January 19, 1999

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To Whom It May Concern:

The thesis accompanying this letter is the result of six months research into the provision of pre-hospital care services for the province of Ontario. The document is timely for a number of reasons.

With the "downloading" of these services to the UTM (Upper Tier Municipalities), a number of players have become interested in becoming involved in the provision of EMS in the province.

There are a number of models worldwide, but the two key players at this point appear to be the Fire Service and the Private Corporations led by Rural Metro and Laidlaw/CMR. This paper explores the evidence for/against either of these two service providers, and, instead suggests a very workable, efficient, public model which would serve both the patients and the officers, and fit in well with the province wide, integrated system we have been developing for the past twenty years.

It has been produced without assistance or grant from any funding agency and represents my own interest in this field and my belief that the next two years will affect the provision of this service for the next twenty. Should our decisions not be the proper ones, they may be prove to be costly ones.

Should you have any comments or concerns which this paper has not addressed, feel free to contact me at either my home address, or at my E-mail at; jmcnara@mid.igs.net

I have made a number of copies of this document available to a list of persons, both with the Fire Service, the Ambulance Service and with the Ministry of Health. Feel free, however, to copy and pass it along as you see fit.

I trust that you will find it of some use.

Sincerely,

Dr. M. McNamara MD CCFP

INTRODUCTION

The ongoing rhetoric surrounding the issue of what model should be chosen as the "best" service provider of pre-hospital care in North America, and particularly in Ontario, has been escalating for the past twenty years. The advent of this dispute originated approximately the same time as the inception of the now famous "Emergency" TV show. The various proponents and opponents have all attempted to present their cases in a manner which highlights the strengths and downplays the weaknesses of their respective paradigms.

The Fire service, with its established infrastructure, public relations strength and public image, view themselves as the "logical" choice, forgetting that theirs is a relatively new and almost purely American model which has few parallels in other countries. The Private providers, with their record of "doing more with less" and their "economies of scale" profess to have the most attractive economic model for the public, all the while downplaying the fact that their main objective is profit. The public service model adopted by the Ontario government has the advantage of being a "province wide seamless system" but clearly has a poor track record in the treatment of its employees and of the service in general.

Recent government policies have presented each of these providers with an opportunity of moving to the forefront in the Ontario playing field. Each are currently maneuvering and lobbying in an attempt to make theirs the dominant model for the years to come. At stake are not only the future of the various shareholders, but also the potential cost to the public of making a "poor" choice, based on the aforementioned rhetoric.

The arguments for the fire service participation originate in the US within a system vastly different than that found in Ontario. Their arguments are heard time and again in the US, documented in the pre-hospital care medical literature and in Fire Journals repeatedly by a fire service leadership who have a clear view of what the current wave of downstaffing and budget cutting holds for the fire service.

The private and corporate service providers, although less fortunate in terms of public access and public relations, are likewise making their viewpoints known. To these, as to their fire service counterparts, the EMS system is the road to salvation, through expansion, profit taking and escalating call volume.

A number of "studies" and consultants reports, (which I will review in this paper) have, over the years, studied the Ontario system and suggested a variety of options which would benefit the public. It is interesting to note that none of these Canadian consultants has ever suggested either a completely private or a fire based model as the "best" system to adopt.

This thesis attempts to shed some "objective" light on the arguments presented by these various players, by approaching them using established "evidenced based" criteria, criteria which is widely accepted in the medical literature.

It begins by reviewing the histories and development of both the ambulance service and the Fire department, in both Ontario and the US. The various similarities and differences are examined and the literature is reviewed for evidence of a "best" model, whether public (state or province run), private, corporate, or fire based. It is only through reviewing the past mistakes and successes that a more efficient and useful model will evolve.

Since much of what the fire service offers is directly dependent on their current, existing staffing patterns. These, in turn, are directly dependent on the call volume, both past numbers and the "estimated" future numbers. It is very important to understand what these patterns depend upon, and to attempt to forecast how these variables will change with time, directly affecting staffing levels.

This thesis therefore reviews the fire department literature and examines it in order to determine the evidence for the following: staffing of stations within cities as well as staffing at fire scenes; the evidence for the four minute "industry standard" response time adhered to by the fire department; the evidence for/against pre-hospital care interventions and the fire services role in these. In other words, how would fire department staffing patterns and station locations look if EMS were removed from the picture? The impact of prevention has been profound with regards to fire mortality in Ontario. What impact will this have on staffing? Changes to existing fire legislation in Ontario appear to be leading the service in directions not envisioned by its founders. Fire suppression is taking a back seat to education, prevention, safety and planning. If this continues, how will this impact on fire department manpower and vehicle placement? These are all questions that this paper will consider in its appraisal of the fire department as a "logical" choice for the provision of EMS services.

The thesis continues with a look at other models worldwide and how our current system compares. I will further comment on a possible direction for Emergency Services within our province and the potential savings and benefits to the taxpayers with specific systems.

I hope that it will prove enlightening to many and act to "quiet" the rhetoric which seems to have developed a "life" of its own through the sheer dint of having been repeated so many times. Both fire service supporters and ambulance supporters here in Ontario must be aware of just how little evidence exists to support the practices in pre-hospital care as well as in the provision of that care.

When "objectively" reading this thesis, keep in mind the following:

"When, at some future date, the high court of history sits in judgment on each one of us recording whether, in our brief span of service we fulfilled our responsibilities to the state, our success or failure in whatever office we may hold will be measured by the answers to four questions:

First, were we truly men/women of courage-with the courage to stand up to one's enemies and the courage to stand up, when necessary, to one's own associates?

Second, were we truly men/women of judgment of the future as well as the past-of our mistakes as well as the past-our own mistakes as well as the mistakes of other-with enough wisdom to know what we did not know, and enough candor to admit it?

Third, were we truly men/women of integrity? Men/women who never ran out on either the principles in which they believe or the people who believed in them?

Finally, were we truly men/women of dedication, devoted to servicing the public good?" (John F. Kennedy, 1962)

These words by JFK should serve as a reminder to us that both EMS and the fire service exist to **serve** the public, and not the needs of either service. If we, as policy makers and leaders of EMS, are to make decisions which will impact on the system for the next decade and for the better of the public, we must ensure that these are made rationally and **properly**, not **politically.**

PREAMBLE

FIRE DEPARTMENT HISTORY AND DEVELOPMENT

The development and evolution of the fire departments on the North American continent has been well documented in a number of historical fire texts. Baird and Green-Hughes provide two of the more definitive works in this field.

The fire service, which began as a "volunteer bucket brigade", designed to respond to local needs in emergencies has evolved into a well run, mechanized, paramilitary organization with well defined objectives, operating within their circumscribed, **municipal** boundaries. The military "flavor" is thought to have evolved due to influences of the World Wars, when military trained firefighters returned and sought out jobs in expanding communities. The influence of their training is seen in the organization to this day.

The service has seen a great many changes and advances in the past hundred years, including the expansion of its scope of practice to include prevention, inspection, building design and safety, all the while improving its basic fire suppression capabilities.

Its most notable accomplishment is undoubtedly its public relations and public prevention programs. Through its **funded** programs of prevention, the Fire Service has managed to decrease mortality and property losses from fires by a significant amount over the past twenty years. They have developed a model to be admired and imitated in this field. The Fire Service Associations have become a powerful lobby force for the officers through their model of public relations and presentations. They are consummate spokespersons for their service and its record. As I will demonstrate in this thesis, the fire service has been able to aptly utilize this public image to further the aims and objectives of their service.

While the fire service has been involved in rescue in a somewhat haphazard fashion in Canada, its primary reason for being has been and continues to be the protection of property. It has had, particularly in Ontario, close links with the business community and the Insurance providers.

Both Baird[1] and Green Hughes[2] are quite clear on this point in their books on

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[1] **"The Story of Firefighting in Canada"; by Donal M. Baird; Boston Mills Press, 1986.**

[2] **"A History of Firefighting"; by E. Green-Hughes; Moorland Publishing; 1979.**

the history of fire depts. They trace a clear, distinct link between fire departments and insurance companies whom, between the 18th and 19th centuries, commonly "donated" material and equipment in a direct attempt at reducing property loss. Baird makes note of the fact that:

"insurance companies were involved in fire protection...whether it was by donating equipment or by exhorting the local authorities to improve their protective measures."

Today, the Office of the Fire Marshal and the various fire department organizations heavily influence the standards for building safety and fire department station location and staffing. Ontario city Fire Services are regularly assessed as to their respective risk levels by insurance representatives who allocate specific designations to these cities. The "level" of risk is reflected in the insurance premiums to businesses and homes.

The fire department associations are also involved to a significant degree in lobbying for fire service recognition and a larger piece of the budget pies.

One example of the lobbying efforts originating within the fire department membership is represented by the 1996 document by the Toronto Fire Fighters Association President who suggested that the fire dept. could assume the ambulance services' duties at an additional cost of 400,000 dollars[3]. This document, entitled:

"Fire Based Emergency Medical Services: The Philosophy, Capabilities and Effectiveness"

was made available to a large number of local councilors in a self-serving attempt at fire department service enhancement.

In spite of their close ties to business and insurance, the fire fighters themselves have always managed to maintain an "altruistic" community philosophy and to this day remain busy with numerous charities and public functions. They continue to be admired as respected professionals by the majority of society. There are a large number of charities which have benefited from fire department involvement, including cystic fibrosis, muscular dystrophy and a number of burn units. Without their support, many of these organizations would be "strapped" for working capital. While laudable, this function is still not one which should be funded by taxpayers. It has been encouraged in its development by the nature of the work the officers do, the time and opportunity available to them to pursue these interests, the fact that the service itself "budgets" for public education, public relations and

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[3] **"Fire Based Emergency Medical Service: The Philosophy, Capabilities and Effectiveness"; by Mr. Mark Fitzsimmons President Toronto Fire Fighters Association and Mike Figliola, EMS Specialist. 1996.**

prevention. With the exception of the altruistic philosophy, similar opportunities are lacking in pre-hospital care. In spite of the obvious lack of funding for public education and prevention, it is interesting to note that the ambulance officers themselves are also involved in similar endeavors, albeit on a strictly volunteer basis, in raising funds for charitable events such as "Tender Wishes".

Due to the development, in the late 1960s, of an organized, province wide basic ambulance system, the Ontario fire depts. never had the opportunity to develop along the lines of their US counterparts. EMS in Canada has never, (until recently) held the Ontario fire departments fascination like it has in the US.

In the US, a variety of factors coalesced in the 1970's and 80's, which provided the opportunity for the U.S. fire service to organize and move into EMS.

The US movement can be traced to the inception and production of a (now) well known EMS show called "EMERGENCY", featuring Johnny Gage and Roy DeSoto, the two "grandfathers" of the television EMS movement. The impact that these two provided in terms of public expectations and perceptions has been integral to the development of Fire based EMS in the US. The models that followed were as a result of this public pressure for an improvement to the current standard of care, the "private" EMS "scoop and run" approach of the day. The movement had its peak in the early 1980's.

US regulations governing the provision of EMS have been greatly influenced by the fire lobby group. Legislation was also heavily influenced by the fact that traditional private providers were often at loggerheads in a "market economy" fighting it out for every fare. The fact that most "private" EMS providers only collected on 60% of their billings cut the profit line to such a degree that a sub-standard level of care was the inevitable result. Shrinking profits resulted in cuts or elimination of ongoing education, training and equipment for the officers employed by these private entrepreneurs. The obvious result, in a dynamic field such as emergency medicine, was a deteriorating level of care, obvious even to the untrained public. Public concern and complaints led to legislative changes which, in turn, favored the fire groups. The fire departments of the US were quick to seize the opportunity to successfully move to fill this gap, with their version of a "standardized" non-profit driven product.

This trend continued until the involvement of the large corporations of the 1990's, including Rural Metro and AMR/Laidlaw. Once these new "privates" got their act together, it quickly became obvious that fire department EMS was not the bargain touted by the Fire department experts. Recently, we have seen resurgence in the "private" and "corporate" models in the US. While there are many unresolved questions about the appropriateness of these models for the Canadian health care system, they will not be explored in any depth in this thesis, as there is a paucity of information about them in the medical/ems databases. The question of the

appropriateness of a profit driven agency providing health care for Ontarians is one which must wait another day.

A recent 1990 review[4] revealed that fire based EMS made up only 36% of all US EMS service delivery.

Fire service authors are fond of reiterating that the fire based ems system is the "most efficient, cost effective" system in the world. While this statement has never been validated by any studies, the number of times this comment is repeated would suggest to the uneducated reader that fire based ems is one standardized product. Nothing could be further from the truth.

In 1980, the ACT foundation (Advanced Coronary Treatment) identified 26 distinct fire service EMS profiles in a research project completed for the US Fire Administration[5] and entitled "Fire Service EMS Program management Guide". This study reported that fire/ems in the US was present in 26 different models with 52 different permutations. Today, twenty years later, these models have each been further refined and modified so as to be barely recognizable from their origins. The Seattle system bears little resemblance to Pheonix, which little resembles San Diego, etc. The study, completed in 1982, further reported that Fire Departments delivered 80% of US EMS.[6] A follow up study done in 1989 revealed that this had shrunken back to approximately 41%. **A second, more current 1992 pre-hospital care study[7] revealed that only 36% of all ALS was being performed by fire based EMS.** This, however, may soon change, as the fire department's lobby group mobilizes for change.

In 1991, the IAFC and the IAFF produced a joint resolution which listed the fire service's main objectives for the next decade. (see statement above)

This joint" statement, concerning pre-hospital **medical** care, was issued

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[4] **"A Survey of Advanced Life Support Practices in the United States; Lavery, Robert F. et.al. Pre-Hospital and Disaster Medicine, Vol. 7 No. 2, April-June, 1992.**

[5] **"Profiles: Defining Fire Service EMS"; by Bradley H. Smith. JEMS, June, 1984.**

[6] **Born of Necessity and Thriving: A survey of Fire Service Involvement in Emergency Medical Services: by Mary Newman, JEMS Almanac, January, 1982.**

[7] **"A Survey of Advanced Life Support Practices in the United States; Lavery, Robert F. et.al. Pre-Hospital and Disaster Medicine, Vol. 7 No. 2, April-June, 1992.**

THE INTERNATIONAL ASSOCIATION OF FIRE CHIEFS
and
THE INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS

JOINT RESOLUTION
on
EMERGENCY MEDICAL SERVICES

WHEREAS, Pre-hospital emergency medical care is a major service provided by America's fire service, and;

WHEREAS, As first responders to most emergency situations, it is imperative that the fire service continue to provide pre-hospital medical care; and;

WHEREAS, The fire service has been hampered by a lack of public recognition and support for its vital role in providing emergency medical care;

THEREFORE BE IT RESOLVED, That the leadership of the International Association of Fire Fighters and the International Association of Fire Chiefs agrees that America's fire service must continue to provide pre-hospital emergency medical care; and

BE IT FURTHER RESOLVED, That International Association of Fire Fighters and the International Association of Fire Chiefs urge all elected officials, professional associations and health care providers to recognize and support the provision of emergency medical care by the fire service.

Adopted by

Chief W.D. Hilton, President
International Association
of Fire Chiefs

Alfred K. Whitehead, President
International Association
of Fire Fighters

January 9, 1991
Washington, DC

unilaterally by two independent yet co-joined fire service parties, without input by physicians, "other" EMS providers or allied health care professionals. It is an excellent example of the arrogance typified by the Fire Service leadership in the US. No input was solicited from any of these other crucial health care providers.

Viewed retrospectively, it seems that this earlier 1970-80 movement into EMS was an unstoppable wave, yet it is important to note that the movement did still have a number of cautious detractors and critics, with good reason, from the very beginning.

As early as 1974, Dr. Carl Irwin, a respected fire department physician, wrote on this very topic, including a landmark article in the April 1974 issue of Fire Chief Magazine, wherein he stated:

"Dazzled by promises of money, equipment, good public relations, and a popular television program, the fire service has seemingly confused rescue with medical care. As a result of this, fire departments have adopted a bastard offspring of these two. There is no quarrel with the traditional rescue function of the fire service. Certainly, there is no quarrel with the concept of a rescue squad-highly motivated, well trained and emergency oriented. There is no doubt that rescue personnel must know basic first aid, and must know techniques of gentle handling and extrication of the injured. There is no quarrel with the poplar belief that

rescue personnel should be furnished the most modern and sophisticated tools for their work, and must be trained in the use of these tools; however, this is simply a continuation of the traditional concept of rescue service.

There is a quarrel with the present image of the medical attendant's role. *There is a significant question regarding involvement of the fire service in the unrelated field of medical care".*

In spite of these cautious detractors, the involvement of the fire department in EMS continued to evolve in the U.S. over the next decade. More than one fire chief found himself answerable to his community for the quality or lack thereof of pre-hospital care similar to that seen weekly on "Emergency".

In spite of both popular public sentiment and the desire of the fire service to assume EMS duties, there was resistance from private and state providers as well as more analytic medical people. To these, the ongoing strife which typified mergers were strong indicators that all was not well with those "dual" services that did evolve.

Strife within and between the services was and remains the accepted norm in the US. By 1983, the initial fire dept. impetus to become involved in the EMS system began to wane and many chiefs began to ponder the wisdom of their move, both from a fiscal as well as a "service" perspective. Budgets began to "tighten" and EMS was becoming an expensive and time-consuming endeavor. This is well documented and reflected in the literature of the time. Fire service leaders began to question whether the commitment to pre-hospital care had been as well researched as possible. This quote from the November 1983 issue of Fire Chief magazine summed up their concerns nicely:

"The concern seems to be not whether the fire service should be involved in EMS-most fire officials accept that there is a legitimate role for the fire service in EMS-but whether there should be a limit to the fire department's responsibility in furnishing pre-hospital emergency services."[8]

Canadian fire departments experts of today, often point to US models such as Seattle and Phoenix as the shining examples of how successful a fire/EMS marriage can be. There are as many examples of the complete failure of similar systems such as seen in Washington, New York, etc.

