

# 2003 ANNUAL REPORT

## PROVINCIAL OUT-OF-HOSPITAL ADULT CARDIAC ARRESTS

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# Executive Summary

This is the 6<sup>th</sup> Nova Scotia Provincial Annual Out of Hospital Adult Cardiac Arrest (OOHCA) Report and the first using our Cardiac Arrest Endotracheal Intubation (CAINT) Registry. This year we have attempted to report by District Health Authority and provincially. Also, for the first time we are reporting on the neurological status of patients who survived to hospital discharge.

Heart Disease remains the #1 cause of death in Nova Scotia and Canada. The majority of deaths from heart disease occur outside a hospital. Half of all deaths are sudden, within an hour of the attack. The American Heart Association and the Canadian Heart and Stroke Association's chain of survival (early access, early CPR, early defibrillation and Early Advanced Life Support) is used to describe the optimal care for a victim of out of hospital cardiac arrest (OOHCA). Survival is dependent on the strength of all the links. The OPALS<sup>1</sup> study confirmed that the two (2) major determinants of survival (discharge from hospital) are bystander CPR and early defibrillation. Other determinants are witnessed arrest, rhythm on arrival of a defibrillator and ALS care.

## **Incidence:**

The incidence of Out of Hospital Cardiopulmonary Arrest in adults has been reported in the US as ranging from 32 to 128/100,000 people. There are several possible reasons for this wide range; some systems may only be reporting cardiac arrests they are called to, some may include only arrests with resuscitation attempted, some may report on the number of arrests per total population – not adult population. The incidence of adult out of hospital cardiopulmonary arrest in Nova Scotia last year was 155/100,000 population at risk [1184 arrests in patients 16 years of age and older divided by 763,396 (population 16 years of age and older) multiplied by 100,000]. The fact that Nova Scotia has a high incidence of cardiac arrests is not surprising given the prevalence of heart disease (in 1999 Nova Scotia had the 3<sup>rd</sup> highest provincial incidence of heart attacks in people over 45 years of age – 242 per 100,000). The 5-year (89 –94) average of morbidity for Ischemic Heart Disease (IHD) was the highest of all provinces at 800/100,000 population; 5-year average mortality was 160/100,000 – above the Canadian average. In 2003, cardiac arrests accounted for 1% of all calls for an ambulance.

## **Epidemiology:**

Dr Christian Vaillancourt<sup>2</sup> looked at OOHCA for the year 2002 for five EMS Systems; the BC Ambulance service, the City of Edmonton, the OPALS communities, Urgences

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<sup>1</sup> Stiell IG, Wells GA, Field B, Spaite DW, Nesbitt LP, DeMaio VJ, Nichol G, Cousineau D, Blackburn J, Munkley D, Luinstra-Toohey L, Campeau T, Dagnone E, Lyver M. Advanced Cardiac Life Support in Out-of-Hospital Cardiac Arrest. *N Engl J Med* 2004; 351:647-56.

<sup>2</sup> Vaillancourt C, Stiell IG. Canadian Cardiovascular Outcomes Research Team. *Can J Cardiol* 2004 Sep;20(11):1081-90.

Sante of Montreal and ourselves. His report included 5,288 OOHCA with resuscitation attempted. Males accounted for 62.6% to 70.4%. Most occurred in a private residence. OOHCA were witnessed 38.7% to 51.3%. Asystole was the most common presenting rhythm accounting for 35.7% to 51.3%.

In Nova Scotia last year, 67% of out of hospital cardiac arrests occurred in males. The mean age was 65.8 and a median of 70. Seventy-nine percent (79%) occurred in a private residence and 58.4% of arrests with resuscitation attempted were witnessed. Sixty percent (60%) had an initial rhythm of Asystole. This high rate may be accounted for by the fact that almost half (48%) of arrests occurred in rural areas.

### **Determinants of Survival:**

Last year the newspaper, USA Today, ran a series of articles on out-of-hospital cardiac arrest survival in the fifty (50) largest urban centers. They identified the critical importance of bystander CPR and early defibrillation – publishing the call response intervals at the 90<sup>th</sup> percentile (the interval in which 90% of all calls are responded to). De Maio et al<sup>3</sup> showed that there is no particular interval associated with successful resuscitation – the earlier the better. She found there was a steep decrease of the survival curve in the first five (5) minutes and then a leveling off.

