS services, offering differing levels and quality of care provision that vary significantly from place to place and region to region.
The Rochester Region is similar to the state in that there is a wide variety of service and quality levels present throughout the region. In the Rochester Region, the formal groups that existed did little to improve the quality and availability of Emergency Medical Services. A handful of local leaders acted on their own initiative to respond to the problem. Some efforts were made toward training classes for the basic ambulance services, but these were limited in availability, scope and scope of practice.

The Rochester efforts were focused primarily on the City of Rochester and a few of the immediately surrounding suburbs. The Newark-Wayne efforts were focused on a few of those ambulance services that transported patients mostly to Newark-Wayne Hospital. The Southern Tier efforts were focused initially on Elmira and, somewhat later, Corning. Initially, there was no regional effort to respond to the new State level EMS policy. With few exceptions, Rochester hospitals took no interest in, or responsibility for, the condition of their patients in the pre-hospital phase.

Pressman and Wildavsky identified complexity of joint action as a source of difficulty in implementing program goals. In the face of this challenge, two non-official regional organizations in succession sought to provide an organized and coordinated response to the State EMS law in the Rochester region. Faced with the daunting task of taking action within the context of nine counties, at least 21 hospitals, at least 109 ambulance services and an unknown number of first responder agencies, these organizations tackled the problem of this complexity in an effort to establish some coordination of operation and care. Over time and with difficulty, this effort led to a
significant increase in the number and type of training courses available within the region, the development of a cadre of trained instructors for each level of EMS training, and the implementation of specialized rescue and pediatric training as well. The staff of the later regional EMS organization (EMPIRE Nine) developed two new demonstration projects to showcase models of Advanced Life Support service provision useful for rural areas. These showcase models of ALS provision included a step in the direction Pressman and Wildavsky (ibidem) identified as necessary for system development – the transferring of power and authority from the local providers to the State or to a regional level. In this particular case, the authority was not transferred to the State, but only to a higher level of service provider. Nevertheless, even this small transfer was a struggle. It was a small step, but the concept of authority transfer was understood. These models met with mixed receptions at the time, but have since been replicated several times throughout the region. The transfer of authority from the local EMS provider to a higher level has not progressed any higher at all – not to the EMS council and certainly not to the State.

Active leadership and publicity stimulated some interesting examples of competition in areas that already had EMS political rivalries. These positive outcomes were not caused by Article 30 or the EMS Council. However, the availability of new resources allowed each rival to try to outdo the other in a quality or credentialing contest in the hope that it might be the EMS service that ultimately survived the struggle. In the end, most survived and the survivors all became ALS service providers. Competition was effective as a stimulant for positive change, though limited in scope.
As discussed in Chapter 1, a somewhat unique historical and geographical pattern of settlement and development of small towns in New York has had the effect of "fixing the pattern" of EMS delivery. This pattern, when combined with the political doctrine of "local control," has had the effect of allowing the fragmentation of service delivery, and guaranteeing local control over its management and evaluation. This pattern of highly localized service delivery then was loosely overlaid by a network of EMS Councils that are roughly contained within a collection of eight health department regions. Partly as a result of this historical evolution, plus modern considerations of public cost, the fire protection and ambulance services have largely remained in the volunteer sector. The legislature of New York State, when considering regulation of the EMS business, consistently adopted a posture of effective non-regulation until the EMS law was finally amended effective 1997, with generous waiver provisions until the year 2000. For the first twenty-five years of its policy, the State, in essence, authorized the status quo except for “developing minimum training standards” for EMS personnel.

The broader, more vaguely stated official goals of the state required an implementation mechanism more comprehensive than was ultimately constructed. Although Article 30 provided a legal foundation for EMS, the law was silent on the matter of a "system architecture," or design for the actual provision of prehospital Emergency Medical Care. As importantly, the law did not develop what Brewer and DeLeon (1983) felt was essential to successful policy implementation -- a sound technical theory for how the goals should be accomplished. The technical theory that emerged seemed to be the notion that merely getting all the players together and adopting
standards should somehow lead to progress. Yet, nearly all of the standards developed, whether stated or implied, are input or process standards, mostly the former. There are no output or outcome standards. Thus, State policy provided for a statewide “EMS system” that could be characterized as merely a loose network of autonomous EMS providers that was fragmented at the top and even more fragmented at the bottom.

As discussed in Chapter 2, McDonnell and Elmore (1986) identified four alternative classes of instruments for implementing public policy: mandates, inducements, capacity building and system changing. In the case of New York, the State allowed for all four to be used, but initially used only one (mandates) in a very limited way, followed a few years later with a second (inducements), providing very modest expenditures in limited areas, mostly for training. The last two categories were never fully employed. The State was not ready to invest the rather substantial amount of funds nor tackle the complicated delineations or transfers of authority and power from EMS providers to some other level of government. Investing in capacity building required expenditures the legislature was not prepared to make. Furthermore, such expenditures would undoubtedly lead to system changing, since the current providers could not employ the funds for the purpose intended. There were few agencies or organizations that could build the systems contemplated, and the use of system-changing tools (i.e., transfers of authority) would likely have given rise to the defensive responses that McDonnell and Elmore warned about on the part of the EMS organizations being changed.
This lead directly to another area of potentially confounding events or forces that could interfere with successful implementation of state policy goals. Pfeffer (1981) noted that policy makers should place power in areas that were favorable to the policy being developed. Perrow (1986) has described what he calls “the power view.” That is, the propensity of street-level players to attempt to “turn” policies or programs away from the stated goals and toward the goals or self-interest of field or regional level players. Because the State did not have an effective technical theory, and because the power relationships were not addressed effectively, power was not placed in the EMS Council organization effectively (if at all). Absent this source and exercise of power, Perrow’s fears were realized; the local players “turned” the EMS council system and policies toward their own ends, which included maintaining and ossifying current territories and patterns of response.

To summarize, all of this structured a policy environment of decentralized decision- and policy-making by those who provided the service, rather than those who "consumed" it, and a practice of political activism concerning resistance to regulation or standard-setting by state or similar agencies. Whether understood at the time or not, the net effect of the EMS Act of 1974 was to establish as public policy that the nature, level, and quality of Emergency Medical Services to be provided to the public would be decided at the local level only. Further, that these decisions would be made chiefly by those who provided the service, rather than by those who needed or used it. The public would get what the ambulance service felt like providing.
Emergency medical services are among the most critical services of any community. The quality and timeliness of such services may determine the outcome in life or death struggles more than any other community service. It is important to recall that Drs. Pantridge, Lund and McIntyre established that the critical time frames involved are derived from biological considerations, not political or legislative. Drs. Eisenberg, Cales and Cowley established that the organization of the responding services can contribute to the survival rate by ensuring that these biologic time frames are met.

This review is important because of the typicalness, or representative characteristics, of the Rochester region to New York State and of the state to the nation. New York State is a large state and one that uses volunteer service provision heavily. The Rochester Region is roughly typical of the rest of the State in terms of the geography, population size, type, concentrations and geographic dispersal, transportation network and mix of EMS providers, making it broadly representative of the rest of the state.