The above covers most of the more basic reasons why the U.S. systems never evolved here in Ontario, and why they will find great difficulty gaining a foothold. Fire department EMS remains a very costly and not necessarily successful experiment in pre-hospital care.

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[8] **"EMS In The Fire Service-Time Out!"; David B. Gatz, consulting editor; Fire Chief Magazine, November, 1983.**

Even those systems which have been touted as successes by the Fire Service leadership are faltering in the face of economic reality. The Phoenix system, for example, which has been reviewed in other documents and found to be an excellent system, is also one of the costliest systems in the world[9].

The Seattle system operates on a "rule of seven", whereby seven officers are "on scene" within seven minutes and patient transport subsequently occurs within seven minutes[10]. Again, very labor intensive and costly.

The only Ontario service that has evolved from a fire-based system is Ancaster fire department, near Hamilton. The municipal councilors are enchanted with their fire chief's assertions that they are getting two officers for the price of one, and that their service is "cutting edge". **Nothing could be further from the truth**. The Ancaster service makes use of a clause in the ambulance act which allows "part-time" officers to perform ambulance duties with only a first aid license, CPR and a Class F driver's license. A far cry from the currently accepted P1 to P3 officers found elsewhere in the Province.

No officer at this service has the current "Ambulance and Emergency Care" course which is the standard among the province's other full time officers. In addition, none has the current "EMCA" qualification necessary to be employed as a full time ambulance officer.

Each fire fighter in this service is scheduled to work 24 hours per week as per the Act, which defines "part-time" as "24 or less hours of work per week". The community receives sub-standard care, the fire fighters are paid more per hour than the better qualified ambulance officers in neighboring communities and these neighboring communities often pick up the "regional" slack, since the Ancaster department is reticent to leave its "area" (re: municipal boundaries) to provide area coverage. They remain a source of difficulty for a province wide, "seamless" system. This has been and will the shape of things to come, should the Fire Service leadership prove successful in their lobby efforts.

Today, the Fire based EMS system in the US is well supported by a determined fire lobby group. Their leadership is well organized and motivated. They make up a significant presence in administration, education and planning. The Canadian fire chiefs who travel to the US to study and learn, return indoctrinated and convinced of the correctness of the fire service assertions. Many of these are today pushing for

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[9] **"15 Years of Paramedic Engines"; by Deputy Chief Gary Morris, Phoenix Fire Department, Fire Chief, May, 1993.**

[10] **"Seattle's Medic One: Riding the Bleeding Edge"; Bob Bruce, Emergency, March, 1994.**

similar systems here in Ontario and other provinces, in spite of the obvious costly failure of recent attempts in Calgary and Edmonton, both of whom have divided their services for better efficiency and response. We can, however, count on the fire service leadership to continue these intensive lobby efforts for as long as they view EMS as a "logical, growing "field" with which to expand their services.

The Ontario Ambulance Service-History and Development

Funeral Homes, Private Entrepreneurs, Hospitals and Volunteers operated the Ambulance Service in Ontario, until 1967-68,, with no set standards of care. Emergency medicine itself was in its infancy, and little research had been done to confirm the usefulness of any pre-hospital interventions. Provincial standards were non-existent and the "acceptable standard of care" which exists today had not even been born as a concept.

Dr. McNally, the "father" of ambulance services in Ontario, proposed a "para-military" model in 1967-68, which was adopted by the Provincial government of the time. The Ambulance Act was subsequently written which set the standards and qualifications for officers across the province[11]. His vision was that of a province wide, seamless system which would best serve the Ontario public.

The late 1960's saw the Ministry of Health institute a basic "EMT" course which ran for six weeks out of Base Borden, Ontario. Dubbed the "Borden" course, the FCC or "Fundamentals of Casualty Care" became the Canadian equivalent of the US basic EMT course of 80 hours. The Canadian model went one step further, in that training consisted of 240 hours total and topics such as basic anatomy were well covered.

The standards for the position of "ambulance officer" in the province of Ontario have varied with various governments over the years. The early 70's saw the first true paramedic's graduate from the "Kingston" program with skills such as suturing and intubation. These officers were 20 years ahead of their times and legislation of the day as well as organizations such as the College of Physicians and Surgeons acted to limit their scope of practice and they were unable to actually use the skills they'd acquired. Most subsequently moved on to join the ranks of management or simply left the service out of sheer frustration.

In 1972, the Ontario Community colleges developed an "Ambulance and Emergency Care" program for those wishing to make pre-hospital care their calling. Graduates from these programs have now become the "standard" across Ontario. The programs are standardized from college to college and consist of 1200 to 1400 hours of training, with didactic sessions and a "preceptorship" with a "teaching crew" forming the core of the programs.

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[11] The Ontario Ambulance Act, 1984. Revised, 1997.

Officers from these programs are chosen to move up to the "P2" level after having served for a minimum of three years. They are chosen by aptitude, skill, knowledge and interview.

In spite of this commitment, the officers of this province have never enjoyed the public support on a par with the fire departments. Nor have they enjoyed the same "political" support. They have a long history of lobbying successive governments to institute reform in pre-hospital care. The MOH has responded in a variety of fashions, all of which have effectively delayed the process of research and implementation.

In 1984, for instance, the MOH adopted the American Emergency Medical Services model of pre-hospital care and stated that future development would be along established guidelines. (see appendix A)

Obviously, many of these 15 "essential requirements" were predicated on the American Fire/EMS model and simply did not apply to the established "province wide" existing system here. In addition, the rural areas of Ontario, just the area which would benefit most from timely paramedic intervention, did not have the wherewithal to implement 911, let alone the other "necessary" components. The MOH itself was unable to implement these consistently throughout Ontario. Clearly, what was lacking was political will and **funding.** Many of these "conditions" are still cited as criteria for establishing an ALS system today. Most officers, however, view them as stumbling blocks.

The Conservative government of the 1960's attempted to expand the "vision" of Dr. McNally through the expropriation of all ambulance services in Ontario. This coercive attempt resulted in the formation of the OAOA (Ontario Ambulance Operators' Association) to champion the rights of "free enterprise". The OAOA became the "voice" for the private owners/operators and lobbied effectively for their rights as private, responsible entrepreneurs, who had, until now, been the mainstay of pre-hospital transportation. The result was the formation of the system of ownership which exists to present.

The ambulance service, from the officers' view, continued to develop, shaped by both political and economic forces throughout the 70's. Subsequent to the failed attempt by the Province to buy off the services in 1968, various organizations formed to promote the interests of the officers. Unions and associations became the word of the day. The ACCP or Association of Casualty Care Personnel, the Ambulance Labor Association, the Ambulance Care Association are but a few that appeared and disappeared.

Various unions such as CUPE, SEIU and OPSEU have each had

confrontations with government which resulted in occasional strikes, but more often than not, in officers grudgingly accepting the pittance offered through the governments third party agents. A telling point to all of this is the sad fact that the negotiating officers often referred to the process of third party negotiating as "collective begging".

The Ministry supplied the funding for wages and benefits, based upon their own esoteric formulas, but continued to hide behind the curtain of "private" and "public" employers, who remained accountable and responsible while being essentially impotent. The more notable strikes occurred in Mississauga, Hamilton, Collingwood and Owen Sound.

The conflicts between government, operators and front line workers molded the system into the model we utilize today. The advantages to this type of model from the government's point of view are obvious: control maintained by a centralized agency (the MOH) which mandates the standards, supplies the vehicles and funding, and keeps the right to do the billing. This "arms length agreement" resulted in province wide standards (a good thing) and a reproducible, standardized product.

It also resulted in a fractionated working force, poor morale, fairly high job turnover and, eventually, in a final mix of unionized and non-unionized workers, powerless to present a united front through which they could articulate their expectations and issues. The representation that these officers enjoy through their various Associations and Unions has determined the type of bargaining as well as wages and benefits they receive for their services. The predictable result has been growing disparities in wages, benefits and hours of work between services that continue to require the same standardized qualifications and responsibilities from their officers. **What has resulted is a system where ambulance officers are one of the best bargains going, the best trained but least paid of our emergency care workers.** It is interesting that the Ministry has ever denied ambulance officers "danger pay" for a hazardous job, while this is standard issue in the US Fire/EMS model, which recognizes the risks of contagious diseases, societal violence, etc.

It was not until the Supreme Court decision centering around Collingwood, that the MOH was forced to acknowledge the fact that officers were indeed "Crown Employees". The "final chapter" to this struggle has been written by the Conservative government of today. The right honorable Micheal Harris' MOH has managed to unilaterally decree a cessation to "successor rights" for Crown Employees which affects **only** these few services which had the audacity to challenge the earlier governments. What this essentially means is the following: should the services be sold off, the officers' benefits, wages, seniority, pensions, etc. also terminate. The officers would be eligible to "reapply" for their positions and compete with other applicants. Additionally, they would start at the "start wage" and holiday rate, initially ignoring their accumulated years of service. The swift passage of this legislation, however, is likely a coincidence.

Currently, six different types of ambulance service ownership are currently operating in this province, each funded, until recently, by the Provincial Government. These are, respectively, Volunteer, Private, Municipal, Hospital based, Fire Department based and Ministry owned services, each adhering to the operational standards set by the Province's Ministry of Health, but offering a variety of employee wages and benefits, for essentially the same job.

To add to this, the Ministry has maintained control over vehicle movement by setting up a number of CACC (Central Ambulance Communication Centers) centers in each of their six regions, effectively controlling vehicle movement. These centers control both land and air ambulance as well as maintaining contact with other communication/dispatch centers from Police, Fire and 911. Also interesting is the fact that the MOH insists on "performance" criteria for the "privates" or new "contracts", while keeping the right to move vehicles at will through its CACC centers.

While call volumes in most urban centers continued to rise throughout these years, the provision of Ambulance services by the province changed little. The Ministry of Health, until this year, funded all Ambulance Services across the Province, through a variety of third party payment schemes, and to a **minimum** acceptable level.

The only exception to this has been Metro Toronto, who, realizing years ago that the level of care was substandard, began enhancing their ambulance budget to bring their service up to par with the growing demand. Today, the Metro:Province ratio has gone from the original 20:80 split to a 50:50 split[12]. Without the city's help, the ambulance service would operate at half of its present capacity, yet the Ministry of Health has always considered this an acceptable level. This sub-standard level of staffing is ubiquitous in the rest of the province.

To this day, the Ministry of Health is unable to provide a plan or formula to present to the public which might explain their vehicle deployment. If one calculates vehicles per population, we find that Mississauga (for example) has one ambulance for every 150,000 persons. Metro Toronto has one for every 50,000 persons. Rural areas may have one for every 5,000, etc.

If one calculates call volume, the results are as confusing, with small cities like Orillia having four ambulances for a call volume of 6,000 and Kitchener-Waterloo

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[12]GTA Task Force Report, pg. 4, 1996. Reads as follows: "...that the province spends about $16 per capita on ambulances in Metro, compared to $12 per capita elsewhere in the GTA. Metro Toronto supplements our (DAS) Department's funding by almost an additional amount. This in turn provides a level of service to the citizens of Metro which would be difficult to maintain under any form of altered governance or funding structure."

having thirteen vehicles to service 35,000 calls. Using Geographical distance analysis results in the same confusing pattern.

In an obvious attempt at a band-aid solution to this dilemma, the Ministry of Health endeavored, in the late 1980's, to support their underfunded ambulance service by turning to ancillary services such as the fire and police departments for support. With the support of the Fire Chief's Association and the Fire Fighter's unions, a concerted effort, based on the US model, began to take shape as full time, dedicated fire departments across Ontario began to render assistance to overworked ambulance services. This eventually led to their considering the feasibility of "taking over" ambulance services.

In the late 1980's, the Ontario Ministry of Health, the ambulance providers and interested parties (fire dept. associations) entered discussions as to which calls the fire dept. would be expected to respond to and thus was born the "tiered response" system"[13]. Originally intended to supplement the ambulance service during peak times by sending the next most appropriate and available service to the accident scene to render care until an ambulance was available, this stopgap measure has grown to the point where the number of these "medical assists" now make up from 50-80% of many large municipal fire departments' call volumes[14]. The inevitable result is that fire departments' call volumes have been enhanced by "medical calls" and municipalities have responsibly responded by picking up the tab for more fire halls, more fire truck purchases and by hiring more firefighters. Since these calls are "medical" in nature, and we are sending fire suppression experts to fill the gap, one must really question the appropriateness of this.

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[13]Emergency Health Services Branch; Tiered Response Agreement, 1990.Fire departments agree to respond if the following conditions are met:
Difficulty/absence of breathing.
Unconsciousness.
Severe Bleeding.
Real or apprehended heart attack.
Motor Vehicle collision.

Agreement updated as of February 20, 1997.
File Reference #2450-1.

[14]Internal memo from the office of John Dean, Commissioner of Ambulance Services; January 24, 1996.
The paragraph, in its entirety reads:

"Combined fire departments can produce better response times because they have twice as many stations, two times as many active vehicles and four times as many staff, and not all fire departments use the same method of calculating response time. The combined operating budgets of the six area municipal fire departments is over three times that of Metro Ambulance yet we respond to fifty percent more calls."

The officers of this province, while being effectively handcuffed due to legislation based on employment "confidentiality" have still been able to mobilize with some effectiveness and force the various governments to scrutinize the provision of ambulance services in the province through a number of "inquiries", coroners' inquests and hearings.

In 1976, the MOH commissioned Dr. McNally[15] the founder of the "provincial" system to undertake a study of the system which had evolved. He found, among other issues, that the ambulance service suffered from chronic underfunding.

The Shapiro Report,[16] tabled in 1988, concluded similarly and noted that the "fragmented" system did not serve the Province well. They suggested a variety of models including a provincial or regional agency, such as the OPP. This would effectively service the province in a manner consistent with a "seamless" integrated medical system. This study was commissioned by OPSEU union and was never taken seriously by the MOH. It did, however, add to the general outcry from both the public and the officers and eventually led to the "Swimmer" Report.

This report commissioned by the MOH and headed by Dr. Gene Swimmer, came to the same conclusions as the previous reports, however, the MOH again failed to act on the findings. Since that time, governing bodies and philosophies have changed, and ambulance services is no longer considered a priority by the present government.

At the end of this thirty year process, we are left with a system which has a solid core of EMCAs with an average of 1500 hours training, a number of whom also have training in "symptom relief". The larger southern Ontario cities also have a number of P2s or paramedic level 2's and P3's, which form the core of their second line of pre-hospital care. The entire system (air, land, water) is coordinated by a provincial dispatch system which divides the province into 6 separate regions, while allowing cross regional transfers and coverage. There are no seams in the system and vehicles cross municipal and county boundaries in the performance of their duties. There is no doubt that the dispatch system also has the capacity to incorporate within it the fire department response system as well, saving millions for individual municipalities. This, however, may never occur, as Fire Departments mobilize to protect their turf. This is also hindered somewhat by the Conservative governments latest strategy which may see the central dispatch centers being

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[15] "Report of the Project Team on Emergency Services and Primary Care; chaired by Dr. Norman H. McNally, 1976.

[16] "Final Report of a Commission of Public Inquiry into Ambulance and Emergency Health Services Delivery in the Province of Ontario; chaired by Jack Shapiro, (OPSEU-Shapiro Commission) 1988.

privatized or sold off, the final mistake in an evolving system.

The latest movement on the part of a government which refuses to acknowledge its responsibility for pre-hospital care is the unilateral decision to "download" the provision of ambulance services onto the Upper Tier Municipality. Should this occur, the "seamless" system we enjoy today, one which allows vehicles to essentially cross the Province in the performance of their duties, would surely be at risk.

Ontario Fire Department and Ambulance Services (selected examples)

Stats and Stations:

The following urban examples are presented to highlight the tremendous range of services which "protect" Ontario's cities. Most of these cities are protected by one fire service and one ambulance service, which may be private, public, hospital based, or Ministry owned. Although statistics and maps of a number of ambulance services have been requested, they have not been supplied by the services reviewed. The fire services, by comparison, have all been very forthright with their information.

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Toronto Fire:-Toronto's fire departments constitute the largest conglomeration of fire services in Ontario.

