REGION OF OTTAWA CARLETON — REPORT
RÉGION D'OTTAWA CARLETON — RAPPORT

Our File/N/Réf.

Your File/V/Réf.

DATE 10 November 1998

TO/DEST. Co-ordinator
Community Services Committee

FROM/EXP. Medical Officer of Health

SUBJECT/OBJET **INDEPENDENT AUDIT OF AMBULANCE RESPONSE TIMES**

DEPARTMENTAL RECOMMENDATION

That Community Services Committee recommend Council receive this report for information.

PURPOSE

The purpose of this report is to explain the "response time" results of the analysis of the 1997 ambulance raw call data for the Region of Ottawa-Carleton (ROC).

BACKGROUND

One of the most important things to anyone who calls for an ambulance in an emergency situation is how quickly the ambulance arrives. In the industry, this is call "response time" and is considered a basic and essential measure of performance.

An independent consultant with extensive emergency medical services credentials was retained to conduct a response time analysis of the Ministry of Health's 1997 raw call data for the Region of Ottawa-Carleton.

The results reveal very serious issues regarding response times for high priority emergency calls in our region. The analysis indicates that even in urban areas the response time is considerably higher than it should be. The results of the independent consultant's analysis are described in detail in this report.

A letter to the Honourable E. Witmer, Minister of Health, expressing grave concern about the current level of service and requesting immediate control of dispatch and additional funds was sent by Regional Chair, Bob Chiarelli on 9 November 1998. A copy is in Annex A.

METHODOLOGY

The 1997 raw call data for Ottawa-Carleton included 112,737 Computer Aided Dispatch (CAD) records for 1997 activities at the Central Ambulance Communications Centre (CACC). These records included all ambulance calls originating or terminating within the Region of Ottawa-Carleton, as well as those handled by ambulances physically stationed within the Region, regardless of pickup location. The records include all emergency and non-emergency calls, as well as transactions completed for ambulance stand by and administrative assignments. The number of records and their general distribution are consistent with previous MOH summary reports, and therefore suggest no omissions of data. Annex B illustrates a summary of the analysis of the raw call data and a description of codes or classes used for ambulance calls.

The analysis was conducted using generally accepted principles and analytic practices. The purpose of the analysis was to:

> i. document and understand the existing level and demand for services in our region, and
> ii. assist in the development of a new land ambulance system for 1 January 2000, which is the time specified for the Region of Ottawa-Carleton to assume full responsibility for this service from the Province.

In general, two forms of analysis were performed for this report. First, the data was sorted by geographic area, including by lower tier municipality, and by kilometre square across the Region. Second, within each area, call volumes, patient tallies and response time performance were established for all codes or classes of calls. Several other operational metrics were calculated such as the time to complete an emergency call from call receipt to clearing the receiving hospital. The analysis performed on raw call data is illustrated in Annex C.

In cases where more than one ambulance was sent, the recorded response time was taken to be the response time of the first ambulance to arrive at the scene. This is in keeping with standard industry practice, and prevents the distortion of response times by later arriving vehicles.

A map illustrating 5 km x 5 km squares detailing response times to life threatening emergencies (code 4) is shown in Annex D.

In order to have a clear understanding of the issues addressed in this report it is imperative to understand the variations in the applications and definitions of certain performance measurement criteria such as "response time".

i. Response Times

This is a complex issue because the different definitions of "response time" produce widely varying results, and major differences in clinical performance. Accordingly, the rigorous and clinically defensible definition that provides the fullest disclosure has been applied to the 1997 raw call data for the Region of Ottawa-Carleton.

The definition of "Ambulance Response Time" used by the consultant for this analysis is: *the time between the ambulance dispatcher's first contact with the caller and the arrival of ambulance at the address of the call*.

Ambulance CAD systems routinely capture the time that a dispatcher starts entering information about a call. The Ministry of Health's CAD system records the time of the dispatcher's first keystroke of date entry as "time zero", and this is the time that has been used as the starting point for all Ambulance Response times reported in this document. Details on time entry points are listed in Annex E.