The Call Response interval for 90% of all out of hospital cardiac arrests in Nova Scotia in 2003 was 16 minutes. This means that for 90% of all cardiac arrests (urban, suburban and rural) the interval from call answered at the Ambulance Communication Center to the Ambulance arrived at the scene was 16 minutes.

One way to address the interval between collapse and the arrival of a defibrillator is a Public Access Defibrillation Program. The results of the multi-centered Public Access Defibrillation (PAD) Trial have just been published<sup>4</sup>. Public Access Defibrillation resulted in a significant increase in the number of survivors. The limitation of PAD is that approximately 80% of out-of-hospital cardiac arrests occur in private residences. Many systems have attempted to identify areas of high cardiac arrest incidence – casinos, airports, golf courses, gyms, large public buildings and recreational facilities - have all been named. Last year an article was published in CMAJ regarding the risks of heart attacks in recreational adult hockey players. We identified 2 arrests occurring in hockey arenas last year.

In 2003, Public Access Defibrillation programs defibrillated 2 of the 438 patients defibrillated (.4%); Medical First Responders shocked 41 (9.4%).

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<sup>3</sup> DeMaio VJ, Stiell IG, Wells GA, Spaite DW. Optimal Defibrillation Response Intervals for Maximum Out-of-Hospital Cardiac Arrest Survival Rates. *Ann Emerg Med.* 2003;42:242-250.

<sup>4</sup> The Public Access Defibrillation Trial Investigators. Public-Access Defibrillation and Survival after Out-of-Hospital Cardiac Arrest. *N Engl J Med* 2004;351:637-46.

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The other critical factor influencing survival is bystander CPR. The USA Today article cited the top two US cities for performing bystander CPR - Seattle's rate of 44%; Boston's 30%. In Dr Vaillancourt's report, the incidence of Bystander CPR ranged from 14.7% to 46%. The Nova Scotia rate for the past five (5) years has was 37.6%.

The USA Today article focused on the subgroup of patients found in VF or pulseless VT as these are the truly "salvageable" patients. They cited the incidence of VF/VT, as presenting rhythm, of between 12 and 26 per 100,000 population. (The Nova Scotia rate was 14.3). According to the USA Today article, the data supplied by the 50 largest US centers showed a 6 to 10% average survival rate for VF/FT. Several cities – Kansas City, San Francisco, Houston, Tulsa, Oklahoma City, Boston, and Seattle have reached or surpassed a 20% survival rate for VF/VT patients. When reading EMS system's Out of Hospital Cardiac arrest survival rates it is important to be sure you are comparing similar systems (area covered, population served, call response interval, bystander CPR rate, level of EMS service). Using the denominator of VF/VT the survival rate for all of Nova Scotia in 2003 for VF/VT non EMS witnessed patients was 12.5%. However to properly compare survival rates to those listed above we should only be looking at our urban areas. The survival rate for VF/VT non-EMS witnessed patients in our two largest urban centers (Industrial Cape Breton and Halifax Regional Municipality) was 25%.

In yet another way of evaluating system performance some look at the survival rate for only witnessed arrests with bystander CPR in which the presenting rhythm is VF or VT. In Dr. Vaillancourt's report the range for this measurement was 13.9% to 16.7% with Nova Scotia's being 15%. For the past year our survival rate in this group was 14%.

The concern with evaluating effectiveness based on subgroup analysis is that the purpose of an EMS system is to help meet the needs of all the people in its area not just the ones that can be reached within a certain amount of time (and therefore would likely still be in VF or VT).

### **Survival:**

Survival rates vary widely among EMS Systems. Survival to hospital discharge ranged from 4.3% to 9% in Dr Vaillancourt's report. A major concern is the methodology used to capture all incidents of cardiac arrest. How one defines both the numerator and the denominator has a major effect on the survival rate. It is therefore critical that each system reporting its cardiac arrest statistics clearly define what it is exactly that they are measuring and how they performed that measurement.

In 1991, the recommended guidelines for uniform reports of data for Out of Hospital Cardiac Arrest: the Utstein Style were published in the Annals of Emergency Medicine. These represented the results of two meetings – the 1<sup>st</sup> at the Utstein Abbey located on an island off the Norwegian coast and the 2<sup>nd</sup> in Surrey, England – of the American Heart Association, the European Resuscitation Council, the Heart and Stroke Foundation of Canada and the Australian Resuscitation Council. The intent of the Utstein style of

reporting was to standardize the definitions of the terms used in systems' reports and research on Out of Hospital Cardiac Arrests.