Prior to their 1998 amalgamation, they consisted of 82 fire stations

They staff 3000+ officers

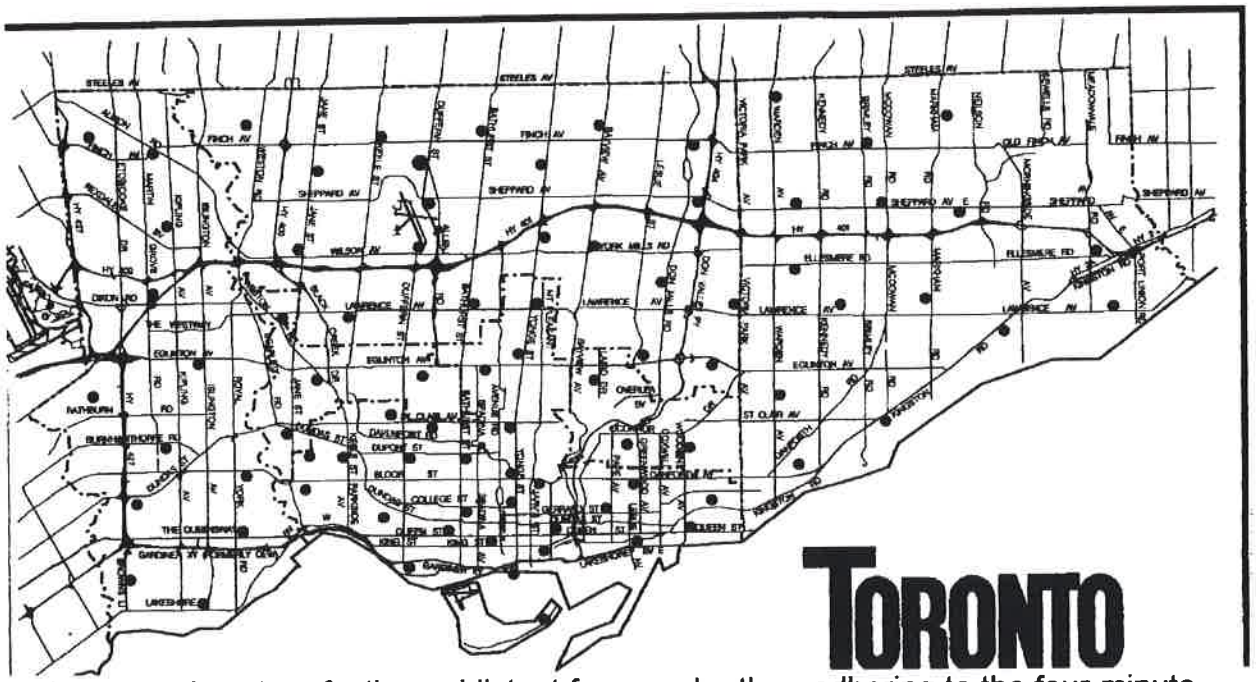
Their combined budgets totaled 221.7 million dollars.

They attended approximately 92,000 calls in 1996.

The fire service calculated that their call volume was approximately 60% medical calls and 40% fire responses which are further broken down into CO monitor alarms, false alarms and 2% working fires.

Until this year, they also operated 6 dispatch centers, one for each of the separate boroughs. This system remains, but is currently under review.

The map on the following page shows their station placement. Note that the



stations are almost perfectly equidistant from each other, adhering to the four-minute response barrier.

Their average response time is just over 4 minutes and they claim to arrive at the same time or prior to the ambulance at least 80% of the time.

FIRE DEPARTMENTS 1998

Metro Ambulance:

-Metro Ambulance is considered by many to be one of the finest providers of pre-hospital care in the world.
-The level of training provided by the Mitchener Institute and the Sunnybrooke Base Hospital program is unparalleled anywhere else in Canada or the US.
-The service consists of 36 stations.
-Their budget for 1996 was $62.9 million dollars.
-Total fleet consisted of 130 ambulances vehicles, in addition to first response vehicles, support units, multi patients transports, communication vehicles and maintenance vehicles. They maintain 80 active vehicles at peak times.
-Their call volume in 1996 was 256,000 calls of which 40% were true medical emergencies requiring ALS.
-They transported 176,000 patients.
-Their "save" rate averages 17.5%, one of the best in the industry when "all comers" (all patients counted, Utstein style criteria being used) are used in the equation.

-They staffed 946 officers and their front line to administrative ratio is 85%:15%.
-The map on the following page shows their station locations. Note that these are quite widespread and directly influence their response times.
-Metro ambulance service calculates that they arrive at the same time or prior to the fire department 70% of the time.
-Their average response time is between 5 and 6 minutes to most ALS calls.

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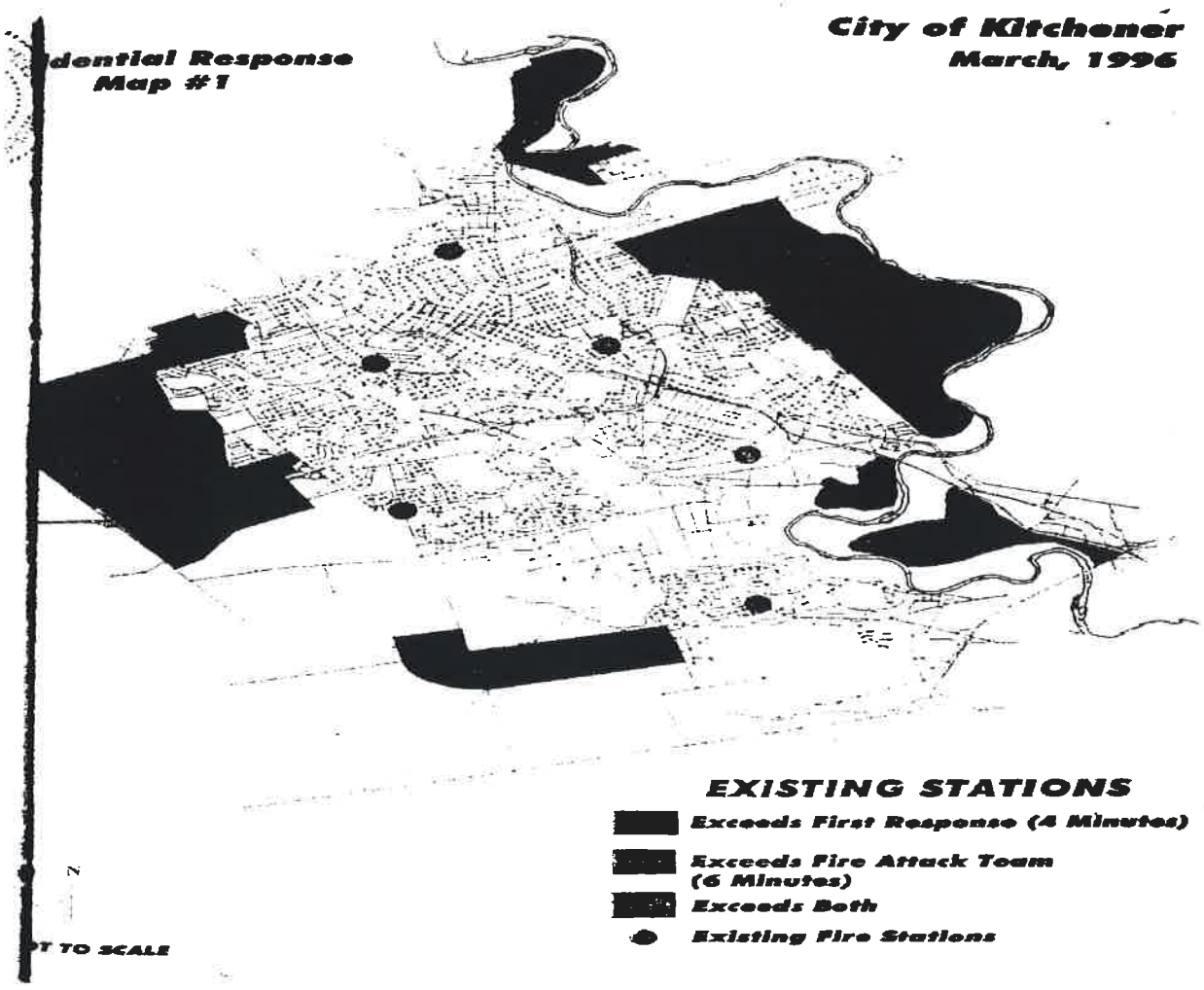
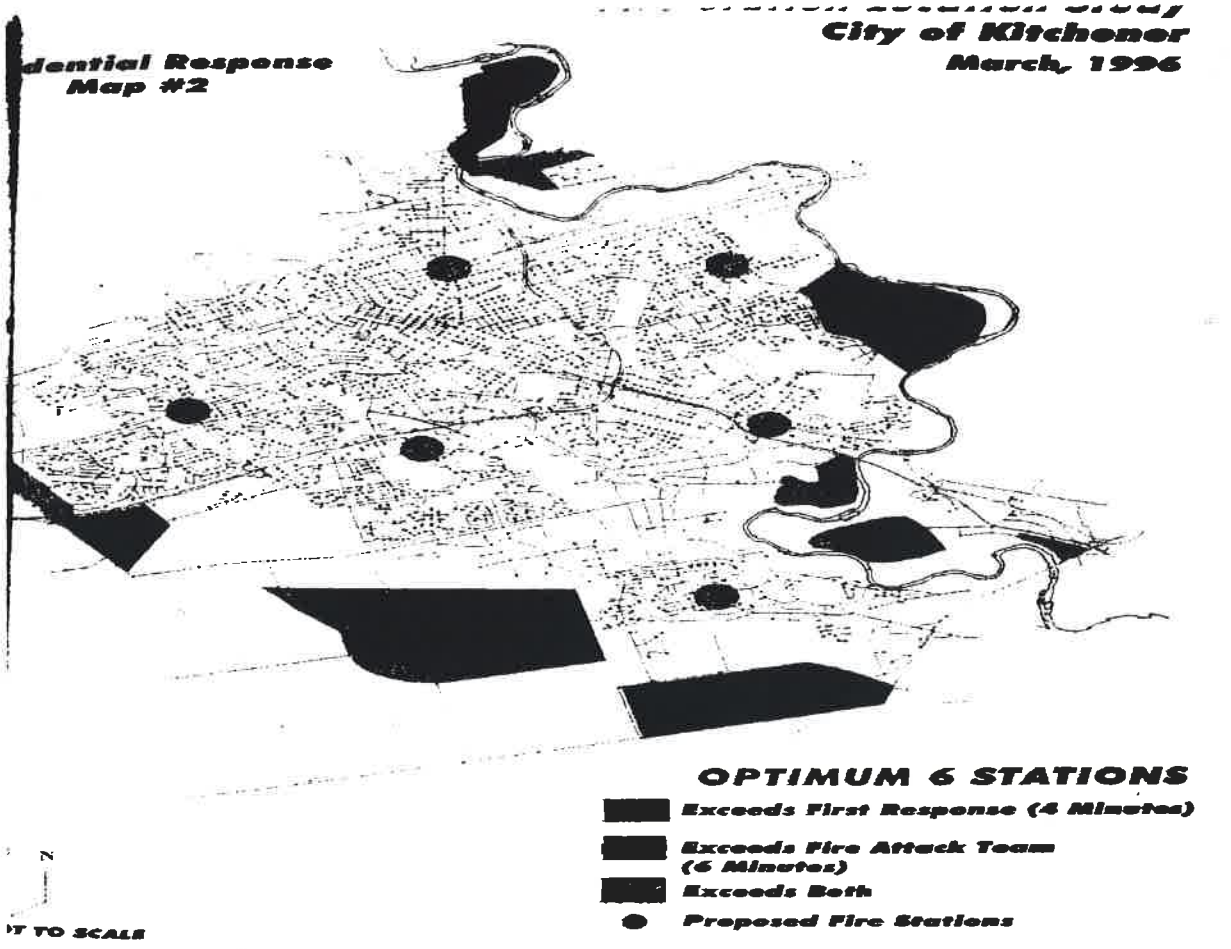
Kitchener-Waterloo area Fire Departments (1996):

-The Kitchener-Waterloo area is serviced by a number of Fire Departments, including North Dumfries, Wilmont, Wellesley, Wollwich as rural examples, and Cambridge, Kitchener and Waterloo as urban examples.
-The total population serviced is 366,500 urban and 47,711 rural dwelling persons.
-The total square kilometres covered are 314.
-The total number of stations are: 12 rural and 9 urban.
-The total number of staff is slightly >555 officers. Its front line to administrative ratio is unknown
-The fire department total call volume in 1996 was approximately 5,000 calls, including first response and false alarms.

-Their total budgetary expenses were: $1,271,619 for rural and $32,642,332 for urban.
-The total numbers of vehicles available were 21 units for rural and 21 units for urban responses. The availability of these varied little from days to nights.

-Two maps of the services urban station locations are provided on the next pages.
-These are presented in order to show the fire department's 1996 proposal for a 9 million-dollar plan to move 5 fire halls and build a sixth, in order to decrease areas of the city not accessible to the fire department within the "magic" four-minute response time. Interestingly, the ambulance station locations were **neither** studied, nor moved i in an effort to improve response times for **life threathening** calls.





-No effort was made to scrutinise or enhance ambulance response times. A combination fire station, ambulance station and community centre was added as part of the new sixth station, which was built in a new subdivision in the north end of the city.
-Note that the new, updated placement of the fire stations once again adheres as closely as possible to the "four minute" rule.

Kitchener-Waterloo Ambulance Service (1996):

-The K-W ambulance service covers 1,345 square kilometres of area providing

service to the city as well as the region.
-The service responded to 34,500 calls annually.
-They staff 85 full time personnel.
-They have 13 available vehicles to cover this area with backup from neighbouring

cities/regions as needed.
-Their total budget for 1996 was $3,436,000.
-They service a population of 413,000.
-They have 5 stations from which to operate with a sixth soon to come on line as an "add-on" to a new fire station.
-They are "privately" owned and operated although fully funded (until recently) by the MOH (Ministry of Health.)
-They are trained to provide Basic Life Support with "Symptom Relief".

A review of fire departments for Southern Ontario revealed a wide variety of services and service levels. A few of the larger, more "progressive" (by fire dept. definition) services offer first response, defibrillation and other services, as well as being involved in the OPALS study. Most do not offer defibrillation or even first response.

It is also clear that most fire departments in Ontario do **not** view Tiered Response or EMS as a priority.

Halton's tiered responses make up 38% of their calls. Peel's 35%; Simcoe 15%, Victoria County, 6%, and Metro Toronto, 65%. Quite a variation within adjacent jurisdicitons[17].

A review of the Fire Marshal's data further reveals that **fully 75% of Ontario fire fighters are volunteers.** The cost of training these officers to current "ambulance" levels is astronomical and likely prohibitive for most municipal fire services. It is clear that the Ontario fire "scene" is vastly different from the US setting with its more highly populated, urban areas and intensified tax base. With the exception of a few Ontario cities such as Toronto and Hamilton, most areas of Ontario could not afford the transition to a fire based, municipal system for the provision of ambulance service .

The only possible conclusions one can arrive at when scrutinising the differences between fire department budgets, call volumes and ambulance service efforts, is the sad fact that Ontario's public and political figures certainly weigh the value of a human life far below that of property loss.

To summarize the above:

There is good historical evidence to show that the fire system and the ambulance

[17] Statistics courtesy of Ministry of Health, Ambulance Services Branch, Region 3.

systems in Ontario and in the US developed due to political forces and not based on any sound evidence. While the ambulance service today would have undoubtedly benefited from remaining within the scope of the MOH or even the Solicitor General's office it appears that downloading is a fact of life which is likely irreversible. Unless the MOH and the current government are made to see the difficulties inherent in a municipal based system, the future of pre-hospital care in Ontario appears grim indeed.

With the downloading to the UTMs already in place, we must now exercise care to choose a system which will build on the advantages of the existing ambulance service, utilize resources appropriately (ie: amalgamating dispatch centers) and will best serve the interests of the **public good**, not the salvation of either department. Any decision made must be one that has been carefully scrutinized and is the most cost effective and efficacious. We must determine and set out the basic standards by which this evidence is presented and acted upon.

In the field of medicine, the scientific community has already set standards for determining this evidence and I believe that these should be applied as appropriate. The decision on one or multiple service providers must be the **proper** one, not the **political** one.

At this point in this presentation, it is likely that there are a number of questions weighing on the readers' minds concerning evidence and its determination and uses. (Ie: what is "evidence"? What are the "Gold Standards"? How are these applied? Are not all studies created equal? Etc.)

A brief review is in order, to facilitate understanding of later concepts.

For those readers who have a prior understanding of statistics and evidence based approaches to medicine, it may be time saving to skip ahead to the "Arguments" section.

For those with no background in these concepts, this section will help to clarify the strategies used in the literature search which follows

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EVIDENCE IN PRE-HOSPITAL CARE

People who indulge in research are, as the name implies, searchers. Searchers invest their time and money to find things. They rarely report a therapy which does not work or an intervention that is harmful. It is human nature that when most of us go hunting, we persist until we find something. If mere blind chance were involved in research, then study results would be statistically significant 50% of the time and negative 50% of the time. Like flipping a coin with random chance, we would be positive half the time and negative half the time. We know, however, that this is seldom the case. While negative studies can be as useful as "positive" studies in guiding us away from harmful therapies, they are less likely to result in helping the authors access significant grant money for future research. They are therefore less likely to be published.

In uncontrolled trials, we find that more than 80% of new or studied therapies are more effective or better than the standard therapy. It is important to note that these studies are regarded by serious researchers as "exploratory" forays, and, as such, almost always result in the discovery of something statistically significant, yet, rarely clinically significant. Changes in treatment should never be based on these types of studies, but should await confirmatory RCTs (**randomized control trials**) which lessen investigator bias and reveal deficiencies overlooked by the uncontrolled trials. The following proves the point:

A 1983[18] study by Sacks and Chalmer compared the sensitivity (the ability of a test or study process to detect a difference when there is one) and specificity (the ability of a test or study to find no difference when there is none) of uncontrolled trials to RCTs for the same research questions. They found that 84% of uncontrolled trials reported the "new" therapy more effective than the old, while only 11% of the follow up RCTs examining the same questions confirmed this finding.

Based on the evidence presented by this literature review and others like it, we can calculate that the sensitivity of uncontrolled trials is 89%, while the specificity is only 11%.