Emergency response time reporting is a particularly good example of the importance of comparing apples to apples for benchmarking purposes. Some emergency agencies report their "response times" as shortened segments of actual response times. For instance, many Canadian fire departments report "response times" as the time between notifying a fire station of a call, and the arrival of the fire truck at the address. In other words, the time from which the person with emergency initiates the call, to the time that it is delivered and taken by the fire department is not counted in fire department response time reporting. As is explained later in this report this is a significant amount of time. Some police agencies in Ontario report "response time" as the time between receiving a call and the time an available police car can be found to accept the call.

All of the "partial response times" produce optimistic values which mask portions of the actual response time. In the interest of the citizens of Ottawa-Carleton the Region will always use the above definition of "ambulance response time".

ii. Fractile vs Average Response Times

The Region of Ottawa-Carleton supports the use of 'fractile' response time reporting and not the use of 'average' response time reporting.

All response times in this report are reported at the '90th percentile'. This means that 90% or 90 out of 100 of the calls included had a response time of the reported value or less. For example, a response time of 9.8 minutes at the 90th percentile means that nine out of ten calls had an ambulance arrive at the address in 9.8 minutes or less after the first keystroke of data entry by the ambulance dispatcher. Fractile response times at the 90th percentile is a widely accepted industry standard benchmark.

Although the use of fractile response times has been adopted by the MOH for operational standards set in the Regulations to the *Ambulance Act* (eg.Sections 42 and 56), the MOH's Central Ambulance Communications Centre for Ottawa-Carleton refers to response times for our region using average response time reporting.

Averages report the response times experienced by roughly half of the customers. For instance, an average response time of 9.8 minutes means that about half of the response were less than 9.8 minutes, and half were more. Average response times do not convey the response times for the half that were more than 9.8 minutes. For example were they responded to in 10 minutes, 13 minutes, 18 minutes or possibly more?

Like most modern ambulance services, the Region of Ottawa-Carleton will not use average response time reporting when it assumes full responsibility of ambulance services because it paints a very optimistic picture, one which distorts the reality experienced by at least half of patients, those for whom the response times were longer.

To assist in the understanding of the differences between the two methods, a comparitive example using fractile and average response times is shown in Annex F. The table illustrates the impact of the different response time reporting mechanisms.

DISCUSSION

ANALYSIS

The review of the 1997 call data received from the MOH revealed serious issues regarding response times to high priority emergency calls in the Region of Ottawa-Carleton. Even in areas which should be the easiest to serve (the urbanized core), response times are between five and seven minutes longer than those seen in industry leading ambulance systems.

Ambulance response times of less than 8 minutes and 59 seconds at the 90th percentile are considered 'the gold standard' against which urban ambulance systems are benchmarked.

In the Region of Ottawa-Carleton's urban core, life threatening emergency call (code 4) response times run from approximately 14 to 16 minutes at the 90th percentile. In fact, only three square kilometers of the entire Region have response times under 11 minutes at the 90th percentile, and even in the best served area (Nepean), only 56% of calls have response times of 9 minutes or less.

While there is no information available as to how well other communities in Ontario (except for Toronto) are doing, Regional staff found, through the best practices review conducted late this summer, that the City of Calgary's goal for 1997 was: 8 minutes or less response time at the 90% percentile. In 1997 the City of Calgary achieved 8 minutes or less at the 87th percentile. By comparison the City of Toronto presently provides a response time of less than 8 minutes 59 seconds to about 85% of life threatening emergencies. Annex G shows response times to emergency calls for Ottawa-Carleton by lower tier municipality.

It is important not to understate the impact of these deficiencies on survival rates in the Ottawa-Carleton community. The Base Hospital program reports that in 1997, in the Ottawa-Carleton urban area, 5.4% of people survived out-of-hospital cardiac arrest. These are discouraging numbers, but not unexpected given the long ambulance response times. Medical research clearly indicates the importance of response time in the 'Chain of Survival'. Delays in the arrival of Paramedics dramatically reduce patient survival from a medical crisis such as cardiac arrest. Annex H illustrates the Chain of Survival and Annex I includes a letter from Dr. Justin Maloney, Director Base Hospital Program..