In Nova Scotia survival rate is defined as the number of patients discharged from hospital neurologically intact divided by the number of people who suffer an out of hospital death of cardiac origin and in whom resuscitation was attempted. However accurate comparisons need to go beyond Utstein. Systems need to delineate the policies they use to identify who has resuscitation attempted and how they arrive at a cause (cardiac vs non cardiac).

Interestingly Becker et al<sup>5</sup> noted an inverse relationship between incidence and survival. They hypothesized that this might be the result of the same factors that increase the incidence on heart disease could also prevent successful resuscitation. On the other hand it may be the result of the policies of the system as to which victims of OOHCA they attempted to resuscitate. A system with a very restrictive policy on who should have resuscitation attempted would have a lower incidence and a proportionate increased success rate.

As stated above, a major concern is defining exactly what patients make up the denominator in the survival rate determination and that the numbers being collected are a complete and accurate accounting of all OOHCA s. With a single ambulance system that is called to all OOH deaths we believe we can accurately capture the denominator. The reviewers have access to hospital medical records. As well we have access to the ME's decision as to cause of death. We follow every survivor to hospital admission and therefore believe we accurately capture the numerator. A Patient Care Report (PCR) is completed for all patient contacts – including DOAs. The PCRs are faxed directly to the Data Processing Office within 48 hrs of the call. Any incomplete PCRs are returned for completion. As well Quality Control Medics (QCMs) review all arrests for specific criteria. Each month they send in a list of arrests they have audited. Finally the Billing Office sends the Data Processing Office copies of all PCRs with the protocol numbers corresponding to a DOA or cardiac arrest. If there is a question as to cause of the arrest (cardiac vs non cardiac) the PCR is reviewed by the Provincial Medical Director using history, physical exam findings, past medical history, initial rhythm, hospital, medical examiner and Department of Health (Vital Statistics data).

Survival, according to the Utstein style of reporting cardiac arrest outcomes, is defined as discharge from hospital neurologically intact. For 2003 the Quality Control Medics (QCMs) were able to conduct neurological assessments on all 21 survivors. They used the Cerebral Performance Categorization. This is a five (5) level assessment where one (1) means good cerebral performance, two (2) moderate cerebral disability, three (3) severe cerebral disability, four (4) comatose, vegetative state, five (5) brain death/organ donation candidate.

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<sup>5</sup> Becker LB, Smith DW, Rhodes KV. Incidence of cardiac arrest: a neglected factor in evaluating survival rates. *Ann Emerg Med.* 1993;Jan;22(1):86-89

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In 2003 there were 21 OOHCA patients who survived to discharge from hospital (3.6%). Of the 21 survivors, 19 (90%) had a CPC score of 1, 2 (20%) scored a 2. Therefore the number of neurologically intact survivors was 19 or 3.3%. These Numbers and percentages are lower than the previous year but if placed on a control chart it is evident that they are within the normal statistical variation.

**Limitations:**

This report is dependant on accurate and complete documentation on the Patient Care Report. This continues to improve but there are still missing data. There also continues to be glitches in our report generating program which delays the production of the report.

In 2003 we started including data from several Medical First Response (MFR) agencies as the important determinant is when does the defibrillator arrive – not who arrives with the defibrillator. Unfortunately, we receive only a small percentage of all the cardiac arrests that MFRs attend.

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# Definitions

**Adult:** Any patient 16 years of age or older.

**Asystole:** The cessation of all electrical activity in the heart.

**Arrest Witnessed (EMS):** Patient arrested after arrival of emergency response personnel. Utstein studies report 10% of out-of-hospital cardiac arrest occur after the arrival of emergency personnel.

**Bystander CPR :** *(also called Lay or Citizen CPR)* An attempt to perform basic cardiopulmonary resuscitation on a cardiac arrest patient by a person who is not a member of the organized emergency response system. By this definition a physician, nurse or paramedic who witnesses a cardiac arrest and provides CPR is classified as a bystander.

**Call Response Interval:** The period of time from the moment the call for help is answered at the Ambulance Communication Centre to the moment the paramedics arrive at scene. Also referred to as call received/receipt until at scene interval. Note that this interval does not extend to arrival at the patient's side.

**Call Shock Interval:** The period of time from the moment the call for help is answered at the Ambulance Communication Center to the time the first defibrillation (shock) is given.