The "power" of a study can also be measured by calculating the "alpha" error. This is the chance of a study finding a statistically significant result when there isn't one. The inverse of this is the "beta" error or the chance of a study design not finding

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[18] **Sensitivity and Specificity of Clinical Trials: Randomized vs historical controls: by Sacks, HS, Chalmers TC, Smith H Jr. Archives of Internal Medicine, 143:753-755, 1983.**

a statistically significant result when there is one. These two measures can help researchers calculate the risks of a result being arrived at by random chance. Uncontrolled trials have the potential for a large alpha error. They commonly find differences when there is none.

By contrast, the specificity of RCT's is very high, at 88% but their sensitivity is very low. Therefore, we see that RCTs act to clearly define which treatment is better, while uncontrolled trials define encouraging areas for further research. The conclusions of Sacks and other statisticians is that:

Most positive results found in uncontrolled trials means nothing more than that someone should do a more rigorous study to confirm results[17].

In a December, 1997 article, Callaham reviewed all the articles available in the pre-hospital care medical literature by designing a search strategy which cross linked such terms as EMS, clinical trials, pre-hospital care, etc. as well as those discovered by perusing the bibliographies of these articles. He searched specifically for studies that actually provided statistical evidence of efficacy. He found that:

"Research can produce false-positive results just as can diagnostic tests. A search of all the scientific studies in Medline since 1985 revealed 5,842 publications on pre-hospital EMS, but only 54 were RCTs (and therefore unlikely to produce false-positive results). .....Of the 54 RCT's, 7% reported harm from the new therapy, and 74% reported no improvement in favor of the new therapy and only 13% showing a positive outcome of the intervention were uncontradicted; of these only 1 examined a major outcome such as survival, and only 1 compared the intervention with a placebo and could therefore evaluate the efficacy of EMS itself.....a serious reexamination of EMS practice is indicated."[19]

Of the 5,842 publications found by Callaham, 170 were clinical trials and only 93 of these were RCTs, the only type of evidence a serious clinician should accept before implementing new therapies. 54 of these trials actually studied pre-hospital interventions; 9 trials were excluded because they studied physicians (not EMTs) in the field, and 4 were excluded because they did not measure a clinical outcome in a human patient. 9 more trials were identified from a hand search of the bibliographies of the clinical trials produced by the Medline search. The remaining 5,788 publications were uncontrolled trials, which we know have an 88% chance of finding a difference but only an 11% likelihood of being correct in their report of positive outcomes. This review highlights the paucity of evidence which plagues the pre-hospital care field. What is the reason for this lack of EMS research? Callaham speculated that:

"Several reasons exist for this, not the least of which is the paucity of ER physicians

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[19] Quantifying the Scanty Science of Prehospital Emergency Care; by Michael Callaham, MD. Annals of Emergency Medicine, 30:6 December, 1997.

who are research oriented and the fact that they often work for organizations unfamiliar with research and <u>whose primary focus is not health care".</u>

Interestingly, even the early studies showing benefit with early defibrillation were not RCTs; the two follow up RCTs of urban defibrillation which came later found no benefit compared with the two tier ALS defibrillation model, or a prehospital care physician model.

Does it matter that there is no evidence supporting what the paramedics do? Intuitively the emergency physicians and ALS providers believe that pre-hospital care does make a difference. We base this on the notion that many of the therapies we use have been proven in hospital, therefore, applying these at an earlier point in the patients illness should pay dividends. This is not always easy to prove, however.

The paramedical personnel of this province have persisted in lobbying government for change and the addition of new responsibilities under the assumption that EMS "intuitively" should make a difference. However, the difficulty of proving that a 15-minute intervention will somehow affect hospitalizations, decrease mortality or dramatically change outcome is a difficult one to prove. When a "critical" patient undergoes six months of therapy, how can one prove that an initial correct 15-minute intervention has improved one-year mortality? The benefit of transferring "in-hospital" intervention to earlier "out of hospital" application has never been proven of benefit in a rigorous trial, likely due to the fact that "end points" continue to be defined by "in-hospital" standards.

The only intervention shown to decrease mortality in a small number of statistically significant studies has been defibrillation, in spite of larger follow up RCT's which did not find a difference. Defibrillation is a skill that is easily taught, catches the public perception and is quite dramatic when successful. For these reasons, Fire Services has placed a disproportionate emphasis on this one skill, as has the pre-hospital care service. One must remember, however, that these calls make up less than 5% of all EMS calls. (In Calgary, less than .2% of all calls[20]) This emphasis on life saving and multiple aggressive interventions is also related to the US EMS system's historical focus on cardiac arrest and major trauma to the exclusion of almost all other calls.

The scope of practice in Ontario is much broader than this. Here, the ambulance officers primary objectives have expanded from this narrow cardiac/trauma focus into a mission which emphasizes the goal of reassurance and comfort as well as the provision of relief from distress and pain. Studies, however, consistently miss these important "surrogate" end points. This should be a source of

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[20] Personal correspondance, Mr. Tom Sampson, Emergency Medical Services Department, Calgary, Alberta.

pride and focus for the researchers, rather than the current myopic vision of cardiac outcomes as being the sole important determinant of cost effectiveness.

While there is little evidence for specific interventions in pre-hospital care, there is, (as I will show further along) good evidence for the maintenance of the service on an ethical, medical and cost-benefit basis.

The acceptance of this "evidence" is predicated on the hypothesis that there are only certain conclusions to be drawn if all the researchers adhere to the same general rules of evidence. There are numerous articles and books available, which set out firm guidelines for an evidence based approach to all aspects of medicine.[21]

The following, an excerpt from a text by Sackett and Guyatt, lists the commonly accepted levels of evidence

LEVELS OF EVIDENCE:

Expert opinion: this is considered to be the poorest form of evidence for or against a specific treatment. Interestingly enough, it is often the one we rely on the most. How many of us perform specific skills because someone we respect has taught us a specific method or technique? That "expert" may have very good reason for having adopted that particular method....perhaps he/she had a bad experience that taught them that this specific skill should be performed in a given manner. This, however, should not replace a well done, randomized trial which offers **objective** proof of efficaciousness. Mark Twain was noted to say that:

"Opinions are like rectums, everyone has one".

This is a rather direct way of saying that one must remember that opinions, no matter how well intentioned or supported by the reputation of its spokesperson, remain **anecdotal** evidence at best, and should never replace that found in clinical trials, no matter how august the reputation of the speaker. The historical literature is filled with examples of "experts" who were eventually proven wrong by well conducted, factual experiments.

A good example of the dangers of "anecdotal" evidence which remained unquestioned for decades is the use of digitalis for the conversion of patients in Atrial fibrillation (a disorder of cardiac rhythm). The belief that digitalis "converted" people with A-fib into a normal cardiac "sinus" rhythm had been ubiquitous since the time of William Osler. Anyone questioning this "truism" was subject to ridicule and considered to have

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[21] **Sackett and Guyatt, etc.**

fallen below the established standard of care. When this "dogma" was actually subjected to a rigorous trial in 1973, (Lancet, 1974) it was found to be no better than placebo, and that, left alone, 50% of people with new onset A-fib would convert spontaneously anyway. Digitalis is now more appropriately used for rate control.

It is only through the use of these "tools" that EMS may become recognised as legitimate part of the Health Care Team. In this manner, they can be assured that their treatment is, in fact, benefiting their patients.

-Case series studies: This is generally accepted as the "next" level of evidence. Here, an investigator simply reports that one or more of his patients develops a specific symptom/adverse effect while on a treatment drug. No comparison group is included and readers can only conclude that these adverse effects can/may follow the use of this drug.

-Case control study: Once a "hypothesis" is generated from Case Series, an investigator then might gather "cases" who have already suffered some adverse event and "controls" who have not. An attempt is made to "match" these for "other" variables and conclusions are formed around the differences between the two groups. Adverse effects found in the treatment groups are considered to be linked to the treatment, if different from the non-treated group.

These studies are easy to carry out due to data storing policies of modern hospitals. Using these databases, numerous comparisons of drugs vs. conditions can be carried out at the touch of a button. There are inherent biases, however:

Three case control studies in the early 70's found an association between breast cancer and reserpine, a drug used for hypertension. They concluded that more women on reserpine developed breast cancer than the general population. Follow up clinical trials (8) found no such connection. Women with risk factors for breast cancer and heart disease had, in fact, been excluded from the "comparison" group to make them more comparable, yet, this was precisely the group most likely to have received this antihypertensive medication.

These studies are also done retrospectively, which also allows the researchers to select those items they wish to count and to include/exclude patients according to criteria which can "doctor" their data.

Researchers will also search harder in the case group, looking to prove associations.....few researchers wish to be rewarded with negative research.

-Cohort study: This constitutes the next level of evidence. An investigator identifies groups or cohorts of patients with an illness. One group receives a specific

treatment and the other does not. The study then follows these two groups forward in time, counting adverse events that occurred in each. Again, certain biases are inherent in these studies, as investigators and participants are not "blinded". The following exemplifies these biases:

GP's in Britain n the 1960's and 70's, followed two cohorts of patients taking/not taking oral contraceptives (OC) and found that 41 of the OC users but only 8 of the non-OC users had DVT's (deep vein thrombosis or blood clots). From these numbers, they calculated that the users had an increased risk rated at 6 times that of the non-users. Biases included the type of patients self referred for OC, (they were higher parity, smoked, and were more likely to have important past history of diabetes, CVA, DVT or varicosities). Second the hypothesis that OC's caused DVT was already believed and accepted by British physicians who had more opportunities to examine those patients on OC's who returned regularly for prescription renewals. These were all unblinded examinations. Third, there were no objective criteria for diagnosing DVT other than a patients complaint of leg pain or swelling, and, on objective testing by venography during the follow up RCT, it was discovered that less than half of the patients with symptoms actually had DVT.

An RCT of 10,000 Puerto Rican women was later carried out and found that of an initial list of 48 patients with suspected DVT's, only 17 were confirmed by venography and, of these, 9 were on OC and 8 on placebo, suggesting that the increased risk was only 1.3 times greater than placebo, not sixfold as previously thought.

-***RCT:*** These are considered the best form of evidence available. A double blinded, randomized trial blinds both subjects and practitioners to the types of medications or treatments being administered. This effectively eliminates any chance of bias on the part of study participants and also reduces the "placebo" effect.

There are variables common to EMS delivery which make RCT's difficult to run. EMS can vary tremendously from region to region and this can nullify the validity of statistically significant developments from one region and their applicability to another. There are few good EMS laboratories currently set up which can measure outcomes and there are no validated scoring methods, severity scales, outcome measures and other tools to evaluate medical, occupational, and financial morbidity. To add to these problems is the fact that information systems for EMS lack accuracy, completeness, and the ability to be linked. There is no standardization of reporting, although the "Utstein" criteria has recently been suggested for cardiac calls.

It would also be difficult and unethical to withhold certain EMS treatments from our patients. There are new answers on the horizon, however. New "before and after" trials are now in progress, which act as the next best thing to an RCT

The OPALS (Ontario Pre-hospital Advanced Life Support) project is one such trial. All patients are enrolled to receive the current standard of care. A new standard of

care is then implemented, and all patients again receive the new standard. The first group is then compared to the second group, for outcomes and benefits. Large numbers of patients are required to prove statistical significance with these studies.

For instance:

To be confident of observing one or more adverse reactions to a drug, investigators need to follow three times the reciprocal of the true adverse reaction rate. Therefore if the rate is 1 per every 1000 patients, the investigators would have to follow 3000 patients to be 95% confident of finding at least one true reaction attributable to that drug.

In conclusion, these types of studies form the "levels" of evidence accepted by the medical community. The searches by Sacks and Callaham outline the lack of evidence, whereas the explanations provided clarify why this state exists, what is being done to correct it, and why benefit is so difficult to prove with a brief intervention. Why is it necessary to even expand on current service levels if we can't even prove that what we do makes a difference?

Deciding on how to use the little evidence we do have commonly takes one of three forms:

-Induction: treatment on the basis of retrospective analyses of uncontrolled clinical experience or that of others to determine a therapy that seems to work or ought to work.

-Abdication/seduction: treatments based on the recommendations from your teachers, consultants, colleagues, etc, or accepting a treatment on faith.

-Deduction: basing treatment on prospective analyses of formal randomized clinical trials designed to expose worthless or dangerous treatments. Therapy can be selected that successfully withstand formal attempts to demonstrate their worthlessness.

Of these, the EMS system has made use of INDUCTION, but is making inroads into using DEDUCTION. To move towards deduction marks a turning point for the ambulance officers of this province and suggests that they are acquiring the mantle of a "professional organization". They are close to becoming yet another "regulated health discipline" much like midwives and nurse practitioners. It has been suggested that their future scope of practice could\should conceivably include many duties currently done by family practitioners and home care workers. They are beginning to make inroads into the field of public health, introducing preventive teaching at schools and public places. Accident prevention is quickly being discovered as the area where we might have a significant impact on a group of patients with long term "tax" potential. Some authors have speculated on this in a number of articles:

A December 1997 articles by Dr. Daniel W. Spaite et.al. suggested that future practitioners of EMS might conceivably find themselves not only administering IV medications in the home, but also running community health programs and childhood immunizations. Others feel that:

..."EMS may include everything from communications centers providing an access point for the health care system to EMS personnel providing postoperative care, rehabilitation, and many other "primary health care" services.[22]

While not all providers agree on the scope, all must agree on one premise: that expanded scope EMS must be implemented in a manner that can be carefully evaluated to determine its effects on current EMS systems as a whole and on individual patient outcomes. In addition, it should not be run as an "adjunct" to an existing service.

It has the scope, the call volume, the demand and the presence to deserve individual emphasis and financial consideration.

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[22] **Developing a Foundation for the Evaluation of Expanded-Scope EMS: A Window of Opportunity That Cannot Be Ignored; by Daniel W. Spaite, MD. et. al. Annals of Emergency Medicine, 30:6; December 1997.**

ARGUMENTS
EVIDENCE AND SERVICE PROVISION

The preamble explained briefly the objectives of this paper. Having presented the history of the respective services in Ontario, the levels of evidence and the lack of evidence for specific interventions in pre-hospital care, it seems only fair to use these standards to examine some of the "key" questions which UTM (Upper Tier Municipality) councillors will have to answer when attempting to decide on one or multiple service providers for EMS.

Recently, the fire departments, particularly in some of our larger metropolitan areas, have intensified their lobby efforts to convince politicians that the US model of fire based EMS is the most cost effective, efficient system world wide and one which should be implemented here in Ontario without any further delay.

These persons have presented a number of arguments which seem to favour this particular stand, yet offer no references or studies which make their arguments immutable. Having listened to these "arguments" one comes to the conclusion that an objective review of the "evidence" could certainly prove helpful in clarifying the truth of the matter and underscoring the "rhetoric" which resounds whenever proponents and opponents meet.

With this in mind, this author undertook a literature search for evidence for a number of the more common "arguments" presented repeatedly.

These are presented here in no particular order.

COST

Costs of an EMS system can be viewed from a number of perspectives. There can be analyses of the service itself. There can be comparisons between services. There can be analyses of the "hidden" costs from which the service benefits, such as utilization of ancillary services such as police and fire for "first response". There are costs associated with rendering the care expected of the paramedics and there are costs associated with withholding that care. There are costs associated with prevention, reaction, support, maintenance, communications, administrative and front line. There are cost comparisons which have been done between paramedicine and "other" life saving treatments, such as transplant surgery and chemotherapy. In most cases, authors compare apples and oranges, utilizing compartmentalized evidence to support their point of view.

Cost Benefit of EMS:

This author performed a comprehensive search of a number of databases using the search terms:

EMS, Fire based EMS, ambulance, pre-hospital care, rescue work, disaster planning, emergencies, emergency medical services, accidents, ALS, BLS, EMT, randomized control trial, cohort study, case control study, care report, expert opinion.

Articles were searched for in the following databases:

Medline, Cochrane Data Base, Index Medicus, Healthstar, Cinahl, Fire Doc and the Internet sites.

These are all well accepted, medical, nursing, EMS, administrative and fire based databases. The articles found were, in turn reviewed and further articles that were listed in the bibliographies were also obtained.

In addition, the author commissioned two independent professional researchers to conduct independent literature reviews to access any articles missed.

In terms of "cost" of an EMS system, there were four cost benefit analyses[23] which were of interest. These articles were reviewed using the basic analysis rules as outlined by Sackett and Guyatt.[24] A summary of the findings is presented here.

The first promising study, was by Craren et. al.[25]. He analyzed the death rate per 1,000 population both before and after the 12.5 million-dollar investment that the state of Kansas made in EMS in the early 1970's. Their analysis looked at death rates for the four years before and after the investment. They looked specifically at EMS relevant deaths and the approximate amount of tax revenues realized from lives saved. Their analysis calculated the average life expectancy in the State and

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[23] Medical Care, April, 1981.
Acta Anasthesiology Scandinavia, vol. 31, 1987.
Annals of Emergency Medicine, December, 1990.

[24] **"Clinical Epidemiology, a Basic Science for Clinical Medicine"** ; Deciding on the best therapy"; Sackett, Haynes, Guyatt, Tugwell, Little, Brown 1991.

[25] "The Investment"; by Edward J. Craren; Joseph P. Ornato and Norman M. Nelson; JEMS, 1985.

subtracted this from the life of each patient saved by a pre-hospital care intervention. To focus the study they used only deaths from MIs, (myocardial infarctions) CVAs, (cerebro-vascular accidents) and trauma because their initial presentation is sudden, life threatening and considered amenable to EMS intervention.

Their analysis estimated that the improvements to the EMS system have seen:

"....12.6 thousand lives saved since 1973, and that the tax revenue exceeds tax expenditures by over 6.5 million dollars".

"If the pre-EMS death rate (3.98 per thousand population) had remained constant during the following years during which the state population grew 7%, EMS relevant deaths would have shown a cumulative increase of 15,678."