The analysis of the data also revealed that a contributing factor to these long response times is the length of time for the dispatchers to notify an ambulance of an incoming emergency call. The dispatch process time for the highest priority calls is 3.8 minutes at the 90th percentile. These results fall short of the MOH's own standard of two minutes at the 90th percentile as described in Section 56 of the Regulations of the Ambulance Act. In other words it takes the dispatch centre

almost twice as long to send out an ambulance as it should. In 1997, the MOH's Ottawa dispatch centre met this standard on only 62% of life threatening emergency calls within the ROC. Annex J illustrates the dispatch centres call handling times.

Response times in rural areas are even more challenging, as call volumes are very light. In many areas, only a few emergency calls arise in an entire year. However, deployment improvements can certainly have some impact on the times which range up to more than half an hour at the 90th percentile. While recognizing the vital importance of Tiered Response, Regional Land Ambulance Health Services staff will review other options for the rural areas for the year 2000 including: ambulance first responder units, community based response teams, volunteers and others which may assist by providing some measure of patient support prior to the arrival of an ambulance. It is important to state that response time criteria has a price tag that varies. Some of the variables that affect the price include: call volume, population density and geographic location. Particular attention to medical referral patterns (call location, types of calls etc…) will be key in developing the new system.

Improving response times, although beyond the scope of this report, will likely require some combination of:

- Improved dispatch call handling (will be addressed in a performance based system but may involve higher skill requirements as hiring criteria, more staff training and better technology)
- Improved ambulance deployment operational practices
- Increased numbers of ambulances covering the Region of Ottawa-Carleton
- More ambulances at specific time points

PUBLIC CONSULTATION

While extensive public consultation continues on Land Ambulance Health Services in general, no specific consultation was undertaken for this particular report and data analysis. However, there will be extensive consultation on response time levels of service in the near future as staff develop standards for Regional Council's consideration for the new ambulance systems in the year 2000.

FINANCIAL STATEMENT

Regardless of who runs the ambulance system it is obvious that more funds are required in this downloading from the Province to the Region of Ottawa-Carleton. It will take money and a transition period to reach the industry standard. In addition, the hospital restructuring will likely result in increased costs as a result of more inter-facility transfers. Staff are currently reviewing the options and have begun discussions with stakeholders.

CONCLUSION

While the analysis by the independent consultant describes last year's performance, no major organizational changes have occurred and so it is likely that performance for 1998 will be similar to that provided by the MOH in 1997. If the MOH agrees to provide the raw call data for 1998 the analysis could easily be repeated.

Poor response times have an immediate impact on survival rates for the residents and visitors in the community. If the Region of Ottawa-Carleton is to improve the ambulance services, beginning in the year 2000, the Ministry of Health must immediately agree to include the full control of dispatch and additional funds in the downloading formula to bring the level of service to the standard the MOH itself has determined as described in the *Ambulance Act.*

Approved by
Robert Cushman

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ANNEX A

6 November 1998

File: 03-98-0016

The Honourable Elizabeth Witmer
Minister of Health
10th Floor, Hepburn Block
80 Grosvenor St.
Toronto, ON, M7A 2C4

Dear Minister Witmer

Re: Land Ambulance Response Times in the Region of Ottawa-Carleton

Thank you for the 1997 land ambulance raw call data received on 16 October 1998, for the Region of Ottawa-Carleton.

An independent consultant with extensive emergency medical services credentials was retained to conduct an analysis of the raw data. The purpose of the analysis was to document and understand the existing level and demand for services in our Region and to assist in the development of a new land ambulance system for 1 January 2000. The consultant used the rigorous and clinically defensible definition of "response time" that provides the fullest disclosure in his analysis of 1997 data for the Region of Ottawa-Carleton provided by your Ministry. This definition was the time between the ambulance dispatcher's first contact with the caller and the arrival of the ambulance at the address of the call.