The Rochester Region is comprised of nine counties that comprise a large geographic area containing both urban and rural populations. There is an extensive high-speed road network that connects its urban areas, yet there are also extensive agricultural lands providing challenges of both emergency type and distance. The City of Rochester contains a premier health care community, including a world-class hospital.
The dependence of the State on volunteer EMS providers is similar to many other states in the northeast in that one of the most critical community services is dependent on a patchwork quilt of local EMS providers who are not necessarily coordinated by any guiding medical or legal authority. What happens here has been and can be instructive for the rest of the state.

These characteristics contribute to the transferability of these findings to other regions within New York State, and to other states that have similar geographic characteristics and/or substantial dependence on volunteer EMS service provision. Further, the characteristics of the EMS Council system as it relates to other government agencies, and the problems of implementation that have been encountered, are broadly applicable to other government program types as well as other organizations. The lessons learned here are directly transferable to other organization types and the programs they may undertake, and can serve as a chart for the obstacles they might encounter.

What We Now Know About the Topic

Having established that the service level and quality decisions are made by the providers of the service, rather than by the public, the question then arises of how these decisions are made on the local level. Observation of the EMS providers supports the notion that decisions concerning quality in EMS are made in essentially four steps: Type,
level, quality and durability. Surveys of EMS providers, supported by field observations, support the idea that decisions about service level and quality are typically made by the officers of the EMS service and ratified by the general membership. This has the effect of embedding the decision firmly within the organization, while excluding non-members (i.e., the general public or elected representatives) from the decision making process.

Certain trends and standards of care and service operation exist nationally. This includes clinical (medical) care literature, as well as organization and operation theory. This information is widely dispersed and generally available. Access to this national information is important for quality at the local level.

We have established from the literature and field observation that there are two essential pathways in EMS operations; clinical and operational. The two are distinct, yet intertwined and success in one pathway often requires success in the other was well.

Mintzberg (1983) has postulated an “ideal” structure for an organization that may be applicable to EMS provider services and the larger EMS system. Herbert Simon (1997) and Charles Perrow (1986) have identified that limited scans for information may possibly forejudge the outcome of decisions. The scope of the scan is important. Page (1981) has made recommendations for fire service EMS operations. McIntyre (1983) and the American Heart Association, Cales and Trunkey (1985), Eisenburg (1979 and 1990), Eastman (1987), Pascarelli (1978) and others have all made recommendations concerning response and operating time frames that are biologically based and have strong
implications for quality. Pressman & Wildavsky (1984) have identified important considerations regarding the implementation of government programs that are relevant to our study.

The clinical pathway has received the most attention, including training and medical standards documents, plus on-line medical control for the ALS providers. EMS services in the Rochester Region have made important strides in the Input factors, particularly the level of service provided in many areas, and the number and level of personnel trained to increasingly high levels of certification. Operational factors have not changed significantly, nor is there noticeable progress in this area. It is not a focus of EMS Council activity, nor of the State health department, nor even of the counties involved. Operational factors remain within the near exclusive control of the EMS provider services where power is located at the local level. Certain commercial services have paid close attention to operating standards with the introduction of system status management (SSM) and of computer-assisted dispatch (CAD) to improve their response time and general operating efficiency. However, such attention to operating standards seems limited to the commercial ambulance services, and then only the larger ones.

This work has established who makes these critical decisions about lifesaving services, something about how they are made, and why there is such variation from town to town throughout the region. The EMS officer and chief level officers guide the decisions through a multi-step group decision process by the general membership,
embedding the change into the organization. Not many responding services or individuals report actually belonging to professional EMS organizations.

The EMS services seem to rely on the EMS Council, conferences and magazines and journals for their new information concerning EMS. This deprives them of first hand, cutting-edge information and leaves them with only the information that has been filtered down from the state level. The disadvantage of this is that it may mean they are always “behind the curve” on new information. The advantage would be that any information or technique that reaches them is already vetted for clinical, doctrinal and political acceptability.

While ambulance services must now meet state certification standards, these are essentially input standards, not performance or outcome standards. This is true for both provider service operations and for service or patient outputs or outcomes. The EMS councils usually write and adopt clinical standards at most levels of treatment. These have the tendency to act as Perrow’s unobtrusive control mechanisms to direct the activities of the EMT or AEMT while treating a patient, thus creating some level of standardization of care. However, this is along the clinical pathway, rather than the operational pathway.

With some very limited exceptions, the local EMS providers are essentially unregulated monopolies. Current EMS law makes it very difficult for any other ambulance service, or a prospective new service, to begin EMS service in any given area.
Thus, competition, which did stimulate progress in a few localities, actually has very limited usefulness as a policy tool for improving the quality or availability of EMS service region-wide.

Advanced Life Support (ALS) is not provided everywhere (geographically) or all the time (24/7). There are still broad areas of several counties that have either no coverage, or very late-arriving coverage. Drs. Lund, Cobb and Eisenberg established the importance of key biologic time frames for patient survival, and that effective EMS systems response must meet these time frames in order to be successful. Given the broad areas of no service or late-arriving service, one must wonder if this level of announced service provision actually provides any real patient benefit at all. The answer is beyond the scope of this work. When ALS is provided, wide areas of the region still rely on the AEMT Category 3 “generic paramedics” level, which is not recognized nationally. The shared, tiered response system may make ALS available in a town that does not appear to have it based on inspection of the map. Although claimed by many, there is often less than full time (“24/7”) ALS coverage due to a shortage of volunteers trained at that level. There is still an important measure of unmet need existing in the Rochester Region that has not been determined with precision.

Drs. Cowley and Boyd established the critical importance of organized response and defined time frames for rescue and transport operations (e.g., “The Golden Hour”). Helicopter service in the Rochester Region has improved since 1980, though still has some important limitations. Response time and thin coverage are the two chief
limitations. Although published response times are not available, reports from the field indicate that responses are often delayed substantially owing to long warm up and flight times. While one cannot argue that helicopter service is not available at all, it would seem a fair statement that it is not as available as it might be if it were provided within the context of a structured response of the likes recommended by Drs. Stewart, Trunkey, Cowley and Boyd.

Certain factors of quality in EMS that influence the operational pathway can be framed up into a standard ITO (or ITOO) approach. Most of the factors are input factors. Some are process factors. None are output or outcome factors. State data are not quickly available for planning/adjusting response. The most recently available data are from 2002 in most cases, and sometimes older.

There is a growing EMT-D movement, sometimes found in combination with public access semi-automatic defibrillators and Intermediate Life Support (ILS). This has the drawback of providing the appearance of ALS without actually having true paramedics. Both public and EMS service members may believe they have the benefits of ALS while, in fact, they do not. Although ALS is available as a follow-on service in theory, in practice the thin availability and long response times may mean that ALS is first provided by the hospital emergency room – an ironic throwback to the old days before ALS was available at all.
There is an inconsistent approach to organized first responder services. Police involvement as organized first responders is highly variable from county to county and from day to day. The involvement of industry as organized first responders to the workplace is similarly inconsistent. A few industries have model first response teams, yet this seems to be the exception, rather than the norm.