Instead, an overall mortality reduction of 9.35% was realized. While the study acknowledged that a reduction in EMS related deaths was certainly the end product of many agencies working in a "preventive" fashion, there is no doubt that the advent of an officially sanctioned EMS ALS system also played a significant part.

A study[22] conducted by the Department of surgery at the University of Arizona also concluded that:

"A total of 174 years of life was saved by the intervention of the .....paramedic rescue service, this resulted in a cost per year of life saved of $8,886.00. A comparison of cost per year of life saved with published estimates for treatment of acute nonlymphocytic leukemia by chemotherapy or bone marrow transplantation, liver transplantation or heart transplantation showed a paramedic rescue service to be the most cost-effective in ems of cost per year of life saved among these medical interventions".[26]

These two studies prove clearly that paramedics are cost effective.[27] The estimated cost of providing this service in this study was four US dollars per taxpayer per year.

The cost of a good paramedic system averaged approximately 12-20% of the trauma patients "total" costs in terms of care, hospitalization, rehabilitation, etc. with the ICU department using up about 54% of total costs.

The three-year, 1978-1981 Nebraska program[19] saved 174 potential years of

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[26] **"Cost-Effectiveness Analysis of Paramedic Emergency Medical Services in the Treatment of Prehospital Cardiopulmonary Arrest; by Valenzuela, et.al. Annals of Emergency Medicine Vol. 19, No. 12, December, 1990.**

[27] **"Cost of a Saved Life Following Out-of-Hospital Cardiac Arrest Resuscitated by Specially Trained Ambulance Personnel; by Jakobsson, Nyquist, Rehnqvist,Norberg; Acta Anaesthesiol Scandinavia, 31; 426-29; 1987.**

life lost adding a significant number of persons to the local tax base.

In terms of savings, "realized savings per year of life saved" averaged approximately 4,000 to 9,000 dollars, depending on the system in place.

The study in the Annals, 1990, compared this with chemotherapy for ANLL (leukemia) at $64,000 per year of life saved; with bone marrow transplant at $62,000 per year of life saved; with liver transplantation at $43,000 per year of life saved, and with heart transplantation at $27,000 per year of life saved.

In conclusion, it appears that there is good evidence to support the ongoing investment in EMS as there is an excellent return on cash invested in terms of lives saved as well as reduced morbidity. In Ontario terms, we know that 1,026 persons were killed in motor vehicle accidents in 1996[28]. Most of these were in the 16-35 age group, prime taxpayers. One can extrapolate that a well run EMS system would/could have a significant impact on the save rate of these individuals, both in terms of prevention and treatment.

Since EMS is cost effective, the next question researched was concerning the actual service provision. Who best to tender the provision of EMS services?

A similar search to the above was conducted on the same databases, looking for service providers and EMS studies addressing "the best choice".

The results were somewhat surprising. There were **no** randomized clinical trials comparing service providers and costs. There were no trials comparing private providers to public providers. There were **no** cohort or case/control trials. There were, however, a large number of retrospective and descriptive trials by fire department "experts", who quoted each other. (92 articles, see Appendix B) The following provides one example of a "typical" fire service statement found in these articles:

"The literature on the provision of fire and emergency medical services overwhelmingly supports the notion that the amalgamation of services is a logical and cost-effective way to provide service. The formal acceptance of the merger of the services is reflected in the 1991 joint resolution of the IAFC and the IAFF. Articles written in both fire service journals and EMS journals frequently espouse the strategic and operational advantages of combined services."[29] (Bruce,

[28] **"Vital Statistics"; Office of the Registrar General, 1996.**

[29] **"Development of a Strategy for Conflict Management During Fire/EMS Department Amalgamations; by Bernard E. Williams, PhD, Deputy Chief, Edmonton Emergency Response Department, Edmonton. A research project submitted to the National Fire Academy as part of the Executive Fire Officer**

1994, Benson, 1994, Brame, 1991, Heitt, 1991)

The four articles referenced at the end of this statement, providing support for this assertion, were also by fire service authors.

It was also interesting that almost all the articles that provided support to the Fire/EMS model were US based. It is also obvious, from the literature, that Fire based EMS is a recent US phenomenon and not accepted worldwide.

Two articles written from Britain, in fact, make very cogent arguments for not involving fire services in EMS other than where the roles naturally overlap, in terms of first aid, rescue, CPR and prevention[30]. This article also discussed the Scandinavian emphasis of pre-hospital care and the involvement of the entire country by **legislating the certification in first aid and CPR for all licensed drivers.**

A separate article describing the Portuguese system also makes a good argument for involving the fire department in a cursory role at best.[31] Here, we see a system with the two services supporting each other, but clearly distinct in terms of duties and objectives. Clearly, the idea of fire based paramedics is not a commonly accepted role, other than in the US.

The literature search also found two cost-benefit analyses examining one and two tiered systems, both by authors from the University of Ottawa, many of them the same researchers running the OPALS (Ontario Pre-hospital Advanced Life Support) study today. These two studies seemed promising, as the authors had an established "track record" in pre-hospital care research.

The first of their two studies consisted of a meta-analysis of survival rates from out of hospital CPR, defibrillation, first response and ALS. Most of their calculations were based on US reports.

This study examined the cost effectiveness of potential improvements to EMS for victims of cardiac arrests. They stated among their conclusions, their belief that certain types of EMS systems were more cost effective than others and that an ALS system, which incorporated fire dept. first response within 4 minutes, followed by ALS within 8 minutes, was the most cost effective. They found that:

Program, May, 1995.

[30] **"Reasons why the Fire Service Should Avoid Adopting the Paramedic Role"; Michael Willis, Regional/Chief Ambulance Officer of Norfolk; Fire, August, 1988.**

Walwesfire "98 Collaboration-Cohabitation outside Marriage; by Laurie Caple, Chief Executive, Northumbria Ambulance Service. Fire magazine, 1998.

[31] **Pre-hospital Immediate Care, BMJ Publishing Group, 1998.**

" a two tier system increased survival from 5.2% to 10.5%. A 1-minute decrease in mean response interval improved survival by .4% in a one-tier system and by .7% in a two-tier system".[32]

While this seemed, at first, to suggest a satisfying conclusion to this search, a "critical" analysis of the studies numbers proved somewhat disappointing.

This analysis turned out to be built on assumptions that could effectively alter costs considerably. The authors, for instance, suggested that the costs of the first tier of a two tier system were fixed, regardless of whether these were firefighter or ambulance based. (this means that they consider the fire department presence to be fixed, regardless of how many/few EMS calls they respond to. In other words, they will always be there in their current numbers.) They further calculated that an improvement of 48 seconds in response time would cost approximately 40,000 more "unit hours", whether by fire or ambulance. Their costs of these "unit hours" were quite varied.

In addition, their survival estimates have since proven to be somewhat optimistic, as seen in their own "OPALS" study. OPALS compared survival before and after the institution of fire department defibrillation In 21 Ontario cities. OPALS results showed conclusively that the "absolute risk reduction" (ARR or the difference in overall survival before and after the new modality) changed from 3.9% survival to 5% survival for a total ARR of 1.1%, a far cry from the 20 and 30% numbers touted by US fire based systems. The number of calls attended by the fire department went from 4% to 49% during this time period, so one can see that there was fair attendance on which to base these numbers. This is significant investment for a sorry return. To put this in perspective, one must realize that the installation of a street light at a busy intersection would save more lives in any given year.

The second study by this group was a cost benefit analysis which separated the links in the chain of survival and assigned them a dollar value. The authors then attempted to calculate the cost of reducing response time below 4 minutes for a one tiered and a two tiered system. They found that improving ambulance response times by this factor would add 368,000 dollars per quality adjusted life years. Improvement of mean response time by 48 seconds in a two tiered system would cost the fire dept. 53,000 dollars per QALY (Quality adjusted life years) with the addition of more BLS providers on pumpers. The authors comment on this:

"The most important sensitivity analyses were those concerning the costs attributed to the BLS/BLS-D providers in pump vehicles. When these costs are considered to be

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[32] **Effectiveness of Emergency Medical Services for Victims of Out of Hospital Cardiac Arrest: A Meta-analysis: by Nichol, Stiell et. Al. In Annals of Emergency Medicine, 27:6, June, 1996.**

zero, changing from a one-tier to a two-tier EMS system appears very attractive indeed. However, we believe this is an unreasonable assumption because there is clearly an opportunity cost associated with using firefighters to provide EMS".[33]

Suggesting that these costs would be "zero" is a far cry from reality. The authors themselves caution:

"The cost effectiveness estimates derived in this analysis must be interpreted with caution because of the quality of the effectiveness and cost data."[34]

Upon review of the paper, it becomes clear that the authors utilized data from one Ontario fire chief in particular, (himself a fire/EMS supporter) who estimated that his firefighters spent 15% of their time servicing EMS calls, therefore, the cost of EMS was 15% of their wages and equipment. This worked out to approximately $19.26 per unit hour. The inherent assumption was that the fire vehicle numbers would be fixed, regardless of the number of EMS calls they responded to. This is a far cry from reality, as this particular service's call volume is 63% EMS calls. The costs of the additional ambulance vehicles were factored in at full cost, which also changes the unit hour cost utilization ratio tremendously. The following excerpt is quite revealing:

"The EMS costs incorporated into the decision analysis were $75.00 per unit hour for a one-tier EMS system, $19.26 for firefighter BLS-D providers in pump vehicles, $66.51 per unit hour for BLS-D providers in ambulances, and $75.60 per unit hour for ALS providers in a two-tier EMS system."

Interestingly, if one were to use this same statistical analysis calculations for ambulance usage at fires, the following conclusions could be drawn: **since ambulance officers spend 2% of their time at fires, their cost of attending fire calls is fixed. Therefore, as a unit hour value, 2% of their time works out to $1.02 per hour to send two paramedics and an ambulance to a fire.**

This calculation clearly shows the error of this type of statistical analysis. Who among us would suggest that a cheaper method of fighting fires would be to send two paramedics in an ambulance? The inverse also holds true. How can it be cost effective to send four firefighters in a pumper to a cardiac call?

One must also wonder where the authors availed themselves of four firefighters and a pumper at a scene for $19.26 per hour? A review of five Southern Ontario cities reveals that the average wage for firefighters is approximately

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[33] **"Cost Effectivenss Analysis of Potential Improvements to Emergency Medical Services for Victims of Out-of-Hospital Cardiac Arrest; by Nichol, Stiell, et.al. Annals of Emergency Medicine, 27:6, June, 1996.**

[34] **"Cost Effectiveness Analysis of Potential Improvements to Emergency Medical Services for victims of Out-of-Hospital Cardiac Arrest": by Nichol, Stiell, et. Al. Annals of Emergency Medicine, 27:6, June, 1996.**

$55,000.00 per year. The pumper itself is valued at >250,000 dollars. How is the magical estimate arrived at?

By comparison, the average ambulance officer is remunerated at $45,000. The wage jump to paramedic adds another $900 dollars to the total cost per officer. A fully serviced ambulance costs approximately 80,000 dollars.

Other aspects of this study which render the results somewhat suspect are the fact that an implicit assumption was made that ambulance and fire vehicle response times could be comparable when this is clearly not the case. The Office of the Fire Marshal, in a 1991 paper[35], made this distinction quite clear:

"Fire departments have used two different methods of calculating response time. Many departments have adopted the OFM method which, for the purposes of statistical reporting, is defined as follows: "The elapsed time between receipt of the call by the department and the arrival of the first unit at the occurrence location." Other departments have adopted "response travel time" which is considered to be the time from when the vehicles leave the station until arrival at the occurrence location. Therefore, those departments which have adopted the OFM definition will have greater average response time results than those adopting response travel time."

The authors also did not factor in "system status management" staffing pattern; made no accommodation for the advantages of moving from a static to a dynamic pattern of distribution of unit hours, made no mention of the improvements to be had with current AVL (automatic vehicle location through transponders) technology and finally, they had some difficulty calculating the rate of bystander CPR available.

Also of interest is the fact that the authors consider BLS fire and BLS ambulance officers to have equivalent training and therefore calculate them as having equal value in the context of this study.

The current educational status of firefighters in Ontario is to train them in CPR, basic oxygen therapy, first aid and defibrillation, all useful skills. To train these to the current ambulance standards would cost approximately 6,000 dollars per officer, (tuition only) not calculating wages, hours off work and certification. Factoring in all of these "forgotten" variables would undoubtedly shift the balance of the equation greatly in favor of a one tiered ambulance system, with extraneous support from police, fire and public in terms of CPR, defib. etc.

In spite of these shortcomings, this study does remain the only "scientific" study of its kind and serves as a model for **the process of research,** if not **content.**

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[35] **"Fire Ground Staffing and Delivery Systems Within a Comprehensive Fire Safety Effectiveness Model"; *Office of the Fire Marshal of Ontario, December 3, 1993.***

To assess the potential costs of these types of systems, future studies **must** factor in costs of initial education, ongoing training, wages, number of stations, vehicles, unit hours worked, etc. In addition, one must consider that most of the fire departments involvement in pre-hospital care in Ontario is rudimentary at best, as they have no communication lines with hospitals, they have no QA programs for standards of medical care and they lack all but the most basic of medical equipment. **There is little doubt that fire and ancillary services have a role to play in first response.**

We must be careful to ensure that this role is not at the expense of the EMS system in terms of funding, equipment, manpower, etc.

If medical calls are increasing, the logical strategy is to upstaff **medical** people with existing training. If police calls are increasing, we would certainly not consider upstaffing the ambulance or nursing personnel in the nearby hospital, then sending them out to police neighborhoods.

First Response and defibrillation are the only two pre-hospital modalities, which have been shown to reduce mortality. (in selected studies and specific regions). Cardiac calls form the basis for the fire service argument for EMS involvement, due to their slightly better response time. One should not, however, discount the fact that these calls make up a very small part of all that paramedics do and that for the majority of EMS calls, a four-minute response time is of little significance.

One further point must be made on this topic. If defibrillation is so cost effective and can be easily instituted, why have we not designed **pro-active** programs to take advantage of this fact? Examples include the placement of AED's (automatic external defibrillators) at community halls and public places; the training of security officers; police officers and other public servants; the passing of building codes to include a defibrillator next to all fire extinguishers, etc. These are only some of the examples that would decrease time to first defibrillation, in a manner which would pay constant dividends without incurring staffing costs. The cost of an AED (3,000) dollars is infinitesimal compared to the overall cost of a public structure such as an arena, community centre, and their attendant safety devices. (sprinkler system, smoke/flame detectors, self-closing doors, etc.) These simple devices require minimal maintenance and do not require expensive staff to administer them. In addition, making CPR a "credit" course in high school, college, university, etc, would make it an accepted and everyday part of life for the newest generation. Scandinavian countries further make these courses mandatory for everyone getting a driver's license. These methods (education, public advertisement) have all been proven methods used very effectively by Public Health agencies.

It is an interesting commentary on today's society that we have taken all these steps to save property and minimize fire loss, but have not acted to ensure that either the first or second links in the "chain of survival" are strong ones. The first link in the chain of survival is bystander involvement. Countries such as Scandinavia have taken the incentive by legislating that all licensed drivers also be licensed in First Aid and CPR. The second link is a quality, well funded EMS system. Yet we are clearly lagging in both areas.

If all of these other options are possible, why have we not acted upon them?

SERVICE PROVISION

The Fire department in the US has always viewed EMS as a handy method of bolstering call volume in order to justify fire suppression staffing patterns in the face of decreasing fire suppression requirements. In spite of the fact that EMS makes up 50-80% of most fire department's calls, budget allocation for this important function is generally approximately 20% of that allocated for fire suppression apparatus, training, equipment and manpower.

A "typical" argument about the Fire Service's view of fire/ems' cost effectiveness is reprinted here from a Phoenix Fire Department article of 1993:

"By upgrading an existing engine or ladder company to paramedic level, the department eliminates the need to hire personnel (six positions for a two member medic unit), the purchase of a vehicle and the additional fuel and maintenance costs that would be incurred. A department can easily save up to $150,000 in start up costs alone".[36]

The plain fact is that the addition of EMS to a fire service is crucial to the maintenance of what fire authorities believe to be adequate **fire** staffing levels:

"Minimum staffing levels are a major concern for all chiefs. I contacted several fire departments using paramedic engines, and those officials frequently commented that they were most successful in justifying minimum staffing with paramedic companies as compared to non-paramedic companies. Virtually all had a four member staffing."[37]

Mary Jane Dittmar, writes in a 1993 Fire Engineering article suggesting that cost effectiveness of fire based EMS is obvious since the fire department already has

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[36] **"15 Years of Paramedic Engines; by Deputy Chief Gary Morris, Phoenix Fire Department, in Fire Chief, May 1993.**

[37] **"15 Years of Paramedic Engines; by Deputy Chief Gary Morris, Pheonix Fire Department, in Fire Chief, May 1993.**

an existing and functioning service and quotes Tim Butler, a fire captain/paramedic from Anaheim as stating that:

"The public gets two services for the price of one. Staffing and equipment are already available."[38]

Interestingly, she also makes clear the hidden fire dept. agenda. In this same article she quotes Bill Madison, deputy executive director of IAFC, thusly:

"How can one justify a multi-million dollar budget if the system doesn't get used?.....it's a matter of time before cost-efficiency comparisons will be made. These analyses," he adds, **"will reveal fewer calls for fire suppression, more expensive fire suppression equipment, and escalating Firefighting personnel costs. The progressive fire dept. understand that EMS runs are one way to resolve the budget problem".**[39]

This and similar articles continue to support fire services in their attempts to integrate EMS into their system, in an obvious effort to lower their own costs per call. A 1980's study of cost per call in Seattle is quite revealing. The researchers divided the cost of fire apparatus, manpower, staffing, etc into the total number of fire suppression calls. They calculated that the cost per fire suppression call was approximately $12,000 per call. The total fire losses per call were approximately $4,000 dollars. When EMS calls were factored in, the total cost per run was just over $1,400 dollars. The addition of EMS calls to their total allowed them to continue justifying the extensive fire suppression crews to specific levels that the fire department required for **fire suppression**.