The results reveal very serious issues regarding response times for high priority emergency calls in our Region. The industry benchmark for an urban high priority emergency response time is 8 minutes and 59 seconds or less. The analysis conducted with Ottawa-Carleton's raw data indicates that even in urban areas the response is considerably higher than it should be. For instance in the City of Ottawa the response time is 14.43 minutes at the 90th percentile. The analysis further showed that the length of time the dispatcher takes to notify an ambulance of an incoming emergency call at the 90th percentile is almost twice as long as the Ministry standard as described in Section 56 of the Regulation to the *Ambulance Act*, as was in effect in 1997.

The impact of these deficiencies on the quality of life for the Ottawa-Carleton community cannot be understated and needs to be addressed immediately.

The Region of Ottawa-Carleton accepts its responsibility for full service provision of land ambulance services in the year 2000. It does not however accept the current very poor service provided by your Ministry. This new information very clearly demonstrates the fact that the Region of Ottawa-Carleton has been downloaded an inadequate service, insufficient funds, and once again highlights the critical importance of including Regional control of the ambulance dispatch process when the program is downloaded.

Your Ministry must rectify this situation immediately to provide the citizens and the visitors to the Nation's capital region with the level of emergency ambulance services they are entitled to. Furthermore, it is clear that additional funds must be added to the calculation for the cost of ambulance service in the downloading process.

Your urgent attention to this matter is requested. I look forward to hearing from you.

Bob Chiarelli
Chair, Region of Ottawa-Carleton

ANNEX B
Summary 1997 Raw Call Data Analyzed

Description	Number of records
Total records provided	112,737
Pickup locations outside ROC	(16,115)
Calls with pick up location within ROC	96,622
Non-patient related priorities (7,8,9,0)	(28,171)
Calls included in final analysis	68,451

Code Definitions

Code 0: Administrative duties

Code 1: Deferrable non-patient transfer

Code 2: Scheduled patient transfer

Code 3: Emergency, non life threatening, patient in stable condition

Code 4: Emergency, life threatening, patient unstable

Code 5: Obviously dead

Code 6: Legally dead

Code 7: No patient carried Any call where a patient is not transported e.g. a call where patient care is provided but the patient declines transport, or a call is cancelled prior to arrival at scene.