Robey (1986) established that a team-based structure should have a mixture of complementary skills and knowledge in order to be most effective at achieving the policy goals intended. A review of the EMS Council membership lists show that the Councils remain completely dominated by EMS providers, not the public or professional managers. Far from constituting a mixture of complementary skills and knowledge, this means that the EMS councils are comprised largely of individuals with duplicate and repetitive same knowledge and skill bases – hardly a team based structure. EMS service provision is controlled by the providers, not the public or the state, both at the local and the regional EMS council level. This fact, in conjunction with the cumbersome determination of need process for new services, virtually ensures an absence of meaningful competition in the field.

The accuracy of patient care, or patient care records (PCR’s) is subject to a review process (QA/QI) by the EMS council, yet this is limited mostly to clinical care, not operational performance or EMS service provision. Although the State Health Department has authority to review such matters, there is only one such representative in the entire Rochester Region who would do it; a practical impossibility given the current
staffing situation. State review is limited to cases brought to its attention by the regional council or program agency staff. Still, this represents an improvement in the clinical situation since 1974.

The study identified six factors of quality that can be arrayed as a process operating within the “input” stage, even though the process may occur unconsciously. They are:

- **Information:** chiefly from outside sources, chiefly national in origin,
- **Knowledge:** general preexisting information that has been sorted by the holder according to values,
- **Values:** previously held and often unchallenged until new information arrives,
- **Opportunity:** an event that allows or spurs a change leading to a
- **Decision:** to act or not act, requiring
- **Resources:** specifically money, training and staff, that provide the ability to move on a decision successfully.

These six factors combine in some fashion and lead to a decision about service level and quality. Knowledge, values and decision (or, more accurately, the internal quality of decisiveness) are internal to the decision-maker and are difficult to influence by outside influences. The others can potentially be influenced by outside groups, trends or information. The surveys showed that information has become available to at least a majority of the EMS services’ officers in the region, and probably more.
The values of the respondents are unknown and not within the scope of this work. Opportunity is sometimes provided by competition, as in the cases cited above, or the potential arrival of a new level of service such as ALS that provokes discussion and decisions.

Resources seem to be there for input. Money is often claimed as a shortcoming, but it always seems to be available for new vehicles and equipment, either by traditional fund raising techniques, or by state grants.

Limitations and Continuing Problems

Good and meaningful data remain scarce. Reporting of this data in ways that are useful to people who could put it to good use is even scarcer and untimely. There is a rather long time lag before data are reported by the State to the EMS services or anyone else. This limits the ability to plan proactively, or enforce accountability. There are few reports on response time, actual EMT coverage (vs. claimed coverage) or BLS /ALS availability and response times. The data that exists is old and hard to get, often protected by the agencies that generate it. There is simply no basis in hard data to determine if the BLS/ALS time constraints discussed in Chapters 1 and 2 are being met on a consistent basis. Similarly, there is no report on overall scene or call times that would allow a researcher to know if the “Golden Hour” for trauma patients is being met.
Conclusions

The basic knowledge of how to operate a quality EMS service seems to be generally present in the region. There is adequate exposure to outside and new information, plus mechanisms for sharing information within the region. Much of this is incremental “institutional knowledge” that builds up over time with an accumulation of standard operating procedures and practices.

What is really missing is an overarching administrative framework that would, among other things, set all this in the I-T-O framework and conduct a systematic review according to a larger strategy. The strategic overview recommended by Joyce (1999), Cohen (2002) or Wilson (1989) simply is not there. Nor is there a coherent organization design of the type recommended by Mintzberg (1983), or containing the characteristics that Perrow (1986), Pfeffer (1981) or Robey (1986) have recommended that would facilitate goal achievement. The progress to date has been mostly on the input. There appears little effort, or at least, results in improving the throughput process or the output of the EMS service and the outcome of the patient. These remain areas for quality improvement.

Boyd (1982) described EMS response as a continuum of response. This study shows that not all points of the continuum are addressed effectively in the Rochester Region. If the technical theory embraced by the State had been effective, and if the EMS council system had been effective, one could reasonably expect to see:
* All ambulance services reaching certification levels at an early date, certainly well before the 1999 legislated mandate.

* All provider schedules covered with an ambulance response 24/7 with a response time that would meet Dr. McIntyre’s AHA ACLS standards.

* A higher percentage of personnel trained to at least the Basic EMT level, with the balance trained to a higher level.

* All primary service areas covered with Advanced Life Support services at the Category 4 full paramedic level, and with responses within the requisite eight-minute time frame.

* All primary service areas covered by formal First Responder programs, consistent with Boyd’s approach to a system (op cit.) and providing service within the requisite four-minute response time.

* A citizen involvement program that mimicked Dr’s Cobb and Eisenberg’s success in Seattle, including system access and citizen-CPR programs.

* A data feedback and analysis system that was timely, and a process of analysis and planning to make good use of it.

* An administrative system that was consistent in size and scope with the geographic realities of the region. That is, the “catchment area” of the Level I trauma centers and their medical equivalents would be consistent with the administrative infrastructure, e.g., the regional EMS councils.

After 30 years, this would be a reasonable expectation.
EMS in the Rochester Region of NY State remains fragmented and locally controlled. These local operations are operationally limited and constitute one large network of marginally regulated monopolies. Some progress has been made since 1974, especially in the area of general personnel training and review of clinical performance. Some EMS providers are receptive to outside training and new information. Operations performance remains unregulated.

The research questions that were examined can now be answered.

EMS service provision in the Rochester Region of New York State does not meet national quality standards on a consistent basis. As described in Chapters 1 and 2, leading researchers and other experts have established standards for service provision and timeliness that are essential for providing meaningful and effective emergency medical care. Specifically, these standards are not met uniformly throughout the entire region, and where provided at all, are often not provided twenty-four hours per day, seven days per week. The quality of the EMS service provider is determined in large part by the most influential officer(s) of the service. The key decisions about quality are largely retained by the organization itself, rather than outside entities, such as the village, town or county governments. Further, there is important suggestion that the internal decision making of the EMS service provider is a multi-step process guided by the officers as a group.
Leading experts in organization design and EMS operations identified important structural and functional characteristics needed for policies and organizations to be effective. These were reviewed in Chapter 2.

The primary reason the region does not meet national standards on a consistent basis is because the State constructed a “system architecture” for EMS in New York that compares poorly to these characteristics referenced above, leaving the State with an ineffective system architecture and organization design to implement its policies. In addition, there is a geographic mismatch between the actual patterns of provider operations on the ground and the administrative infrastructure intended to guide or “coordinate” it. The EMS Council system was a poor choice.

The fact that any progress was made at all was the result of local, pioneering leadership. Progress in quality EMS service provision in the Rochester region was made despite the EMS council system and State policy rather than because of it.

To have any chance of meeting national standards, the region must have:

1) Citizen education and training (citizen access, CPR and first aid),

2) An energetic first responder program, including:
   a) An active and enthusiastic police participation,
   b) Employer participation,
   c) All fire departments participating,
d) Simultaneous dispatch of the above with ambulance dispatch

3) ALS covering all locations, specifying
   a) 24/7 capacity
   b) Second call capacity/capability
   c) automatic dispatch in order to defeat the considerable distances involved.

4) Genuine air medevac capability in all areas with different (read: “all”) providers coordinated in coverage of time and area,

5) Wide-area system status management (particularly county wide) of all elements of EMS: BLS, ALS and helicopter evacuation.