Many fire department authors like to dwell on the fact that the fire department staffs for all eventualities, like an army held in reserve. Other emergency agencies, however, have made do without this backing, devising ingenious plans for "disaster" staffing. Hospital emergency departments run continually short of staff, and barely get by on a day to day basis. In the event of a disaster, contingency plans fall into place, where every available person is called in for the duration of the crisis. Fire departments, like the police, EMS, and other agencies, need to devise more creative solutions to staffing costs. We, the public, cannot be expected to continue funding personnel to "sit and wait" in perpetual readiness for a disaster that may never happen. Fire Services and the public representatives need to decide whether they will staff for "hundred year" events or "thousand year" events. (events which statistically occur only every thousand years, but are tremendously destructive....Ie: San Francisco earthquake) Staffing to this level would be a tremendous cost to any

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[38] **"Fire Service EMS: The Challenge and the Promise; by Mary Jane Dittmar, Fire Engineering, July, 1993.**

[39] **"Fire Service EMS: The Challenge and the Promise; by Mary Jane Dittmar, telephone conversation. Fire Engineering, July, 1993.**

municipality.

This argument may seem obvious to many when all the variables are pulled together in one cogent presentation, however, the interested parties have made a concerted effort, through their literature and their support services, to present themselves and their staffing patterns in a favorable light. Knowing this about emergency service staffing, why then:

DO WE STAFF FIRE DEPARTMENTS TO THESE LEVELS?

Research into this question, revealed that the reasons are multi-factorial, but intimately tied to the insurance industry and business. There are a large number of "pseudoscientific" studies which Fire Chiefs, Associations and bureaucrats quote to support their respective arguments and to prove/disprove the value of more/less manpower per pumper and more/less manpower per scene.

A literature search at the Ontario Fire Sciences Resource Library reveals 44 studies dealing with fire service optimum staffing levels. (See Appendix C) Only one of these was a randomized trial, and the rest were "case studies" and "arbitration" settlements between particular agencies and their workers. None were able to agree on either a standard staffing level for specific cities or even for specific fire scenes and vehicles.

The results of the various studies funded and supported by various interest groups (ie: fire chiefs, fire fighters) reflect the positions of each of these groups. They are likely a strong contributing factor to the reason that even fire officials and "expert" fire department opinions cannot determine the optimum staffing coverage for a given hall/city/county. For example:

The OFM (Office of the Fire Marshal) suggests that local governments assess buildings, structure, placement, protective equipment (ie: sprinklers, detectors, etc.) and arrive at a decision about "local" needs. They do, however, recommend four fire fighters per pumper on initial apparatus.

The IAFF presented a review of fire service practices and concluded that all fires should be attended by a minimum of four officers per pumper with a preferred ratio of 6-8.

The NFPA standards are: for high hazard occupancies: no less than 24 fire fighters and two officers; for medium hazard occupancies, 16 fire fighters and one officer; for low, 12 fire fighters and one officer.

The Auburn Public Safety Department study is probably one of the best examples of a randomized "controlled" trial in fire department staffing. New graduates were

assigned to one of three groups with one commanding officer and standardized tasks. All tasks were repeated three times to confirm an "average" per team. Simple tasks showed no difference between two and four person crews. Complicated tasks showed a large variation. The study conclusion was that three represented optimum staffing, although four would do the work a little more quickly and be less exhausted afterwards. Although less effective than four, three constituted a reasonable compromise.

The Provincial Federation of Ontario Fire Fighters insists on 4 fire fighters including one officer per pumper and 5 fire fighters and one officer per aerial.

The Ontario Professional Fire Fighters Association recommends than 5 fire fighters and one officer be assigned per pumper and 6 fire fighters and one officer per aerial.

(***An interesting fact is that the Boulder city fire department concluded that the best equipped fire department in the world could not extinguish a blaze larger than 5,000 square feet, since control is a variable dependent on the amount of water flowing towards a fire and the heat generated. Therefore, all fires larger than this are surrounded and allowed to burn out***). If this is so, then some cities are grossly overstaffed with fire services.

The membership themselves contribute to the pressure, by bargaining regularly for more officers in an attempt to raise the "standard" on all responses. North York fire department, for instance, has a contract stipulation that four officers **must** accompany the pumper on any fire call. If three men are on at one station, the call automatically becomes a two-pumper response as a neighboring pumper "backs" them up. This again increases call volume and inflates statistics.

The following comment is quite telling when compiling information on this topic:

"Our research shows that when a paramedic engine company hits a threshold of 4,000 calls a year, it's spending about 50% of its time out of service. At that point, the department considers two options: Convert a neighboring engine company to paramedic status; Convert a nearby ladder company to paramedic status, if all neighboring engine companies are already paramedic status." [40]

Ambulance services in Ontario, by comparison, rarely upstaff unless they manage to hit at least an 80% utilization rate.

The Insurance companies have contributed to this strategy by their control of premiums and the calculations utilized by their actuaries. Although the companies

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[40] **"15 Years of Paramedic Engines"; by Deputy Chief Gary Morris, Pheonix Fire Department, Fire Chief, May 1993.**

contacted refused to divulge these calculations for "industrial" protection, a cost comparison of "private" dwelling protection is quite telling and is reviewed in detail under the "response times" portion of this thesis.

Of late, the fire service has been touting that a four-person crew is also perfect for responding to cardiac calls and that this is the optimal number required for a successful resuscitation. Many US articles cite this interesting statistic, yet none provide proof of this, other than their own individual "in-house" studies. In Ontario the standard until recently, has been two responders. This has worked quite adequately. With the implementation of paramedics, this level of staffing has increased to three (if a first responder helps) or sometimes four at the scene, but always two en route.

A review of the literature reveals only one study which looked "objectively" at crew size on an EMS call.[41] This study concluded that two person crews perform the same number of procedures as three person crews, although they have statistically significant longer on scene times, yet this was unable to detect a detriment to patients treated.

This suggests that the fire department contentions are fabrications, with little evidence to support them. In terms of staffing, provincial and UTM managers should review the basis for current EMS staffing levels and redirect excessive fire department allocations to those areas requiring attention, namely, EMS. This common sense approach will continue to be hampered, however, by the varied funding agencies in Ontario, where the Fire Service is under the auspices of the Solicitor General and the Ambulance Service is now under the direction of the local UTM's.

A brief, but telling point to all of this is the fact that the Solicitor General and the present Provincial Government have allocated an "educational" fund for children of police and fire officers killed I the line of duty.

Ambulance officers and others (ie: corrections, search and rescue, etc.) were excluded.

To date, there have been 34 ambulance officers killed in the line of duty in this province, yet their families often make do without a father as well as a guaranteed income. Surely we owe more than this to these officers?

Unfortunately, these officers were not employed by the Office of the Solicitor General, else they would likely have been included.

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[41] **"Does Ambulance Crew Size Affect On-scene Time or Number of Pre-hospital Interventions?"; Lawrence H. Brown, et.al. Pre-hospital and Disaster Medicine, July-September, 1996.**

BEST SERVICE PROVIDER?

A literature search of the earlier mentioned databases, looking for evidence for the best service provider, revealed 96 "hits" in total. (See Appendix B, data base, listing all studies by author and date.)

Of these, 28 were editorial or opinion letters written by fire department personnel. 41 of these articles were "descriptive" studies, offering no economic information and little information in terms of call volume. 10 were descriptive "reviews" elaborating on a number of "successful" fire/EMS cities, but commenting little on the fire/EMS failures.

The remaining 19 were composed of 5 consultants reports, a small number of research papers for the National Fire Academy, 10 more "quasi reviews/descriptive" articles, and 1cost benefit analysis.

5 of the articles were by medical directors, 3 in favor of fire/ems amalgamation (these were program founders) and 2 who remained carefully neutral. The 5 analyses were by consultant's groups, 4 of them Canadian, all of whom remained in favor of a separate system with the exception of the New York based consultant, who favored amalgamation. 56 articles were strongly in favor of fire/ems, all but 7 of them written by Fire service authors. Several of the other 7 authors were freelance, but had also written and ridden with a number of fire department EMS services. Two authors were Ambulance Directors/Operations Chiefs.

In conclusion, **it appears that there is little evidence (in spite of fire authors assertions to the contrary) for the statement that fire based EMS is the most cost effective, efficient type of service provider.** It was interesting, however, to find the literature "riddled" with descriptive studies (case studies) and "expert" opinion. In terms of sheer "cost effectiveness" it appears that the literature actually supports the provision of services by large "private" corporations such as CMR, who make excellent use of "economies of scale" (large scale buying). One should be cautioned, however, that the introduction of a profit motive into the healthcare equation has never been in the best interests of either the patients, or the employees.

The fire services' involvement in EMS has always been with the attitude of what EMS can do for the Fire suppression service. **If the fire department literature supports anything, it supports this assertion.** It is both overt and covert in numerous articles written by the department heads as well as the leaders of the IAFC and the IAFF.

PREVENTION:

Given that most health care systems recognize the importance of primary interventions such as prevention, as well as secondary interventions such as halting further morbidity, the EMS system must also begin to make this challenging move. Past practice has been to allocate these providers to the limited role of "reactive" responders, sending to accident scenes to treat patients after the fact, rather than acting in a "proactive" fashion to prevent accidents.

The role of proactive interventionist has been a limited one for members of the health care team, due to budgetary constraints which routinely allows a bare, "minimal" level of "reactive" service to exist. Most Ontario officers would agree that their work day is far to busy to be involved in school demonstrations, mall displays, local television educational sessions. However, we must allocate resources to this area of EMS, and not depend any further on the good graces of "volunteers". Examples of successful integrated programs are the CHAT program of Hamilton, the "Heroes" program, and the frequent, volunteer mall displays put on by concerned paramedics and ambulance officers. We must begin to place on emphasis on the utilization of EMS data to identify excessive causes of morbidity and to design programs to intervene.

A literature search of the earlier mentioned data bases failed to identify any "prevention" articles. The cost of these programs are not available at the time of this document's printing.

A current research project in the Hamilton area involves using the paramedics and ambulance officers to identify "Elderly At-Risk", in which the ambulance officers are asked to "screen" all patients 65 and over for causes of morbidity as identified in the medical literature. The program is expected to run for four months prior to reporting findings.

EMS expansion into areas such as home care, immunizations and medications must be evaluated with the input of those organizations already providing this care. It might, for instance, be appropriate for the VON's to oversee initial IV antibiotic/medication setup, then turn the routine management over to the paramedics.

The decisions for future evolution of EMS must proceed on the basis of a sound, "province-wide" system with the allocation of specific areas as "EMS laboratories". The current system favors such a development. Handing over control to fire departments would present us with the same problems that are currently being experienced in the places such as Edmonton, Calgary and the US cities.

It is interesting that most fire departments have a designated, separate budget for prevention and public education. Yet, in Ontario, in 1996, there were only 88 fire-related deaths, and 5 more "preventable" deaths caused by explosion or other fire related methods. Spending large amounts of money on prevention will only, at

best, save 88 lives in this area. It is clearly a field of diminishing returns. By comparison, there were 1026 motor vehicle accident deaths in 1996, most of them to persons between 16 and 35, all taxpayers with potentially long, contributory periods ahead of them. This would be a logical target group in a sensible prevention program. An investment here could potentially save 10 times more people than fire related deaths. Although this is but one example there are undoubtedly other "preventable" accidents with a better rate of return per dollar of education than for "fire related deaths".

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RESPONSE TIMES:

One of the key areas in which the fire services prides itself, is on the maintenance of a four-minute response time. Statements about these times can be misleading, as stated by the Office of the Fire Marshal, earlier. Comparisons between fire and ambulance response times in Metro Toronto and other cities also show significant variability. Metro ambulance claims to have arrived at or before the fire department 65%-70% of the time, while the fire department contends that it arrives before the ambulance 80% of the time. How can this be, in the same city?

Much of this ongoing debate has to do with the manner in which response times are documented. Few fire departments use standardized, ambulance accepted "Utstein" criteria. In addition, there are many hidden components of response times, not the least of which are the times between call receipt and response, as well as arrival at scene and time to patient's bedside[42]. Most fire departments conveniently eliminate these from their calculations.

Arriving at an address is not the same as arriving at the patients side, particularly in high rise buildings. In addition, fire crews have been known to "commandeer" elevators, forcing ambulance crews to use stairs, etc.

Studies and reviews of fire service practices commonly discuss the "four minute response" and the need to adhere to this "Gold standard". (def: an accepted standard by which all future interventions will be judged) Typically, these studies will talk about the importance of arriving at a scene before "flashover". **There are,**

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41 **"Emergency Vehicle Intervals Versus Collapse-to CPR and Collapse-to-Defibrillation Intervals: Monitoring Emergency Medical Services System Performance in Sudden Cardiac Arrest";** Valenzuela, Spaite, Meislin, Clark, Wright, Ewy; Annals of Emergency Medicine, 22:11, Nov. 1993.

41 **"Ambulance Arrival to Patient Contact: The Hidden Component of Pre-Hospital Response Time Intervals:** Campbell, Gratton, Salomone, Watson; Annals of Emergency Medicine: 22:8;

however, no studies providing evidence that a four-minute response time is better than a five-minute time, in terms of property and lives saved at a fire scene. In fact, many fires burn and smolder for hours prior to being discovered. To suggest that a four-minute response time make a difference in these instances is not rational. In discussions with the Office of the Fire Marshal and various fire agencies, there seemed to be a constant assurance that "many" studies supported the four minute response time, yet no references were offered or supplied. A request to the OFM was unsuccessful in acquiring any of these, as was a request to the Fire Resources Centre. While one would argue that a fast response time intuitively makes sense, clearly there is no statistical proof of this.

In fact, it remains unclear as to why this standard was arrived at by the fire service:

In addition, more recent articles mention that this four-minute response time is also essential when responding to life threatening situations, since irreversible brain death begins at four minutes. While this is not new material, **it is interesting that the EMS providers have known this for years, but have never been able to convince the bean counters of the need for more vehicles to meet this standard.** The fire departments are now using the ambulance services arguments to tie in their four minute response time with the need for a rapid response to avoid brain death.

It appears that insurance industry standards have played a large role in the development and maintenance of this standard for the fire department. Noting this, I therefore placed a number of calls to insurance agencies.

A request was forwarded to a number of insurance companies, asking for a premium estimate for a typical 150,000 dollar home in a neighborhood which was: hydrant protected; not hydrant protected; fire hall protected by volunteers; fire hall protected by dedicated, professional fire fighters; and rural or unprotected.

An analysis of the answers revealed that the premiums for identical coverage only changed when the home was situated >8kms from the nearest fire hall. Premium was not affected by type of fire fighter, or distance less than 8 kms. This suggests that the actuaries calculating these premiums find no difference in property loss when response times increase beyond the magic four-minute mark, at least to the 8 minute cutoff. This also suggests that fire departments could likely be placed almost twice their present distances from each other within cities with no increase in cost to homeowners, in terms of premiums.

The Office of the Fire Marshal itself calculates response times as a factor or kilometers traveled minus one, thusly:

RT (response time) = kms. (Traveled) –1

Therefore, a distance of 8 kilometers is equal to a response time of 7 minutes, well within the insurance companies' standards.

There are other problems with fire department responses. The plentitude of fire officers at EMS scenes also creates other unexpected hazards. The "stacking" of a medical scene with an inordinate number of personnel in itself if detrimental to patient and family well being. In addition to the required two to three paramedics, there are now 3-6 fire fighters, one additional large vehicle and various items of equipment. (extra oxygen tanks, defibrillator, etc.) Scene "congestion" is becoming a growing problem which is causing a number of complaints to be registered by the public, the ambulance officers and the paramedics. In addition fire services have access to special overide devices in elevators, and fire officers have been reported "locking down" an elevator after arrival at a high rise scene, forcing the ambulance officers to either wait for the second elevator, or take the stairs. Large fire vehicles also have a tendency to "block" driveways and access routes, again delaying the paramedics.

At least 50-80% of fire department calls are **medical emergencies.**[43] Currently, when a call is dispatched and the appropriate "tiering" takes place, a pumper/fire truck responds with at least three to five fire fighters. This causes numerous problems to arise, not the least of which is the inherent danger of navigating a cumbersome vehicle through downtown traffic at a high rate of speed. This Fire department practice places at least 6-8 officers (fire and ambulance) at any urban scene, far more than is efficient or needed.

If the purpose of the exercise is to get care and/or a defibrillator to the patient as quickly as possible, there are far cheaper and more efficient methods than on the back of a pumper carrying three to five fire fighters. From a purely logistical point of view, there are faster and simpler methods.