Code 8: Standby, ambulance relocated to balance coverage

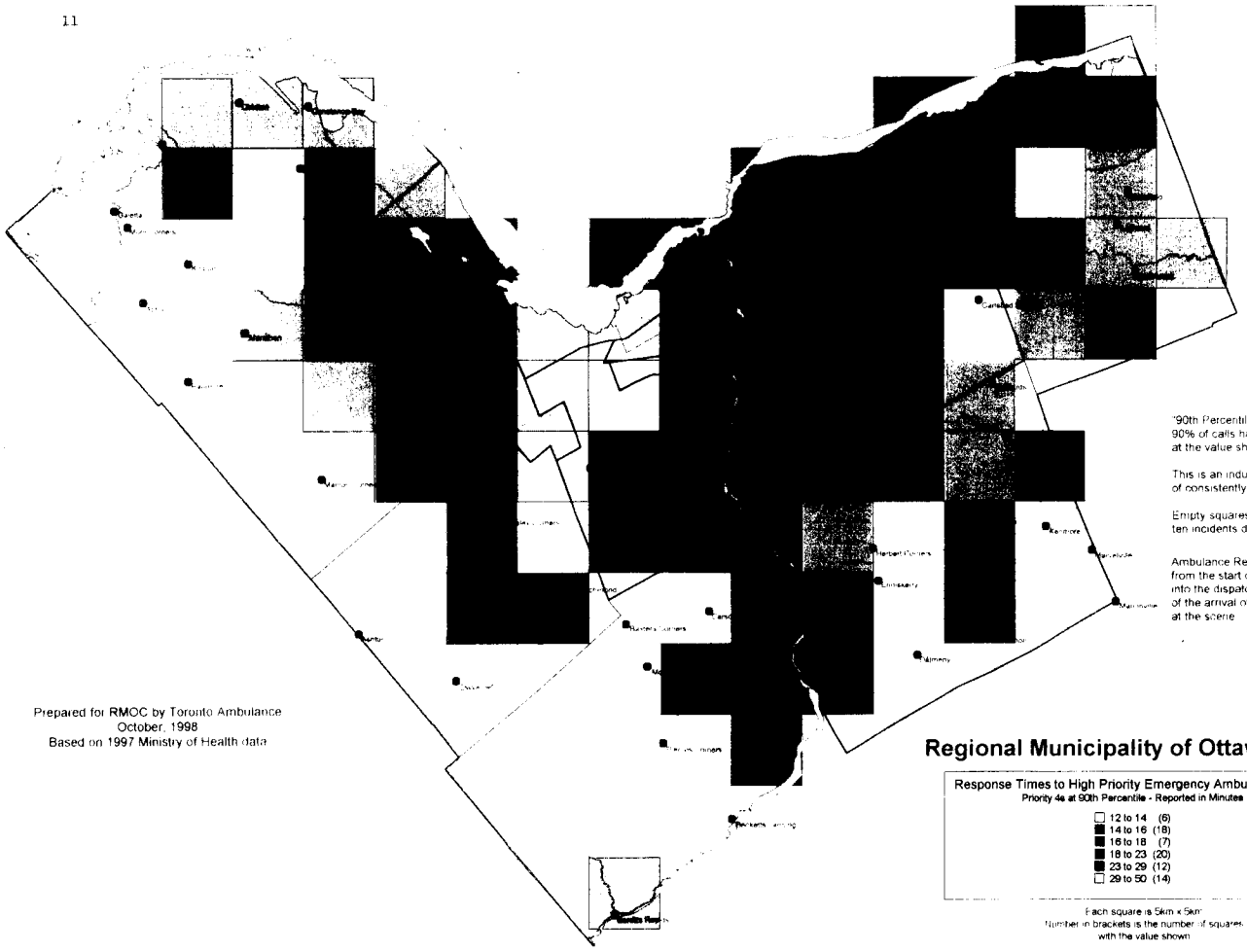
Code 9: Vehicle is out of service for maintenance

ANNEX C

Analysis Performed on 1997 Raw Call Data

For each lower tier municipality, one and five kilometre square, the following data was established:

- Number of Calls by each Priority 1,2,3,4 and 8
- Number of Patients transported from each of Priority 1,2,3, and 4 calls
- Response time at the 90^{th} and 50^{th} percentile for Priority 4 calls
- Average response time for Priority 4 calls
- Response time at the 90^{th} and 50^{th} percentile for Priority 3 calls
- Average response time for Priority 3 calls
- Response time at the 90^{th} and 50^{th} percentile for Emergency Calls combined
- Average response time for Emergency Calls combined
- Call duration at the 90^{th} percentile for emergency calls
- Call duration at 50^{th} percentile for emergency calls
- Average call duration for emergency calls
- Call duration at 90^{th} percentile for non-emergency calls
- Call duration at 50^{th} percentile for non-emergency calls
- Average call duration for non-emergency calls
- Number of call with destinations outside the Region of Ottawa-Carleton



'90th Percentile' means
90% of calls had a response time
at the value shown or less

This is an industry-standard measure
of consistently delivered service levels

Empty squares had data for less then
ten incidents during 1997

Ambulance Response Time is measured
from the start of entry of call information
into the dispatch computer to the time
of the arrival of the ambulance
at the scene

Prepared for RMOC by Toronto Ambulance
October, 1998
Based on 1997 Ministry of Health data

Regional Municipality of Ottawa-Carlton

Response Times to High Priority Emergency Ambulance Calls
Priority 4e at 90th Percentile - Reported in Minutes

- 12 to 14 (6)
- 14 to 16 (18)
- 16 to 18 (7)
- 18 to 23 (20)
- 23 to 29 (12)
- 29 to 50 (14)