Some of these elements are present in some of the locations in the Region, but not in the entire region. Thus, quality in EMS remains a local phenomenon, not a regional system. One must wonder if the State mandated the improvements of ambulance certification, PAD and ALS, or merely ratified them after the fact?

In fact, one could argue that the primary reason there is any quality of care at all, or consistency in the quality of care, is because of the influence of what Perrow terms “unobtrusive control mechanisms.” The real controlling mechanism operating in the region that accounts for the quality of care provided is the consistent chain of medical
control that originates with the national-level medical standards and training curricula. These are then passed through the local medical directors in the form of medical standards documents and training courses to the individual EMT or paramedic. These local level practitioners (not necessarily department officers) then (usually) behave according to the expectations of these national-level medical standards and training algorithms providing the quality and consistency never provided by administrators at the local level. This single concept explains practitioner behavior much more than the administrative system does.

Future Research

There are some topics that are important to the field of public administration, particularly emergency management, that are beyond the scope of this work and would benefit from further research. These include clinical, operational and somewhat broader administrative policy questions.

There are certain factors concerning clinical quality that are related to this work, but that this work cannot get at. These await further inquiry. These include:

* The clinical effectiveness of ambulance crews once they arrive and care for the patient.

* Output evaluation; is the patient treatment rendered in the prehospital phase consistent with the clinical presentation?
* Patient outcome at the emergency room. What is the survivability of patients treated by the EMS providers, and is it any better than the outcome one would have from random chance?

There are some important operational measures that are key to service quality that could benefit from further research if data were made available. These include:

* The question of unmet need. That is, what number of calls are not handled by BLS or ALS service providers in a timely way, including helicopter service, and what happens to them?

* The dispatch time (the time between the reporting of the incident to the dispatcher and the dispatching of some EMS provider). This was not covered fully in this work, but represents a source of potential delay in critical service delivery.

* The response time of the EMS provider to the patient (the time between the receipt of the call by the EMS provider and the actual arrival of the BLS crew at the side of the patient), including responses for second calls and mutual aid calls handled by a neighboring service. This topic was addressed indirectly, owing to data limitations. However, further research that established and analyzed such data would be immensely useful to quality improvements in the Rochester Region.
* The overall field operation time, including the delivery time of the patient to the hospital (including all of the above, plus the time at the scene, plus transportation time). Further research that established and analyzed such data would be immensely useful in knowing whether or not trauma patients in the Rochester Region receive the benefit of “the Golden Hour.”

* Depth of coverage (the ability of an EMS service to handle more than one call simultaneously).

Some broader and intriguing questions in the public administration domain include the following.

* Although there are standards for patient treatment, and national standards for timely response and overall treatment time, there are no standards for EMS “output.” That is, what actually is the product of EMS providers’ efforts? Is it live bodies delivered to the hospital? Is it treatment at the scene? Or is it simply going through the process to completion? This is not well defined from a public administration standpoint and remains to be evaluated as well.

* Once an output is defined, one finds that there are no standards for outcome. A dead body delivered to the hospital is still delivered to the hospital. There are no standards for what constitutes an acceptable number of live bodies to be delivered to the hospital
* Are there actual and important distinctions between EMS Council regions in terms of system design and program emphasis? If so, what does this say about the existence (or lack of it) of a state-wide policy?

Lastly, one intriguing question that could benefit from further research is what might be called the “standards vs. volunteers curve.” That is, answering the question: “How far can one push the requirements before the volunteers drop away? McDonnell and Elmore (1986) identified four alternative classes of instruments for implementing public policy: mandates, inducements, capacity building and system changing. New York State has used one (mandates) in a very limited way, and a second (inducements) in the form of expenditures for training. The State recently increased the mandates for the EMS services, requiring all ambulance services to become Certified, requiring a Basic EMT on board with the patient. Yet, while it did provide funds to pay for courses, it did not provide for the system changes that would make for full geographic availability of EMT training courses to meet that demand, nor did it undertake the capacity building that would provide volunteer personnel in all areas willing to take the courses. Further, there is no system capacity built to respond if they don’t. One ironic consequence is that, while the standard of care provided to the patient has improved -- once help arrives, the likelihood of help arriving in a timely way seems to have decreased. This is stressing the current EMS “system” or network in ways that have not fully played out, yet seem destined to cause radical system changes as the current network of providers struggles to respond to this challenge. It would be ironic if one class of McDonnell and Elmore’s
policy instruments (mandates) ultimately became the trigger and driving force for the implementation of the other (system building). Only time will tell.

This work has reviewed the EMS situation in New York State and the Rochester Region in particular. It has found that the Region does not meet the standards expected of EMS systems nationally, nor is it even a good example of an effective, functioning organization that accomplishes most of its own goals.

How it could have been different? How could it be different in the future? After considering all that is above, it is possible to make some postulations about how it might have been, or yet could be.

First and foremost, one essential undertaking would be to place responsibility for EMS system development and overall service responsibility at a level of government that has greater authority, resources, power and proximity to the governor than does the current EMS Council system. This could be either within the health department or, as with the State Police, in a separate division of public safety. This would elevate the status of the office significantly in the overall bureaucratic hierarchy. This should be combined with a different administrative structure as described in Chapter Two (e.g. Mintzberg) for improved effectiveness and efficiency.

Second, there must be minimum standards for service providers that include not only input standards (e.g. “Certification”) but EMS service performance standards as
well. To accomplish this would then require ample amounts of State-level resources for capacity development. This way the burden of undertaking this task does not fall unduly on the local level and areas of program need can be addressed.

Adequate feedback and analysis capability must exist within the state-level authority so that the organization will have a method of learning as it implements policy. This would include a state-wide surveillance system (beyond the mere Prehospital Care Report system) linked to an analytical capability that can process the data acquired and produce meaningful reform initiatives.

The next logical approach would be to rebuild the State administrative regions (nee Regional EMS Councils) with a wide-area regional approach rather than a locally-generated approach. That is, develop a series of wide-area geographic service areas that are consistent with actual feeder networks for regional referral centers, especially trauma centers. These would center at least, but perhaps not exclusively, on the six major cities in the state.

Such a new state approach would have to place power (money, technical resources, and legal authority) at the wide-area regional level for system development. This would result in some combination of the current Regional EMS Councils (if preserved) and their program agencies along the broader geographic lines mentioned above. This would lead to a combination of lawful authority and financial and technical resources within the same organization.
Any new approach to this problem should also mandate responsibility for EMS service provision at some level of government higher than the current local EMS service providers, such as at the county level government. This would permit the possibility that other delivery models could be considered. That is, put the responsibility for service delivery onto a level of government that does not currently provide the service so that the status quo is not inherently protected. One important element of that would be to eliminate the current system of protected “primary service areas,” thus re-introducing the element of competition. This should allow a focus on EMS system construction rather than maintaining the status quo or “turf guarding.”

If EMS councils remain, or are replaced by advisory boards, boards of directors or some committee from the community, then there should be a statutorily-required mix of representatives so as to gain the full benefit of the “team effect” mentioned above and to prevent cooptation by the current EMS providers.
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APPENDIX A

GLOSSARY OF TERMS USED IN EMERGENCY MEDICAL SERVICES

ADVANCED EMERGENCY MEDICAL TECHNICIAN (AEMT): An individual trained and certified at one of several levels above that of Basic Emergency Medical Technician. Such a technician usually has license to practice one or more of several advanced level invasive procedures not available to a Basic EMT. See also "EMT-CC" and "EMT-P" below.