From this, then, it appears that there is little evidence to support the staffing levels required by the fire department in urban centres such as Toronto, simply to continue maintaining this four-minute response time. There is, however, significant evidence to support a similar "Gold Standard" in EMS as brain death is irreversible after 4-6 minutes. It is feasible, therefore, to continue to utilize fire services to render "first response" and "defibrillation" services, however, the provision of these services

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[43]Pheonix Fire Department survey, 1994 found that their medical calls accounted for 80% of their volume.
Toronto Fire department calculates that medical calls make up 60% of their call volume in 1995. (Toronto Fire Fighter's Association Stats) Metro Ambulance Service calculates the number to be closer to 75%.

should not, in any way, enhance the existing services. Fire department staffing should be according to **fire** call volumes, not EMS responses. If they happen to be available to respond initially, better for the patient. If they are otherwise occupied**, the EMS system should be staffed to a self sufficient and independent level to meet or exceed this four minute response time.** If EMS calls are increasing, EMS services should be expanded. The addition of a large number of EMS "First Response" vehicles would undoubtedly significantly lower existing EMS response times. More on this later.

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Supervision:

Fire service supporters often cite the necessity of having one officer in charge at any scene. There must a hierarchy of command for effective on-scene performance. This is an ingrained, fire department philosophy.

Paramedics in Ontario, however, are not only trained to work in pairs, mitigating the need for a third party supervisor to be along to ensure quality care, but also trained to "control" disaster scenes until the arrival of a higher ranking officer. Even then, control is often shared, and not fully relinquished, as the first officer on the scene often has a clearer view of priorities and needs. In this manner, two persons per car, remain self contained and fully operational on their own, without the added need for an expensive supervisor or officer, except for disasters. Not so with the fire department.

By contrast, most fire departments attempt to staff their response cars to a level which not only necessitates four persons per call, but also a fifth to supervise/help out.

"A paramedic engine provides a company officer for constant supervision and also enhances the total team concept. The crew trains together and always works together. This refined team approach is especially critical during life-threatening medical emergencies."[44]

Seattle, with their patented "Med 7" response system, attempt to:

"We call this a Med 7 response, where you will get a minimum of seven people on scene...We have 7 minutes to respond to a patient from anywhere in the city. Once we arrive, we have 7 minutes to spend with the patient. I might start three IVs, intubate the patient and send blood to the blood bank. I then have 7 minutes to get that patient back to a trauma surgeon."[45]

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[44] **"15 Years of Paramedic Engines"; by Deputy Chief Gary Morris, Pheonix Fire Department, Fire Chief, May, 1993.**

[45] **"Seattle's Medic One: Riding the Bleeding Edge"; Bob Bruce, Emergency, March, 1994.**

Clearly then, Fire/EMS is a costly system and not applicable to an Ontario scene where 2-3 well trained ALS personnel effectively handle all emergencies quite well. In addition, there is a significant question as to the "fit" of a municipally bound system interacting with a provincially organized hospital system.

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TIME ON THEIR HANDS

There is a common misperception among fire leadership and personnel that they are ideally situated for the duties of EMS as they are already in the "rescue" business, have been rendering "medical" care for "hundreds" of years and should be involved in EMS, as they have the ready infrastructure, the manpower and increasing amounts of **time on their hands** as fire suppression call demands drop. Having time on your hands is hardly an appropriate reason to co-opt the provision of another service, minimally related to existing duties. Emergency departments do not have their excess nurses repair plumbing although one could argue that it is related and crucial to patient well being. Emergency departments "lay off" or retire excess workers when call volume declines.

"According to the National Fire Protection Association (NFPA) US fire departments responded to 15.3 million calls for assistance in 1993. Of those calls, only 13% were for actual fires. A whopping 57% were for emergency medical service. The rest were for other emergencies."[46]

"In Pheonix, less than 1% of the department's emergency activity ends up being a structural fire, and most of these are extinguished with only one attack line."[47]

In addition, fire chiefs in the US report spending a disproportionate amount of time worrying when crews are "out of service" either retrieving paramedics from hospitals after they accompany "private" ambulance crews, or tied up at a medical emergency. During these times, the vehicle is not available should a fire occur[48].

Similar complaints are common here in Hamilton, where the Ancaster fire department also serves as Ambulance service to their community. The Regional

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[46] **"The Privatization of EMS"; by Rich Adams, Firehouse contributing editor and a volunteer EMT with Bethesda-Chevy Chase Rescue Squad. Firehouse magazine, April, 1995.**

[47] ***"15 Years of Paramedic Engines"; by Deputy Chief Gary Morris, Pheonix Fire Department, Fire Chief, May, 1993.***

[48] **Fire Chief, May, 1993.**

Ambulance Office reports that the Ancaster Fire Chief is very reluctant to allow his officers to service calls out of the area, as this would potentially make them unavailable in the event of an Ancaster fire.

In spite of the involvement of Fire in First Response in Ontario, their focus remains fire suppression, as does their priority.

The following is an excerpt from a typical Tiered Response agreement, which succinctly states the obvious:

"This agreement recognizes that the Fire Service may not be able to respond when available Fire Services are occupied with a fire related response".[49]

In spite of **written** agreements stating this, Fire Service representatives and Fire Association representatives commonly and vehemently deny this fact.

This fire "philosophy" is also clearly the cause of a number of disputes in Fire/EMS mergers. It appears that when the Fire service is placed in charge of EMS, the EMS side suffers from lack of support and vision. This was the case in Calgary, Edmonton, Washington, etc. to name a few. The Calgary system has since been "separated" and is working well with a minimum of strife[50]. In spite of EMS making up 70% of most urban fire departments' call volume, it is interesting that the fire service has never been placed under the direct control of the local governing EMS body rather than Fire in charge of EMS. Most EMS systems could absorb the small number of Fire calls without difficulty, both from a dispatching point of view and a call response point of view.

Fire departments have a proud heritage of selfless devotion to public, community and duty. They have, over the years, evolved into a well-oiled machine for fire suppression. Performing their traditional duties such as rescues, extrications, etc, and their non-traditional duties such as rendering **medical care** are two entirely different responsibilities.

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[49] **"Tiered Response Agreement between the town of Wallaceburg Fire Department and the Chatham and District Ambulance Service and the CACC centre; November 25, 1995.**

[50] Working with Employees and Employee Organizations: Trauma and Triumphs in Transforming a Third Service: by S. W. Cartwright, Prehospital Care Administration, 1998.

The recent Metro Toronto Ambulance Service Review studied this same problem in 1996, and they, along with the Ernst and Young Consultants study of fire departments[51], made recommendations to not only keep the two services separate but to amalgamate the existing five Cities and one Borough fire departments. This, they calculated, would have projected savings of approximately 45 million dollars per year. These and other consultants clearly did not recognize the "time on their hands" argument as sufficient justification for the "merging" of the services.

It was interesting to note that the TFF's association and their president remained adamant to the end that Fire amalgamation with ambulance services would be the best, most cost effective option. It is an argument that they repeat to this day. They were and are still unable, however, to offer any relevant evidence to support this contention, other than fire officials' anecdotal claims. If, in fact, amalgamation theoretically saves this much, why not have the fire department also amalgamate with the police and assign them as auxiliary officers? Why limit them only to EMS? Why not also involve them in parks and recreation maintenance? Streetcleaning? Sanitation? Any of these "non-emergency" functions would also leave them available to respond, when needed, to fire suppression calls without fear of leaving a cardiac patient unattended. Having them tied up on medical calls may not be the most rational use of their "downtime".

It is clear that the needs, staffing patterns and manpower requirements are very different for these two services. Using one to augment the other is neither cost effective nor practical, in spite of fire department rhetoric and the various US models.

If this were a "cost effective and efficient" model, there would likely exist one version of Fire/EMS, not the current 52 US variations, as is clearly the case.

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TRAINING, LEGISLATION AND EDUCATION

The Ontario system developed as a Ministry of Health funded operation, with set province wide standards, and a minimum acceptable level of equipment, training and care. It is upon this solid foundation that the present day paramedic system is resting. While US standards vary tremendously from state to state and region to region, (with the basic federal EMT course consisting of 80 hours) the Basic Life Support provider in Ontario has 1500 hours of initial in house training at an approved Community College. This is followed by mandatory Provincial exams and further training within the service which hires them. Many officers continue their training with

Advanced Life Support Courses and Basic Trauma Life Support Courses. Officers in Ontario also take part in further training to provide "symptom relief" consisting of five protocol driven treatment regimens. (These consist of ASA, Nitro, Ventolin, Glucagon and Epinephrine, as well as oxygen and defibrillation)

This training would also become mandatory for any fire department officer, as the latest version of the ambulance act will clearly not support any erosion of these standards.

The "paramedics" or P2's of Ontario are among the best trained in the world. Upon completion of the basic requirements as outlined above, they must accumulate a minimum of three years experience prior to even being considered as candidates for further paramedic training. Those selected go on to train at the Mitchener Institute in Toronto, the Toronto Department of Ambulance Services training program or the preceptorship program in Hamilton.

The position of dual trained Fire/EMS officer within this Canadian model and particularly the Ontario model would undoubtedly be a difficult one.

Maintaining expertise in two difficult fields is also a growing problem in the US, as fire fighters are expected to be proficient in Hazmat, extrication, rescue, fire suppression, increasingly complex equipment, including respirators, computers etc. Add to this the medical knowledge required of being a paramedic and you have a recipe for disaster.

In the US, standards were arrived at in the late 70's with the basic training consisting of the Federal EMT course. The course was set at 80 hours for the basic training. ALS provider was required to have another 200-1000 hours, depending on the jurisdiction, the number of delegated medical acts and the equipment provided. Standards vary tremendously from not only State to State, but from county to county.

In direct contrast to this, the Ambulance Act in Ontario sets out clear standards for ambulance officers, paramedics etc. There are no provisions for fire fighter/EMS personnel. The Ancaster Fire Department uses a "loophole" in existing legislation to support its existence, however, should these officers ever wish "full time" employment, they would also require the one year Ambulance and Emergency Care course, or its equivalent. Bill 84, which deals with fire departments and service provision states that the municipalities must provide fire prevention and public education, but makes no mention of the necessity of having a "dedicated, full time" fire suppression staff. Should EMS become the mandate of the fire department, the present Ontario wide, seamless system would disappear, to be replaced by a haphazard, Americanized, municipal version of its former self. The Fire Act itself doesn't have the legislated power to recognize ambulance officers as fire fighters, nor does the ambulance act recognize fire fighters as ambulance officers or paramedics.

This jumble of legislation does not even begin to cover the problems of dealing with ambulance unions and associations, and fire department associations and professional representatives, each with their own agendas.

Continuing on education, an ambulance officer receives at least 1200-1400 hours training at a Community College level; they must then pass a provincial exam to work in this province; after three years of full time employment, he/she is allowed to apply for paramedic training, (another six months). Many of the officers pay for further courses out of pocket; ATLS= $300; ACLS= $150. After graduation, these officers can look forward to earning about 20-30% less than a comparable fire fighter. (41,000 vs. 51-55,000) The taxpayer gets a well-trained paramedic for approximately 42-45,000 per year. Note that **none** of the Ancaster personnel have this level of training. Feel free to compare this to the typical fire fighter's **medical** training and wage scale.

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ATTITUDES AND CULTURAL DIFFERENCES

Fire departments are ideal for one duty...fighting fires. Their entire philosophy, training and way of life are entrenched in a "fire fighter" belief system. There is only one way to do things, that is the fire fighter way. It is an aggressive philosphy of recognizing and learning all that is possible about the "enemy", then amassing sufficient resources to overcome and "defeat" him. This philosophy is one which the fire service has applied to EMS in the US.

The Phoenix fire department simply refers to it as the "WAY", and all officers are indoctrinated at the start of their service. The WAY is a costly one. Although there are no studies looking at the added costs of enhancing fire department staffing at the expense of the EMS system, many Medical Directors are becoming aware of the situation and are debating the wisdom of continuing to involve Fire services in EMS.

"The attitudes of the 1940's live on; in many departments, EMS still is treated as punishment duty. Many chiefs have failed to create an appropriate environment for EMTs and paramedics in their departments. EMS has required the fire service to get involved with physicians, hospital administrators, public health officials, and other "outsiders". In many cases, the fire chief or his delegates have appeared uncooperative at best and obstructive at worst in their contacts and relationships with the health care community. Some fire chiefs have objected to the control that EMS system medical directors exercise over fire department paramedics."[52]

In spite of ongoing resistance within the fire department, the powers that be

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[52] **Trends in Fire Service EMS; by James O. Page, J. D. Publisher, JEMS magazine; Fire Services Today, Vol. 50 No. 2, February, 1983.**

remain resistant to any suggestions by outside agencies to change the status quo back to EMS control.[53] They have successfully resisted the attempts by paramedics and other small lobby groups to form a "third service", insisting the EMS rightfully belongs within the fire dept.

The fire department itself appears faced with a modern day "Occam's razor". They want EMS involvement in order to take advantage of the staffing potential, but find that the additional workload is onerous. They have not really given EMS the recognition and financial focus it fully deserves. All too often EMS is treated as a stepchild, when in fact, its demands substantially outweigh the fire suppression and prevention duties.

The advantages are clear, however, for those Fire Departments who are capable of convincing their councils of the perceived advantages of a Fire/EMS, their involvement allows fire departments to justify expanding budgets.

"EMS holds benefits not only for the public but also the fire service in that it increases our ability to justify agency funding and existence on a more comprehensive basis."[54]

A 1988 survey of Miami, Phoenix, Washington and Los Angeles revealed that, on average, 76% of their calls were EMS.[55]

Of 94 articles found and reviewed in the preparation of this document, approximately 80% were written by members of various fire departments, and all were favorable to fire department involvement in one form or another. A few forward-thinking officers acknowledged that there were some basic differences, which have and continue to cause difficulties between the two service providers[56], however, felt that these could be easily overcome and Ems people "adopted" into the greater Fire Service "fold" with minimal disruption.

Although mention of difficulties adapting to EMS roles continues to haunt fire fighters, the authors of the articles reviewed never considered the possibility of

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[53] **In 1980 the US Department of Transportation suggested that EMS be established as "Third Service", outside the realm of the fire department influence. This suggestion faced immediate and fierce opposition. Fire Chief Magazine, November, 1983.**

[54] **"Improving Public Support for the Fire Service Through EMS; by Chief William Peterson, Plano, Texas Fire Department, in Fire Engineer, November, 1983.**

[55] **The National Run Survey 1988; by Eisner and Harvey, et. al. Firehouse, June, 1989.**

[56] **A Bold Approach to Fire Service EMS; by Jim Dernocoeur, JEMS, June, 1987.**

forming a separate "third service". In fact, while they do mention the movement in the early 70's to form this "third" service, they neglect to mention that it was quashed by the fire proponents of the day. The same arguments for EMS to stay within Fire dept. control are made over and over again. This quote is typical:

"Despite the lack of a centralized approach, most EMS services have therefore developed within the fire service. This approach seemed reasonable since the staffing and equipment were already available and with stricter fire codes, the fire work load was lessened, allowing fire fighters more free time for medical activities."[57]

Despite the frequent acknowledgement of the importance of EMS for meeting fire suppression staffing needs, a limited fire dept. survey in 1991 found that fire dept. consistently gave EMS short shrift:

"The survey revealed that ....97% of respondents have a person designated to coordinate EMS, 91% required the coordinator to respond to suppression duties as well.... of the fire prevention officers (91% had a fire prevention officer) only 68% of these had to respond to fire suppression duties".[58]

If a particular service makes up 70-80% of what you do, does it make sense to commit 90% of your resources to the "other" duties?

Articles and "pseudo-research" papers abound discussing the large number of problems with the combined services. A two-part article in Fire Engineering magazine, sums up the problem list:

"The explanations offered for the disparity in reception given EMS by fire departments range from a philosophical difference stemming from the dichotomy between the old and the new, and the traditionalist vs. the innovator, to misunderstandings of workers job descriptions to career issues such as compensation and promotion policies."

Ms. Dittmar is very astute in mentioning all of these "problem" areas in the integration of the services, but, surprisingly, goes on to say:

"Yet, the consensus inside and outside the fire service is that since the common goal of the Firefighting and EMS functions is to save lives, the two services should work as a team to successfully fulfill the public's needs."[59]

Interestingly, her "consensus" of inside and outside sources consists of

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[57] Improving Attitudes of Firefighters Towards EMS: Kem Hunter, et.al. February, 1988.

[58] The Illusion of Gorgeous Uniqueness of the Fire Service Toward EMS: Daniel K. McKeen Firefighter/Paramedic, et. al. January, 1991.

[59] Fire Service EMS: The Challenge and the Promise; by Mary Jane Dittmar; Fire Engineering, July, 1993.

references citing two fire based articles[60] by "fire authors" perpetuating the obvious bias in Fire/EMS literature.

Other areas of difficulty which she points out include tradition; accountability to outside agencies; stepchild mentality; workload; exposure to communicable diseases; the resistance of fire fighters to do "other" duties, notably EMS; the resistance of EMS workers, who view themselves as health care workers who resist fitting into the quasi military structure of the fire dept.

The two attempts at this system in Canada have failed. A few holdouts remain, such as Lethbridge and Edmunston, but it would take 30 years of intense indoctrination to form a similar, costly system here in Ontario. Why is this? Why can't one "emergency service" fill both roles? What is so special about either that makes any marriage between them so troublesome?

While many authors, including Canadian ones such as Mr. Bernard E. Williams from the Ottawa Fire Department profess to have studied the issues in-depth, it is clear from the writings of these authors that the "core" issue has been missed. The many chapters devoted to the issues from the fire departments' perspective and listed above are endless. Fire departments **FIGHT** fires and view EMS as another battle to be won. Each call is aggressively attacked until the foe is overcome.

EMS officers, particularly in Ontario, view pre-hospital care as an **EXTENSION OF IN HOSPITAL CARE** and adopt an empathic, caring approach that allows them to act quickly when needed, (ie: running codes to save lives) and **APPROPRIATELY** with the patients best interests in mind. (ie: calling base hospital to get a morphine order for terminally ill patients. This is normally outside protocol) Fire service authors just don't get it.