Each square is 5km x 5km
Number in brackets is the number of squares
with the value shown

ANNEX E (1)

Time Entry Points

Data for each call included, among others, the following essential time stamp fields:

Time 0 - Time of first keystroke of data entry by the call taker

Time 1 - Time call taker has determined address and priority of call

Time 2 - Time dispatcher notified the responding ambulance of the call

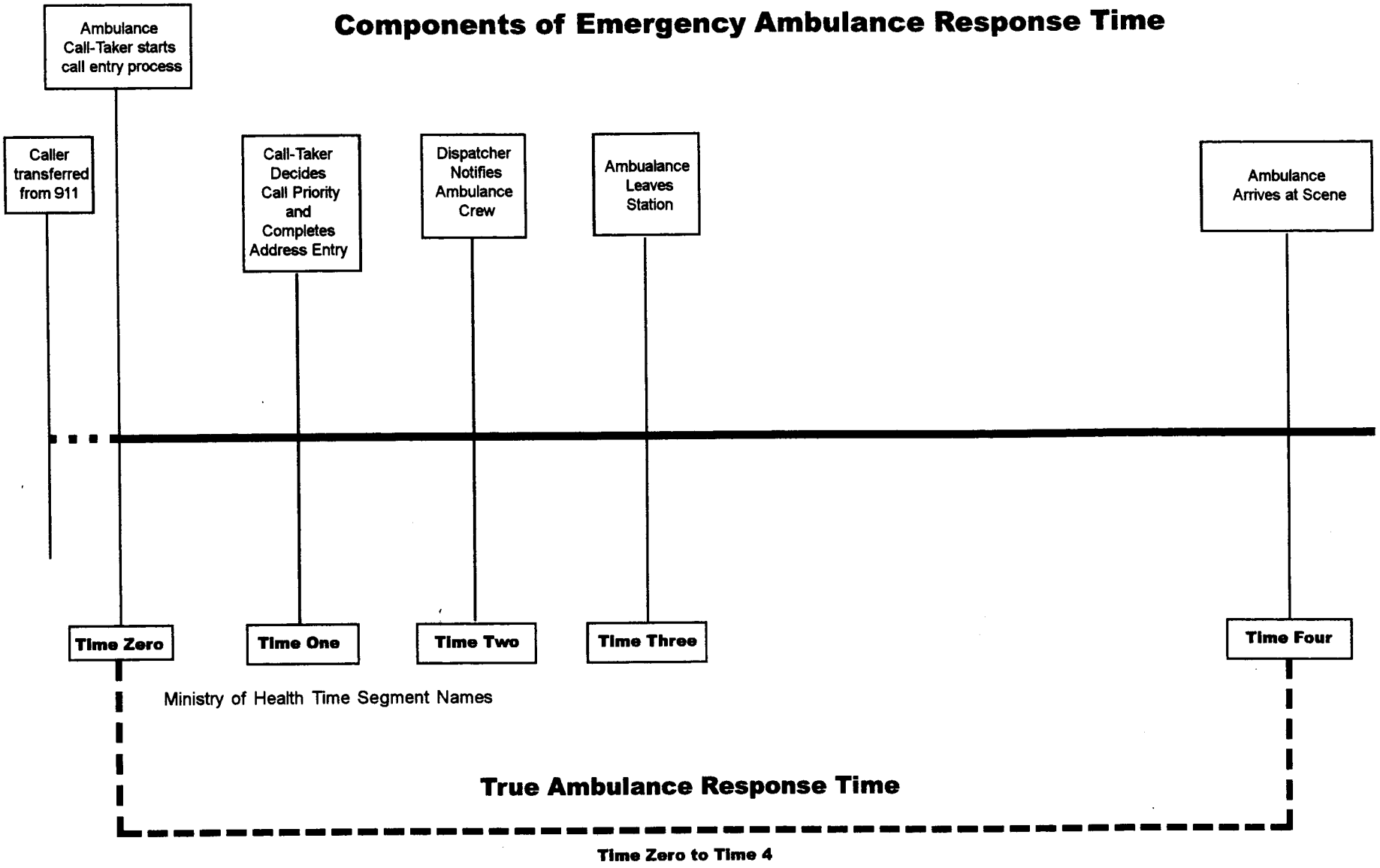
Time 3 - Time the ambulance reported they were en route to the call