ADVANCED LIFE SUPPORT (ALS): A level of pre-hospital care/service characterized by skills and therapeutic prerogatives utilized by AEMT's which include the use of intravenous fluids, phlebotomy, intubation, medication administration, electrocardiography monitoring and interpretation, defibrillation, synchronous cardioversion, and chest decompression.

ADVANCED LIFE SUPPORT TECHNICIAN (ALS TECH): A higher-level Advanced EMT, sometimes called “critical care technician” or "paramedic."

ADVANCED LIFE SUPPORT UNIT (ALS UNIT): A mobile critical care unit, sometimes also called “paramedic unit.”

ADULT: A patient who is at least 13 years old.

AMBULANCE: A motor vehicle, boat, aircraft, or other form of transportation provided for the purpose of transporting sick, disabled or injured persons to and/or from facilities providing hospital services.

ACEPS: The American College of Emergency Physicians. The professional society of physicians who are specifically trained and certified in emergency medicine as a specialty sub-field of medicine. Physicians so certified are often referred to as "board certified." See also; "FACEPS."

BASE: Usually an ambulance station or headquarters where an ambulance vehicle is housed. Usually implies a source of re-supply and relaxation for crew.
BASE STATION: The location of the medical control physician (or designee) and biotelemetry radio used for the receipt of radio reports, EKG's, and issuance of direct medical orders by the physician to the paramedic.


BASIC LIFE SUPPORT: A general term denoting a level of pre-hospital care/service provided by Basic EMT's or lesser trained individuals which is relatively fundamental. It is usually characterized by splinting, bandaging and other wound care, oxygen administration, and similar actions. At its most elementary level, it is often used to describe cardio-pulmonary resuscitation. Invasive procedures (procedures which involve putting something into the body) are distinctly NOT permitted at this level of care. A common misnomer is "first aid."

BIOTELEMETRY: The transmission of a patient's biological data (e.g. heart rhythm and rate) from the scene of the emergency call to the Base Station. This is usually accomplished by radio, but can be accomplished by telephone.

CALL: An EMS event, usually an emergency, which requires the attention of EMS and/or other personnel.

CARDIO-PULMONARY RESUSCITATION--CPR: External, closed-chest heart massage accompanied by artificial ventilations. This was once thought to be effective indefinitely, but is now known to be effective for only a few minutes (app.4-12).

CARDIOVERSION: (see "SYNCHRONOUS CARDIOVERSION" below)

CASE REVIEW (ALSO "CALL REVIEW")': The comprehensive review of selected ambulance calls, usually by the Medical Director or administrator. Such a review is usually conducted for quality assurance and training purposes. See also "Chart Auditing."

CERTIFICATION: Proof of completion of a prescribed course of instruction, issued by the sponsoring educational organization, usually the state health department.

CHART AUDITING: The review of ambulance calls and patient care reports ("charts"), usually conducted by the Medical Director, for the purpose of determining compliance of field personnel with established clinical protocols and operational procedures, or for research.

CHEST DECOMPRESSION: A medical procedure that relieves pressure in the chest cavity (caused either by excess blood or air) by means of inserting a sterile needle (catheter) into the chest, thus allowing a passageway for the excess fluid to escape (also known as "needle thoracentesis"). In this context, it is a procedure reserved to Advanced EMT's.
CHILD: See PEDIATRIC.

CODE (also "MEGACODE"): A very serious emergency call in which the patient is in, or very near, cardio-pulmonary arrest. Distinction is usually made on the basis of "medical" or "surgical," denoting the origin of the problem (medical or trauma cause).

"D.C.": slang for "disconnect, shut down, shut off."

DEFIBRILLATION: A medical procedure which delivers an electrical shock of prescribed intensity to a quivering (fibrillating) heart for the purpose of stopping it completely, (hopefully) allowing the heart's natural pacemaker to restore a normal rhythm. In this context, it is a procedure reserved to Advanced EMT's or, sometimes, lesser-trained individuals using semi-automatic defibrillators.

DEFINITIVE MEDICAL CARE: A level of medical care sometimes provided by hospital emergency rooms which exceeds that normally provided in field by EMS personnel. It sometimes includes all procedures included in Advance Life Support, plus certain additional medical and surgical procedures or treatment modalities.

DELEGATED PRACTICE: The practice of medicine by a licensed credentialed physician via a non-physician para-professional (i.e., physician's assistant, nurse, paramedic). Such practice occurs within previously established limits defining the nature and scope of treatment prerogatives available to the para-professional under specific circumstances.

DISENTANGLEMENT: The disassembly of wreckage or other debris of a collision, building collapse, or other emergency which involves the entrapment of a patient, from the immediate vicinity in such a way as to allow the removal of the patient (extrication) by rescue personnel.

DISPATCH: The sending of EMS or other personnel to the scene of a call.

DISPATCHER: One who dispatches. Also important because this individual becomes the remote controller of operational aspects of a call pending the arrival of an officer to the scene.

DISPATCH TIME: The amount of time necessary to receive a call for help, discern the important information, and send the appropriate assistance. This time block usually ends when the dispatch signal is acknowledged by the personnel responding to the scene.

DISPOSITION TIME: The time interval which begins upon arrival of a patient at the hospital, and lasts until the disposition of the patient from the Emergency Department to the next phase of care, occurs.
EMERGENCY: A usually unforeseen combination of circumstances or the resulting state that calls for immediate action, and in which the passage of time becomes a key predictor to successful outcome. In this context, it usually means a medical or traumatic incident which has an acute onset and which poses an immediate or imminent threat to life or limb.

EMERGENCY MEDICAL SERVICES (EMS): The provision of limited medical care at the scene of an emergency by para-professional technicians. The level of care varies, but is generally defined as between that provided by the lay public ("first aid") and that provided by many hospital emergency rooms ("definitive medical care"). Also known as "PRE-HOSPITAL EMS (PHEMS)."

EMERGENCY MEDICAL SERVICES SYSTEM (EMSS): A consolidated, coordinated program designed to deliver appropriate emergency medical resources to the suddenly ill or injured. Preferably, it is comprehensive in approach, considering all elements, ranging from citizen-recognition of emergencies through post-event rehabilitation.

EMERGENCY MEDICAL TECHNICIAN: Also known as “EMT,” “EMT-A” or “Basic EMT.” A person trained and certified ("licensed") in the knowledge and skills deemed essential ("basic") to the care and treatment of the sick or injured, including especially their care during ambulance operations. Known by the U.S. Dept. of Transportation as "EMT-A." Previously known as “MET,” or Medical Emergency Technician, a forerunner category.

EMT- D: An Emergency Medical Technician who is also specifically trained in the indications for use, and use of, a semi-automatic defibrillator. The training and certification levels are significantly lower than EMT-CC or EMT-P below.

EMT-I or AEMT-I: An intermediate level of EMT that includes the use of advanced airway methods and shock treatment methods such as intravenous fluids or pneumatic counter pressure devices.