The paramedics of this province constitute an emotionally, intellectually, educationally independent, patient centered profession as compared to the fire officers, whose entire philosophy is one based on risk and rescue.

All arguments, differences of opinions and "between service" clashes stem from this.

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[60] **D.H. Hiett, Jr., treasurer of the International Association of Fire Chiefs EMS Section and chief of the Atlanta (GA) Fire Department, telephone interview, May 10, 1993. and Harley, G.D.; Johnson, G.; kantak et al. "Fire/EMS-A marriage in Trouble, Research project, national Fire Academy, Aug. 6-17, 1990.**

OTHER MODELS

Fire service EMS supporters have a tendency to forget that Fire based EMS is strictly a US based phenomenon and not widely accepted elsewhere. (It has recently made an appearance in Japan) They also forget that it evolved in response to a specific set of circumstances and that it is maintained at an exorbitant cost through lobby efforts from the service supporters themselves.

The Australian model, which consists of one tiered ambulance service, trains its officers to not only recognize the need for algorithms but also to recognize when these are **not** needed. The Australian officers are encouraged through their training and CME (continuing medical education) to think "laterally" using the patient's history and examination to determine the most beneficial treatment modality. (ie: not all patients with chest pain get ASA, Nitro and Oxygen. What if the patient's chest pain is due to trauma?) These officers work closely in conjunction with the Emergency health care team and, in the words of one of their medical directors (Dr. Gantham, personal communication) :

"A good paramedic can give a mediocre emergency doctor a run for his money".

It is important to remember that US paramedics do a good job, using an "algorhythm" based approach. However, it is also important to remember that our system here is based on the ability of respective team members to think and act independently, to the benefit of the patient, knowing when to apply an algorhythm and when not to. As a personal comment, given a choice between having a defibrillator strapped to my chest by either an Ontario fire fighter with 25 hours training or a paramedic with 2000+ hours training, the answer is clear. Especially when the latter comes at $10,000 per year less than the former.

In Britain, the ambulance service trains closely with the hospital nursing staff and acquire their skills over three years of both in-hospital and out of hospital training and preceptorship. The service recognizes the need for some overlap of duties between the various emergency services and fire department personnel are trained by ambulance staff in first aid and CPR. This makes for a close relationship between the two, however, the differences between the two roles are clear and neither service covets the other's position. Each have clear duties at accident and medical scenes and rarely overstep their respective bounds.

In Scandinavia, the ambulance service stands alone and utilizes the fire department and police department, where necessary, for first response and support. In addition, the government has a strong commitment to pre-hospital care by legislating all drivers to be certified in CPR and first aid. In addition, both police and fire carry defibrillators. They are currently experimenting with AED's in public places.

The list of alternative models is endless. Ontario's politicians and decision-makers would do well to thoroughly research their decisions before making recommendations which will impact on service provision for the next thirty years. Relying on fire department assurances, no matter how well intentioned, will likely result in costly mistakes such as that seen in Edmonton and Calgary. A municipal system is just that....a municipal system. It has few links to other jurisdictions and receives/offers little support from them. This may be fine for the protection of property, but remains substandard for the protection of life. It is for this reason that Dr. McNally first devised a Province wide, seamless system, which was supported, and encouraged by the Provincial government. It is also for this reason that certain elements of that vision **must** remain with any new provider. This will ensure that the pre-hospital care system continues to fit well with our own Ontario, province wide, integrated hospital system.

If the governments plans continue to promote a province wide, integrated health care system, what possible sense does it make to omit the pre-hospital care providers from this team approach?

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THE FUTURE

While all of these facts make for interesting reading, the truth of the matter is that many decisions surrounding the provision of emergency services are being made today on the basis of political clout and not established evidence. Edmonton is but one example.

The appropriate evidence based decision as to the provision of services for UTM's will not be easy to make. Councilors will find, as others have, that there are many vested interests, controlled by powerful lobby group such as the Fire Department's various Associations.

An interesting example of this type of public pressure surfaced after a recent Etobicoke Fire Department budget debate revealed that one of their three aerial trucks could be safely cut, since the three together had not been required at any one scene in several years. The councilors voted in favor of the proposed cuts but stopped short of actually laying off personnel. The firefighter's responded with a full page ad in the "Etobicoke Guardian", in February 1996, publicly recognizing the councilors who voted to keep the same level of staffing. They further stated in their add that these elected officials had voted "responsibly. Cuts to the service were presented as being dangerous to the lives of the voters, yet nothing could be further from the truth. There were 88 fire-related deaths in all of Ontario in 1996. By contrast, there were 17,384 deaths from ischemic heart disease in Ontario in 1996. Clearly, the risks of dying from other illnesses/accidents is much higher than the risk of dying from a "fire related death". This fire fighter association, however, had the audacity to make a public statement of this magnitude, inciting public fear and mistrust. By their omission, councilors not named, voted irresponsibly. As you can imagine, this sends a very powerful public message to the voters.

Other examples from the US fire services includes their 1980 effort to quell the legislation necessary to recognize EMS as a separate "third service". A more recent attempt by the Toronto Fire Fighter's Association to mislead the Toronto area councilors regarding the facts of Fire based EMS testifies to the survival of these tactics.

Another useful US example is contained in the Leonard Materese study of Police/Fire consolidations wherein he describes 11 separate attempts by various municipalities in the US to combine police and fire services into one public agency. While the consultants calculated the savings to be tremendous, the fire department itself, in each case, mobilized and lobbied the public and communities into believing that the dangers of such a system far outweighed the benefits, in spite of no statistical proof. Each program was, in its turn, cancelled at great expense, and the original providers returned to their positions. In one instance, the fire service supported and

aided in the election of a councilor who was an ex fire fighter, on the platform that he would return the fire service to its rightful place.

By all measures, the fire service is to be admired and respected as an example of what a truly effective model of public and private lobbying can accomplish.

CONCLUSIONS

In conclusion, it appears that there are many models for the provision of EMS services, and that the fire service model is neither the most cost effective, efficient or sensible one for Ontario. While this paper did not expand on "private" models, one must make note of the fact that the OAOA (Ontario Ambulance Operator's Association) has held power for the past 30 years and has made a rather poor showing with regards to service provision, prevention, education, benefits and employee treatment. It would seem that either of these two must fit somewhere near the last of the possible paradigms.

It is hoped that this paper clarifies some of the facts surrounding the rhetoric of this debate. It is unlikely that this paper will have a significant impact on the fire service leadership, who are entrusted with a mission by their membership; a mission to expand into EMS in an imitation of their mentors from the south. The insightful will realize the basic differences which make the systems incompatible and will attempt to work cooperatively within the Ontario model as it exists today. There is much to admire in both the Ontario fire departments and the Ontario Ambulance system. The rhetoric of amalgamation has done much damage to a previously cooperative

relationship. This paper has reviewed and concluded that:

It is clear that Ontario has a system in place with tremendous advantages and untapped potential which should be built upon.

It is also clear that the fire service in the US and Ontario developed from vastly different opportunities, political bases and support.

There is good evidence for continuing with EMS as a service as the cost-benefit ratio is far better than many of today's medical treatments.

There is little evidence for current fire staffing levels in certain cities such as Toronto and excess money would be better channeled into improving EMS services.

EMS must retain its links to the current province wide, integrated hospital system in order to remain useful to its clients. Changing to a municipal based system or fire based system will force boundary and service disputes onto an already strained system.

Fire/EMS is **not** one standard product, as the fire service would have us believe. There are at least 52 different models of this product. The fire service claims that it is the most cost effective, efficient system, yet are unable to provide proof of this. A literature search of all pertinent databases did not reveal any evidence of higher grade than "personal opinion" for the support of this hypothesis.

Prevention has great untapped potential in EMS and the new system to come, **must** incorporate this aspect into its care package. EMS officers are the logical candidates to design and run these types of programs.

The rules of evidence are well established. When applied to EMS, it is clear that there is little that has been truly examined, other than it's overall cost effectiveness. When applied to the fire service and fire based EMS, it is evident that **no** evidence exist to support the contention that it is the most cost effective or efficient.

EMS is .2% to 5% defibrillation (at most) and other calls make up 95-99.8% of what ambulance services do. The focus must shift away from these low percentage calls and onto research into these other areas. To build an entire system based on "idle hands" or "response times" is illogical. Response times are but a small, myopic way of viewing the service. They are also easily reproducible with proper ambulance staffing, at a greatly reduced cost. Other methods of enhancing the Chain of Survival are cheaper and provide continuous returns (such as public automatic defibrillators) and don't require high paid staff to run them.

In addition, the examples from other countries show that proper legislation can add greatly to the public's attention to EMS. The Scandinavian model is but one example.

The Fire/EMS model is clearly not a "best fit" for Ontario. A more sensible system would be a regional one, such as that delivered by the OPP. A system of this type is province wide, seamless, offers cross-jurisdictional support and is able to respond to neighboring disasters. It also takes advantage of economies of scale for purchasing equipment and vehicles, and makes officer transfers and the maintenance of seniority available to the officers of this province, for the first time in their history, thereby boosting their morale and longevity. In addition, it allows for one standard of care for all persons as well as standardized vehicles, standardized equipment, and standardized protocols. A regional system would also fit in with the current hospital system, whereby "regional" hospitals have patients referred to them from rural centers, for critical care and other life saving modalities. Investing in a fire department/EMS system would make it difficult to continue with these inter city transfers, as most fire departments would not want their vehicles and officers out of their respective areas for protracted periods.

Although there are no studies to support the contention of a fleet of First Responder ALS personnel, it seems that the time is ripe for a study into this intervention. It seems to make sense that the dispatching of one, well trained provider, within minutes of the call receipt, would do much to enhance the effectiveness of modalities such as defibrillation. One small, agile vehicle is certainly more responsive than one large pumper with four-five officers. The addition of an adequate number of first responders could effectively halve both the fire departments' and the ambulance services work load. It is estimated that only 2-5% of all fire department calls are working fires, therefore 80-90% of calls don't require a pumper, but are better served by one knowledgeable responder to assess the situation. Similarly, only 40% of all ambulance calls require ALS, (depending on the criteria used to define ALS, this percentage may be much smaller) the remainder being dealt with effectively by BLS intervention. Dispatching one ALS officer to these scenes to render care and assess the scene prior to the arrival of a full ALS crew also makes sense. These officers in their smaller, more agile vehicles could essentially arrive at most scenes within 2 minutes, assess the situation and effectively allocate resources on an "as needed" basis. Equipped with defibrillators and resuscitation equipment, they could also begin the resuscitation prior to the arrival of the two-person ALS car. BLS cars could be dispatched as needed for the other 60% of EMS calls, without tying up an ALS unit. Upon the arrival of the second unit, the ALS responder could be available for response again, with little tie up or delay. An effective and efficient system, saving both the fire department and the ambulance service costly runs through crowded, congested city traffic, a growing problem.

A final comment must address the fact that this researcher has been unable to locate articles dealing with other forms of service provision here in Ontario. The

other models include the private services, the municipal services and the hospital services. Each also deserves recognition, an in-depth analysis and comparison to the other types of service providers analyzed in this paper. Should any readers be aware of any such studies, please feel free to contact the author at his address, listed on the cover page.

Finally, the evidence both here and in the US clearly shows that the fire department constitutes a very effective and efficient lobby group. In spite of their lack of evidence, they are able, by acting on public sentiment and playing up to community fears, to carry a tremendous amount of clout when dealing with our elected decision makers.

In spite of this, we must be certain that any decisions made about the provision of service for Ontario be made properly, not politically.

This will require tremendous will and vision on the part of our policy makers. It is uncertain whether an adequate number of these view EMS as priority or are even willing to spend the time on the research necessary to cut through the rhetoric of deceit. I trust that this document will help in this respect.

Sincerely,

Dr. M. McNamara.

APPENDIX A

. Any city/jurisdiction wishing to upgrade their current system to an ALS level would have to have in place the following 15 components:

-Adequate Manpower
-Comprehensive Training
-Efficient communications (including 911)
-Reliable Transportation (ground, water, air)
-Adequate Emergency Facilities (staffed on a 24-hour basis)
-Access to Critical Care Units
-Involvement of Public Safety Agencies (police, fire, search and rescue, etc)
-Consumer Participation (DHC, EHS advisory committees)
-Access to the EHS system
-Efficient Patient Transfer Methods
-Standard Medical Record Keeping
-Public Information and Education
-Review and Evaluation
-Disaster Planning
-Mutual Aid Agreements

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APPENDIX B-DATA BASE OF SERVICE PROVISION STUDIES:

Title/author/year	City	Study Type	In favor of fire/ems	fire dept au
Bradley H. Smith, 1984		descriptive	Yes	yes
Tim Birr, Fire Chief, 1985	Springfield/Eugene	descriptive	Yes	yes
Jack Stout, JEMS, 1987		descriptive	Yes	no
Tim Butler, Emergency, 1989	Anaheim	descriptive	Yes	yes
Kevin Brame, Fire Chief, 1991	Orange County	descriptive	Yes	yes
David B. Gratz, Fire Chief, 1983		review	Yes	yes
William Peterson, Fire Engineering, 1983	Plano, Texas	descriptive	Yes	yes
William J. Darin, Fire Engineering, 1983	Batavia	descriptive	Yes	yes
Robert P. Pringle	IAFC	review	Yes	yes
David W. Land, 1989	Virginia Beach	descriptive	Yes	yes
D. Scott MacCallum, 1986	Seminole	descriptive	Yes	yes
US Fire Admin. Jems, 1984		review	Yes	yes
D. H. Hiett, Fire Engineering, 1991	Atlanta	descriptive	Yes	yes
James O. Page, Fire Service Today, 1983	ACT	descriptive	Yes	yes
Daniel A. Doughty, 1991		descriptive	Yes	yes
Paul E. Pepe, Prehospital and Disaster Medicine 1989	Doctor	historical	No	non committ
Jim Dernocoeur, JEMS, 1987	QA consultant	descriptive	Yes	yes
Gary P. Morris Fire command, 1977	Phoenix	descriptive	Yes	yes

James O. Page, Jems, 1984	ACT	descriptive	Yes	yes
Kem Hunter, National Fire Academy, 1988	Seattle	descriptive	Yes	yes
Daniel K. McKeen, National Fire Academy, 1991	Port Angeles	descriptive	Yes	yes
George Harley, National Fire Academy, 1990	Fairfax	descriptive	Yes	yes
John Bates, National Fire Academy, 1990	Cunningham	descriptive	Yes	yes
Peter M. Poddel, EMS Management Advisor, 1987		descriptive	No	no
Leonard A. Matarese, Consultants, 1991	11 city review	consultant	No	no
James Fiero, Division Chief, Austin F.D. 1987	60 cities	analytical	Yes	yes
Gary Morris, Deputy Chief, Phoenix F.D. 1993	Phoenix	descriptive	Yes	yes
Garry Briese, CAE of IAFC.		review	No	Non commit
R. Keller, 1994		descriptive	Yes	yes
Mary Jane Dittmar, 1993		descriptive	Yes	yes
Mary jane Dittmar, 1993		descriptive	Yes	yes
Rich Adams 1995	Editor fire mag.	descriptive	Yes	yes
Bob Bruce 1994	freelance writer	descriptive	Yes	no
Bernard E. Williams, 1995	Edmonton	research	Yes	yes
Micheal Willis	Britain	descriptive	No	no
Bob Bruce	Seattle	descriptive	Yes	yes
Jack J. Krakeel		descriptive	Yes	yes
Larry Merrill	Michigan	descriptive	No	no
Alfred K. Whitehead	Washington	lobbyist	Yes	yes
Dan Manz		lobbyist	Yes	no
John M. Watts, Teresa Akes Deen	Barre	descriptive	Yes	no
Ernst and Young, 1996	Toronto	consultant analysis	No	no
David White	US	Med Trans Pres.	No	no
J. E. Peterson			Yes	yes
David W. Land	Virginia		Yes	yes
Joseph Donovan	Virginia		Yes	yes
Frank Kowalski		analytical	Yes	yes
Ron Gresham		descriptive	Yes	yes
Kathy Benson	San Diego	descriptive	Yes	no
Douglas R. Matheson, 1996	consultant review	analytical	No	no
Lauren Simon Ostrow	Phoenix	descriptive	Yes	yes
Paul E. Pepe	Houston	descriptive	Yes	yes
Dave Williams	Austin	descriptive	Yes	yes
G.P. Belton, 1974	Calgary	analytical cc	No	no
Howard Safir	New York	proposal	Yes	yes
Gary E. Richardson, 1996	Winnipeg	analysis	Yes	yes
Mary Jane Dittmar, 1995		review	Yes	yes
Mary Jane Dittmar, 1995		review	Yes	yes

Lorne Ulley, Firefighting in Canada, Dec. 1990	Edmunston	descriptive	Yes	yes
Jeff Woosnan, Emergency, 1995	Albany	descriptive	Yes	yes
Alan Saly, Firehouse, Oct, 1987	New York	review	Yes	yes
Tim Butler, Emergency, Dec. 1989	Anaheim	review	Yes	yes
Gus Maier, Emergency, April, 1994	Evesham	descriptive	Yes	yes
Katy Benson, Emergency, Sept. 1994		review	Yes	no
Michael J. Chacanaca Emergency, Feb. 1994	Fresno	descriptive	Yes	no
Stiell, I. Annals, June, 1996	Ottawa	cost benefit	Yes	no
Caple, Laurie	**Britain**	**descriptive**	**no**	**no**
Cartwright, S. W.	Calgary	descriptive	no	no

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