Time 4 - Time the ambulance reported they had arrived on scene

Time 5 - Time ambulance departed the scene for hospital

Time 6 - Time ambulance arrived at hospital

Time 7 - Time ambulance clear the receiving hospital


Components of Emergency Ambulance Response Time
Ambulance Call-Taker starts call entry process
Caller transferred from 911
Call-Taker Decides Call Priority and Completes Address Entry
Dispatcher Notifies Ambulance Crew
Ambualance Leaves Station
Ambulance Arrives at Scene
Time Zero
Time One
Time Two
Time Three
Time Four
Ministry of Health Time Segment Names
True Ambulance Response Time
Time Zero to Time 4

ANNEX F

Impact of Fractile vs Average Response Times Reporting for a Sample Area in the Region of Ottawa-Carleton

Method of Calculation	**Resulting "response time" value**	**Variation from True Response Time**
True Ambulance Response Time at 90th Percentile	11.85 minutes	0.0
True Ambulance Response Time - Averaged	8.26 minutes	-3.59 minutes

1997 Ambulance Response Times to Emergency Calls in the Region of Ottawa-Carleton

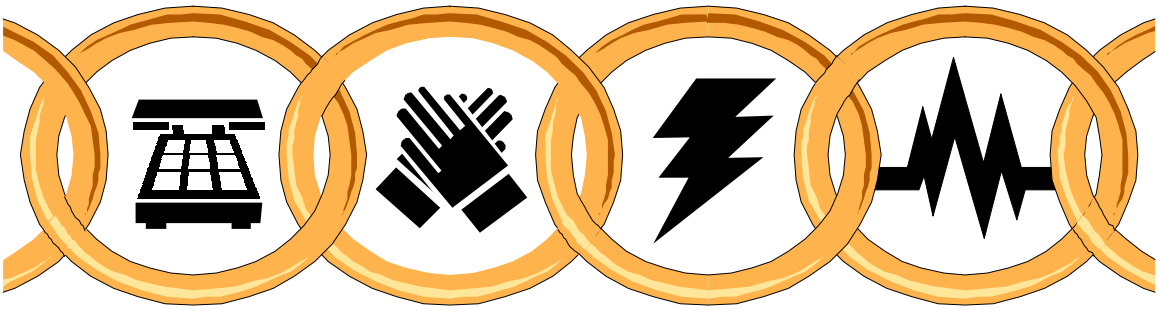
	High Priority - Life Threatening Emergencies (Code 4)		Non-Life Threatening Emergencies (Code 3)		All Emergency Calls Combined (Codes 3 & 4)	
Area Municipality	Response Time at 90th Percentile (minutes)	Total Responses	Response Time at 90th Percentiles (Minutes)	Total Responses	Total Responses	Response Time at 90th Percentiles (Minutes)
City of Nepean	13.58	5,347	25.98	2,976	8,323	19.02
City of Ottawa	14.43	18,827	28.30	11,530	30,357	21.58
City of Gloucester	15.60	3,199	26.95	1,718	4,917	21.23
City of Kanata	15.83	691	24.55	278	969	18.12
Village of Rockliffe Park	16.10	38	35.27	23	61	31.40
City of Vanier	16.12	1,300	31.40	772	2,072	22.97
Township of Goulbourn	17.37	623	25.72	274	897	20.92
Township of Cumberland	18.22	1026	26.88	463	1,489	21.38
Township of Rideau	22.18	382	29.67	158	540	24.33
Township of Osgoode	22.50	532	27.18	171	703	24.12
Township of West-Carleton	30.42	440	39.62	114	554	32.50

Notes:

1. "90th Percentile means that 90% of incidents had a response time for the first arriving ambulance of the value shown or less. This is an industry -standard measure of consistently delivered service levels. Averages are not used as they report the response times for only roughly half of incidents.
2. For the purpose of establishing incident response times, only the response time for the first arriving ambulance is considered for each incident.
3. Totals may from other tables due to presence or absence of data in Ministry of Health fields such as time of arrival on scene
4. Source: Ministry of Health computer aided dispatch system
5. Shown by area municipality in which incident occurred.