EMT-CC or AEMT-CC: An advanced level of EMT that includes use of all basic and intermediate interventions, plus use of EKG and electrical intervention techniques, plus pharmaceutical intervention therapies.

EMT-P or AEMT-P: An advanced level of EMT that includes use of all basic, intermediate and critical care interventions, plus sometimes additional high level techniques such as needle thoracentesis or cricothyroctomies. The specific differences between EMT-CC and EMT-P are usually determined by local protocol and medical control physicians. This level of certification requires significantly more didactic and clinical training that the critical care level.
EXTRICATION: The removal of a patient by rescue personnel from the immediate site of an accident or other emergency in such a way as to allow treatment and/or transportation to the hospital. Disentanglement from wreckage may or may not be a necessary first step to extrication.

FACEPS: Faculty of the American College of Emergency Physicians. Physicians who have completed certain examinations and other qualifying requirements, and have become "board certified," are officially certified as Emergency Physicians.

FIRST AID: A level of training provided by the American National Red Cross and intended for the lay citizen. More generally, the first assistance rendered by anyone at the scene of an emergency.

FIRST RESPONDER: A level of training established by the U.S. Dept. of Transportation which was intended for use by police and fire department personnel who often precede EMS personnel to the scene of an emergency. Not as high a level of training as the Basic EMT. Recently included as a separate level of certification by the N.Y. State Health Department.

FIRST RESPONDER-D: A certified first responder who is also specifically trained in the indications for use, and use of, a semi-automatic defibrillator.

FLYCAR: Jargon for an MCCU that carries an ALS Technician and equipment. It is intended to transport same to the scene of an emergency, but is not intended to transport patients. It may be most any type of vehicle.

GLASGOW COMA SCALE: A numerical rating or "score" which assists EMS and hospital personnel in characterizing a patient's state of consciousness (or lack of consciousness). It is based on such factors as eye opening, verbal response, and motor response (of the patient's limbs), and is indicative of a patient's relative neurological state. It ranges from a low of "3" to a high of "15," with "15" being the best possible score. This summary score is also used as one of the contributing factors in determining an overall trauma score, in cases of trauma. (see "TRAUMA SCORE" below).

GOOD SAMARITAN: A lay-person who renders assistance at the scene of an emergency, usually without the expectation of monetary compensation.

ILS - Intermediate Life Support: A level of medical treatment used by AEMT-Intermediate certified personnel that includes all basic life support interventions, plus respiratory management and anti-shock measures, such as intravenous therapy.

IN SERVICE: An operational status designator meaning the EMS equipment and personnel are completely free from any previous call or other obligation and are available for dispatching to another call. Not to be confused with "In-service training."
IN-SERVICE TRAINING: A phrase used to denote training classes provided to personnel which is usually in-house and informal, but which may include certification courses. Not usually used in conjunction with license-related courses. No connection with the operational designator used above.

INTERN: In the pre-hospital phase: An EMT or AEMT who has completed his/her certifying course, but has not been approved for independent practice according to local regulations. Usually used in the context of Advanced Life Support personnel (AEMT-CC or P).

In the hospital phase: A new physician who has completed his formal class requirements, but is completing his training in a hospital setting under the supervision of experienced physicians and faculty members prior to "release" into independent practice as a licensed physician.

INTUBATION: The medical procedure of inserting an endotracheal tube through the mouth and throat into the breathing passage (trachea), holding it in place with an inflatable cuff. This is done for the purpose of guaranteeing a functioning airway in a (usually unconscious) patient either during an emergency, or often during surgery (either routine or emergency). In this context, it is a procedure reserved for Advanced EMT's. It is sometimes also used to describe the insertion of other breathing tubes or devices.

INVASIVE PROCEDURES: Medical procedures which require the "invasion" of the body in the form of fluids, objects, or energy, such as intravenous fluids, endotracheal tubes, needles, or defibrillation. In this context, these procedures are reserved to the Advanced EMT.

"ISS"--INJURY SEVERITY SCORE: A quantification of injury by means of a pre-determined checklist of injuries and patient status characteristics.


LICENSE: Authority to practice issued by a state or subdivision or other governmental body.

MASS CASUALTY INCIDENT (also, MULTIPLE CASUALTY INCIDENT, MCI): An emergency event that involves more patients than the local ambulance service (or EMS service) is normally capable of handling. An event that "overwhelms" the local system under normal circumstances. The significance is that a declaration of an "MCI" is intended to activate a previously planned response pattern that is different in nature and scale than normal, and draws upon substantial auxilliary resources.

MEDICAL CONTROL: The general oversight conducted by a physician (usually the Medical Director) of the EMS service and clinical care rendered by personnel. Includes direct orders, usually given over the bio-telemetry radio, standing orders prepared in advance for anticipated events, medical training of personnel, and review of calls for compliance with prescribed standards of care.
MEDICAL DIRECTOR: The single physician who is responsible for exercising medical control, and under whose licensed authority all medical treatment, especially advanced life support care, is rendered.

MEDICAL STANDARDS: The predetermined, prescribed/proscribed treatments and expectations for EMS personnel, usually by the Medical Director, and usually in written form. This is called a medical standards document or, sometimes, protocol document.

MOBILE CRITICAL CARE UNIT (MCCU): A vehicle that carries the Advanced Life Support equipment, supplies and technician to the scene of an emergency. This may be an ambulance or other type of vehicle, and may or may not be capable of patient transport.

NEONATE, NEONATAL: A patient who is one month old or younger.

NON-TIERED RESPONSE: A response system using the delivery to the scene of singly-capable EMS units vs. the sequential response of specialized units which have progressively expanded levels of capability (see "tiered response"). Units are not differentiated by level of training. No particular hierarchy for arrival exists.

OUT OF SERVICE: An operational designator used to denote the non-availability of equipment or personnel for dispatching to calls. Equipment or personnel may be "out of service" for one of many reasons, e.g. maintenance, breakdown, or are already responding to or currently working a call, or are cleaning up and restocking after a call

OVERALL CALL TIME: The total elapsed time of a call beginning at the time of receipt of a message to the time the responding unit calls "back in service."

PARAMEDIC: An individual trained and certified ("licensed") at the highest level of Advanced Emergency Medical Technology--an Advanced EMT-Paramedic. Known by the U.S. Dept of Transportation as "EMT-P."

PEDIATRIC: A patient who is 12 years or younger, including neonates.

PHLEBOTOMY: The skill of drawing blood from patients by venipuncture for the purpose of laboratory analysis. In this context, it is a procedure reserved to Advanced EMT's.

PROTOCOL: A standard written procedure for assessment, triage, treatment, or transfer of specified emergency medical cases. A protocol presents a standardized approach to specific medical problems that can be learned in training courses and applied when circumstances warrant. Protocols authorize performance of some skills
independent of specific medical direction. However, medical direction is still necessary for the performance of certain other restricted procedures.

**PRECEPTOR:** An experienced EMT, AEMT or other medical professional (i.e., nurse or physician) who acts as a tutor or trainer in a clinical or field setting. This is customarily used in the context of an AEMT intern who has completed his/her certifying course and is undergoing field orientation prior to being allowed to practice independently.

**RESPONSE:** The act of sending-going to the scene of a call with some kind of personnel and equipment believed to be appropriate for the nature of the call.