**Cardiac Arrest:** The cessation of the heart's mechanical activity with loss of vital signs (no detectable pulse, breathing and unresponsive).

**Cardiac Etiology:** It is impossible to accurately determine the specific cause of cardiac arrest for all attempted resuscitation. According to the Utstein Style Template we classify cardiac arrest as presumed cardiac etiology if it is likely based on all available information - history, past medical history, presenting rhythm, hospital, autopsy and Medical Examiner (ME) records. However, this frequently is a diagnosis of exclusion as patients who do not fit readily into the non cardiac etiology category are included in the cardiac etiology category.

**Cardiopulmonary Resuscitation (CPR):** Broad term meaning an attempt to restore spontaneous circulation. This term refers to basic CPR which is the attempt to restore effective circulation with external compressions of the chest wall, plus expired air inflation or the lungs.

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# Definitions

**Cerebral Performance Category:** This is a five point scale used to assess neurological status of survivors from out of hospital cardiac arrest. Category 1 is conscious and normal, without disability. Category 2 is conscious with moderate disability. Category 3 is conscious with severe disability. Category 4 is a comatose or vegetative state. Category 5 is death. Our system uses a single data collection form but many interviewers to collect this data.

**Computer Aided Dispatch (CAD):** In Nova Scotia, all calls for an ambulance are transferred from a 911 Public Service Answering Point (PSAP) to a single Ambulance Communications Centre and automatically assigned a master incident number (MIN) and time stamped. A computer program guides the call taker through a series of questions and then suggests a response configuration (closest ambulance - no lights and siren, with lights and siren, second ambulance to intercept and/or assist the first, medical first responders as well as the ambulance(s), etc.)

**Dead on Arrival (DOA):** A patient who was pronounced dead upon the arrival of paramedics. There was no attempt at resuscitation.

**Medical Oversight Physician (MOP):** Physician responsible for a specific area in Nova Scotia who oversees the care provided to persons using the ambulance service according to provincial emergency medical policies and protocols.

**Noncardiac Etiology:** Noncardiac causes of cardiac arrest are often obvious and easy to determine. Specific subcategories include drug overdose, suicide, drowning, hypoxia, exsanguination, cerebrovascular accident, and trauma.

**On Line Medical Oversight Physician (OLMOP):** Physician who provides on-line medical oversight consultation 24/7 for ground ambulance paramedics providing care to persons using the ambulance service according to provincial emergency medical policies and protocols.

**Population at Risk:** The provincial population over the age of fifteen (15) years.

**Private Residence:** Home/Cottage.

**Public Access Defibrillation:** The provision of defibrillation by non-traditional "first responders" such as security guards, lifeguards, flight attendants, etc.

**Public Place:** Ambulance/Helicopter Landing Zone, Bar, Casino, Church, Doctors Office, Farm, Golf Course, Group Home, Highway, Hockey Arena, Hospital, Industrial Complex, Nursing Home, Penitentiary, Public Building, Public Street, Recreational Facility, School/Day Care and Ski Hill.

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## Definitions

**Pulseless Electrical Activity:** An organized cardiac rhythm but there is no pulse/cardiac output

**Resuscitations Attempted:** This group includes all persons whom emergency system personnel attempted to resuscitate (other than basic assessment). A resuscitation attempt refers to some effort at basic CPR.

**Resuscitation Not Attempted:** Resuscitation attempts for some patients in cardiac arrest are inappropriate and should not be attempted. The current EHS policy is that if a patient has evidence of being dead for a period of time where resuscitation attempts would have no hope of success the paramedics do not attempt resuscitation. Additionally, resuscitation is not attempted on patients with a Do Not Resuscitate (DNR) order. Also, if the interval from patient collapse until arrival of the paramedics at the scene is confirmed to be greater than fifteen (15) minutes, no CPR has been performed prior to their arrival and, the defibrillator reveals asystole or gives a no shock advisory, resuscitation may not be attempted.

**Survival:** Out-of-hospital cardiac arrest patient successfully resuscitated and subsequently discharged alive from hospital.

**Survival Rate:** The number of survivors to hospital discharge divided by the number of people who suffer an out-of-hospital cardiac arrest of cardiac origin and have resuscitation attempted.

**Utstein Style:** Internationally agreed upon criteria and definitions for reporting out-of-hospital cardiac arrest data and outcomes.