ANNEX H

Chain of Survival



Early Access | Early CPR | Early Defibrillation | Early Advanced Care

The Ottawa Hospital | L'Hôpital d'Ottawa

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Base Hospital Program
Ottawa-Carleton

Programme de base hospitalière
Ottawa-Carleton

November 9, 1998

Ms. Joanne Yelle-Weatherall, Director
Land Ambulance Service
Regional Municipality of Ottawa-Carleton
Health Department
495 Richmond Road
Ottawa, Ontario
K2A 4A4

Dear Ms. Yelle-Weatherall:

Further to your request, please find attached a description of the "Chain of Survival", and the status of each link in the chain in Ottawa-Carleton.

Sincerely,

Justin Maloney, MD
Medical Director

JM:pcm

Enclosure:

Weatherall.

Chain of Survival

A large body of research led the American Heart Association to promote a "Chain of Survival" to improve outcomes from prehospital cardiac arrests. Such a multi-system community response allows people to access the system quickly and to have the system respond rapidly with personnel who are trained and equipped to help. Outcome improves when the following sequence of events occurs as rapidly as possible:

- Early Access
- Early CPR
- Early Defibrillation
- Early Advanced Care

If any link in the chain is weak or missing, the chance of survival is lessened, and the emergency medical system is condemned to poor results.

Chart audits and follow-up by the Base Hospital Program of Ottawa-Carleton revealed that 26 people in Ottawa-Carleton (5.4% of 479 arrests) survived a pre-hospital cardiac arrest in 1997. In 1991, only 8 persons (2.4% of 342 arrests) survived.

The following achievements have been accomplished by the citizens of Ottawa-Carleton in regards to the chain of survival:

Early Access
- An enhanced 911 emergency telephone answering bureau 1988

Early CPR
- A Regional Heart Saver Committee established to co-ordinate the activity of major local CPR training agencies
- Insertion of CPR as a core curriculum subject into grade 9 of all local high schools, 1993-94.

Early Defibrillation
- Automated external defibrillators to all ambulances, 1988.
- Automated external defibrillators to all area fire departments, 1993-94.
- Public Access Defibrillation programs 1998.

Early Advanced Care
- Advanced paramedic program, 1994-95.

The common word in each link in the Chain of Survival is "Early." Ottawa-Carleton must improve the speed of each link in the Chain.

Early Access
- 911 call re-routing to ambulance dispatch and subsequent re-routing to fire dispatch centres can be improved with new equipment and policies.

- Significant overhaul of Central Ambulance Communications Centre's equipment, training, staffing, policies and procedures is needed to ensure the right level of care is provided to every patient as quickly as possible.

Early CPR
- A public education program targeting people who are at risk of witnessing a cardiac arrest (eg. 40 plus year old women, families of cardiac patients.) is needed.

Early Defibrillation
- Public Access Defibrillation programs should expand to all places where people gather.

Early Advanced Care
- Ottawa-Carleton has been promised 78 advanced paramedics. So far, 47 have been trained and another 11 are being trained. The rest should be trained as soon as possible.
- 78 advanced paramedics may not be enough.

Dr. Justin Maloney
Medical Director
Base Hospital Program of Ottawa-Carleton
Ottawa Hospital, General Site
November 1998

ANNEX J

Ministry of Health - Ottawa Central Ambulance Communications Centre Call Handling for Priority Code 4 Emergency Life Threatening Calls

Measurement	**Ottawa Centre Results**
At 90th Percentile	3.8 minutes
Average	2.8 minutes
% under Two Minutes	62%