**RESPONSE TIME:** The amount of time that elapses from the time of dispatch to the time of arrival at the scene.

**RIG:** Industry jargon for an EMS vehicle, usually, though not always, an ambulance. Its use implies an official vehicle that carries EMS supplies, equipment and/or personnel.

**RIG CHECK:** The inspection of a "rig" or vehicle, usually at the time of shift change, and its contents for the purpose of determining that all items and capabilities are present and in proper working order. Implied also is the written recording of this inspection.

**SCENE TIME:** The amount of time which elapses at the scene of a call, measured from the time of arrival to the time of departure to the hospital, or "back in service" call, in the event that no patient is transported.

**STANDING ORDER:** A written order or instruction by a physician which stipulates certain therapeutic modalities to be employed by others (usually non-physicians) in specified circumstances, and which ipso-facto authorizes same to be employed as though the physician were present.

**STATION:** 1) base, 2) a place such as a crossroads or parking lot where a vehicle (i.e. ambulance) is supposed to be at a certain time for a specific purpose, (as in "duty station.")

**SYNCHRONOUS CARDIOVERSION** (also SYNCHRONIZED CARDIOVERSION): The delivery of an electrical shock of prescribed intensity to a patient's heart at a precisely timed moment. The exact timing of the shock delivery corresponds with (is synchronized with) a desired point in the patient's heart rhythm. This is determined by monitoring the electrocardiogram (EKG). In this context, it is a procedure reserved to Advanced EMT's.

**TIERED RESPONSE:** An EMS response system that uses multiple pieces of equipment (vehicles) and units of personnel of differing levels of training and capability.
Theoretically, the arrival of personnel will be sequential and hierarchical by level of training and capability, from lowest to highest; their dispatch based on the anticipated severity of the event.

TRAFFIC: 1) vehicles, 2) radio communications, usually between third and fourth parties.

TRAUMA: A form of injury sustained by patients that is usually very severe in nature. It is usually classified into two groups; "blunt," such as caused by a fall or being struck by an object, and "penetrating," such as caused by a knife or bullet. Particularly serious cases are often called "major trauma," or, if more than one human system is involved; "multi-systems trauma."

TRAUMA CENTER: A specialized medical facility, usually part of a major hospital, which receives, diagnoses, and treats, major trauma victims with specialized and highly sophisticated equipment and highly trained personnel. Trauma centers are classified by the American College of Surgeons as either "Level One, Two, or Three" trauma centers, depending on the resources available and the seriousness of injuries they are prepared to treat. Level One is a higher level of service and readiness than Level Two. Similarly, Level Two is higher than Three.

TRAUMA SCORE: A numerical rating, or "score" which can be assigned to patients by EMS or hospital personnel in order to assist in the characterization of injury due to trauma. The score is based on factors such as respiratory rate, expansion, blood pressure, and so on. It ranges from a low of "1" to a possible high of "16" points, with "16" being the best possible score.

TRAVEL TIME: The amount of time which elapses between either time of acknowledging a call (not necessarily the same as dispatch time) and arrival at the scene of a call, or between time of departing a scene and arriving at the destination hospital.

WARNING DEVICES: Those items employed by emergency equipment and personnel to warn the public of the impending passage of emergency equipment enroute to an emergency call. Intended to signal the need for assuming the right of way while traveling to the call. Common warning devices include flashing lights, sirens, horns, whistles, electronic devices and sometimes bells.

WORKUP: Industry jargon for the act of assessing, treating, and otherwise paying attention to a patient, usually, though not always, including transportation to the hospital. Can be used either as a noun or a verb; i.e., a patient workup, or, to workup a patient.
APPENDIX B

HUMAN SUBJECTS / APPROVAL

July 16, 2004

Kenan Baldridge
10393 Maple Ave,
North Rose, New York 14516

Mr. Baldridge:

The University of Akron’s Institutional Review Board for the Protection of Human Subjects (IRB) completed a review of the protocol entitled “Determinants of Quality In Emergency Medical Services In the Rochester Region of New York, State”. The IRB application number assigned to this project is 20040606.

The protocol qualified for Expedited Review and was approved on July 14, 2004. The protocol represented minimal risk to subjects. Additionally, the protocol matched the following federal category for expedited review:

Research on Individual or group characteristics or behavior or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies

This approval is valid until July 14, 2005 or until modifications are proposed to the project protocol, whichever may occur first. In either instance, an Application for Continuing Review must be completed and submitted to the IRB.

Enclosed are the informed consent documents, which the IRB has approved for your use in this research. Copies of these documents are to be submitted with any application for continuation of this project.

Please note that within one month of the expiration date of this approval, the IRB will forward an annual review reminder notice to you by email, as a courtesy. Nevertheless, please note that it is your responsibility as principal investigator to remember the renewal date of your protocol’s review. If your project is funded, failure to comply with IRB requirements could jeopardize your continued funding.

Please retain this letter for your files. If the research is being conducted for a master’s thesis or doctoral dissertation, you must file a copy of this letter with the thesis or dissertation.

Sincerely,

[Signature]
Sharon McWhorter, Associate Director

Cc: Raymond Cox, Department Chair

The University of Akron is an Equal Education and Employment Institution
DEPARTMENT OF PUBLIC ADMINISTRATION
UNIVERSITY AT AKRON
AKRON, OHIO

August 2004

Dear Chief or Director:

I am writing to ask your help with some research we are conducting in Emergency Medical Services. This research is being conducted as part of a doctoral dissertation at the University of Akron and the purpose is to help identify the factors that lead to quality in EMS service provision. The information you provide will be compiled with dozens of other responses in order to help us better understand the factors that determine quality in EMS, thereby fostering continuous improvement in EMS service provision.

Please complete and return the survey in the enclosed postage paid envelope. It should take you about five minutes to complete the survey. If you wish, add any notes or comments that you think may be relevant.

You do not need to sign this survey or identify yourself in any way. The results of this survey will be used without attributing any particular response to any specific individual or service. All responses will be kept anonymous. All data obtained from this survey will be used in aggregate form only. This research has been approved by the Institutional Review Board for the Protection of Human Research Participants at the University of Akron. Questions about your rights as a research participant can be directed to Ms. Sharon McWhorter, Associate Director, Research Services at 1-330-972-7666 or 1-888-232-8790.

Please note that by returning this survey, you give your voluntary permission to participate in this study. Completing and returning the survey is all you need to do. You are free to withdraw from the survey simply by not returning it. Questions regarding the research may be directed to Ms. Theresa Naska at the address below. Thank you for your participation!

Kenan Baldridge

Please return the completed survey in the enclosed envelope to:

Ms. Theresa Naska
Department of Public Administration and Urban Studies
The Polsky Building 265
Buchtel College of Arts and Sciences
University at Akron
Akron, Ohio 44325 – 7904
330-972-7618

APPROVED
JUL 14 2004
INSTITUTIONAL REVIEW BOARD
THE UNIVERSITY OF AKRON
DEPARTMENT OF PUBLIC ADMINISTRATION
UNIVERSITY AT AKRON
AKRON, OHIO

Dear Chief or Director: August 2004

This is just a quick reminder of the survey we sent you a short while ago. I am asking your help with some research we are conducting in Emergency Medical Services. This research is being conducted as part of a doctoral dissertation at the University of Akron and the purpose is to help identify the factors that lead to quality in EMS service provision. The information you provide will be compiled with dozens of other responses in order to help us better understand the factors that determine quality in EMS, thereby fostering continuous improvement in EMS service provision.

If you haven’t already, please complete and return the survey in the enclosed postage paid envelope. It should take you about five minutes to complete the survey. If you wish, add any notes or comments that you think may be relevant.

You do not need to sign this survey or identify yourself in any way. The results of this survey will be used without attributing any particular response to any specific individual or service. All responses will be kept anonymous. All data obtained from this survey will be used in aggregate form only. This research has been approved by the Institutional Review Board for the Protection of Human Research Participants at the University of Akron. Questions about your rights as a research participant can be directed to Ms. Sharon McWhorter, Associate Director, Research Services at 1-330-972-7666 or 1-888-232-8790.

Please note that by returning this survey, you give your voluntary permission to participate in this study. Completing and returning the survey is all you need to do. You are free to withdraw from the survey simply by not returning it. Questions regarding the research may be directed to Ms. Theresa Naska at the address below. Thank you very much for your participation!

Kenan Baldridge

Please return the completed survey in the enclosed envelope to:

Ms. Theresa Naska
Department of Public Administration and Urban Studies
The Polsky Building 265
Buchtel College of Arts and Sciences
University at Akron
Akron, Ohio 44325-7904
330-972-7618

APPROVED
JUL 14 2004
INSTITUTIONAL REVIEW BOARD
THE UNIVERSITY OF AKRON
October 31, 2005

Kenan S. Baldridge
10393 Maple Ave.
North Rose, New York 14516

Mr. Baldridge:

The University of Akron’s Institutional Review Board for the Protection of Human Subjects (IRB) completed a review of the protocol entitled “Emergency Medical Services in the Rochester Region of New York State: Quality and Service Delivery.” The IRB application number assigned to this project is 20051013.

The protocol was reviewed on October 31, 2005 and qualified for exemption from continuing IRB review. The protocol represents minimal risk to subjects and matches the following federal category for exemption:

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior, unless: (i) Information is recorded in such a manner that subjects can be identified, directly or through identifiers linked to subjects; AND (ii) any disclosure of responses outside the research could reasonably place the subjects at risk of civil or criminal liability or be damaging to subjects’ financial standing, employability or reputation.

Your request for waiver or alteration of informed consent, as permitted under 45 CFR 46.116(d), is also approved.

Annual continuation applications are not required for exempt projects. If you make any changes or modifications to the study’s design or procedures that either increase the risk to subjects or include activities that do not fall within one of the categories exempted from the regulations, please contact the IRB first, to discuss whether or not a request for change must be submitted. Any such changes or modifications must be reviewed and approved by the IRB prior to their implementation.

Please retain this letter for your files. If the research is being conducted for a master’s thesis or doctoral dissertation, the student must file a copy of this letter with the thesis or dissertation.

Sincerely,

Sharon McWhorter
Associate Director

Cc: Department Chair
Phil Allen, IRB Chair
APPENDIX C

EMS SURVEY FORM AND RESPONSES

..Following is the two-page form used to survey the EMS Providers in the Rochester Region. Provider responses are included in the appropriate places on the form. Results were aggregated for all providers. No distinction is made here by EMS Service Provider type. Analysis is provided in the body of the work above.
UNIVERSITY OF AKRON
Department of Public Administration and Urban Studies

EMS AGENCY SURVEY RESULTS
SUMMARY SHEET OF ALL RESPONSES, ALL TYPES OF SERVICES, BOTH MAILINGS (as of 11/2004)

| Total Responses: 41 FR, 44 ambulance, 5 ALS only; 5 not identified = 60 (100%) |
|FIRST RESPONDER (only) | AMBULANCE TRANSPORTATION | ALS PROVIDER (only) | VEHICLE & BUILDING RESCUE |

<table>
<thead>
<tr>
<th>What level of care does your service provide directly?</th>
<th>How many eight hour shifts per week is this level provided?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Life Support (only)</td>
<td>15</td>
</tr>
<tr>
<td>EMT-B</td>
<td>23</td>
</tr>
<tr>
<td>Basic EMT</td>
<td>12</td>
</tr>
<tr>
<td>Intermediate Life Support</td>
<td>10</td>
</tr>
<tr>
<td>Advanced Life Support</td>
<td>18</td>
</tr>
<tr>
<td>No Response</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>93</td>
<td>93</td>
</tr>
</tbody>
</table>

What quality standards does your service officially meet?

| N.Y.S. Dept of Health First Responder Registration | 20 | Certified First Responder: 49 | Certified EMT: 57 |
| U.S. Dept of Transportation HRK standards | 14 | Basic EMT: 27 | Grand Total: |
| OTHER (please specify) | 5 EMT-Inter: 75 | 123 |
| No Response or "none" | 5 Intermediate EMT: 37 | 34 |
| Advanced EMT Category 3 | 33 Advanced EMT Category 4 | 33 Advanced EMT Category 4 | 33 109 |
| No response: | 1 |

How Do You Learn of New Information in EMS? (please check all that apply)

<table>
<thead>
<tr>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>310</td>
<td>312</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Responses Personnel</th>
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</thead>
<tbody>
<tr>
<td>F.A.S.N.Y. information network</td>
</tr>
<tr>
<td>Regional EMS Council</td>
</tr>
<tr>
<td>County Fire Coordinator</td>
</tr>
<tr>
<td>Attend state or regional conferences:</td>
</tr>
<tr>
<td>Subscription to:</td>
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<tr>
<td>Internet:</td>
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<tr>
<td>General News Media:</td>
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<tr>
<td>No response:</td>
</tr>
</tbody>
</table>

How was the type of service chosen? (By a vote of the general membership)

<table>
<thead>
<tr>
<th>Total</th>
<th>Total</th>
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<tbody>
<tr>
<td>42</td>
<td>112</td>
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</table>

<table>
<thead>
<tr>
<th>First responders, ambulance or rescue service?</th>
</tr>
</thead>
<tbody>
<tr>
<td>decision of commissioner/board of directors: 29</td>
</tr>
<tr>
<td>decision of chief(s) or ranking officers: 12</td>
</tr>
<tr>
<td>decision of EMS officer: 4</td>
</tr>
<tr>
<td>decision of outside authority (town board, council, etc): 20</td>
</tr>
<tr>
<td>no response:</td>
</tr>
<tr>
<td>Question</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>How was the service level chosen?</td>
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<tr>
<td>(that is, who decided that you would provide basic, intermediate or advanced level care?)</td>
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<tr>
<td>For the level of standards you meet, how was this level chosen?</td>
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<tr>
<td>(who decided?)</td>
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*Your position in the department (chief, board member, EMS officer or captain, etc.): ____________________________*

THANK YOU VERY MUCH for completing and returning this survey!
Your responses will help with research in the field of emergency medical services.

Please return the completed survey by August 21, 2004 to:
Ms. Theresa Natske
Department of Public Administration and Urban Studies
The Folsky Building 255
University of Akron
 Akron, Ohio 44325-7004