**Ventricular Fibrillation / pulseless Ventricular Tachycardia (VF/VT):** A totally disorganized / extremely fast, ineffective electrical activity in the heart resulting in no cardiac output.

**Witnessed Arrest:** Patient collapse was seen or heard by a bystander.

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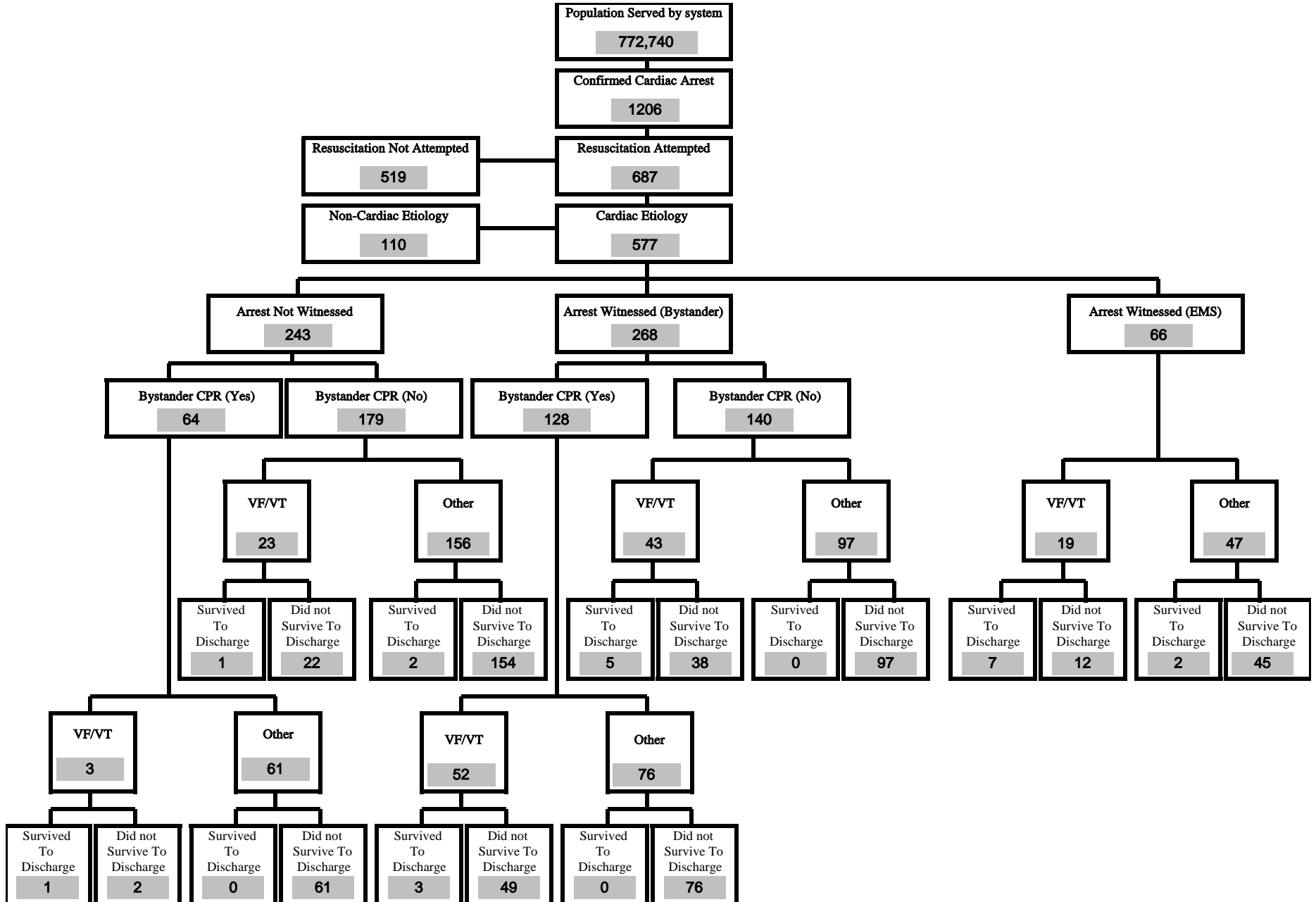
# Utstein Style Report

In 1991, the recommended guidelines for uniform reports of data for Out of Hospital Cardiac Arrest: the Utstein Style were published in the Annals of Emergency Medicine. These represented the results of two meetings – the 1<sup>st</sup> at the Utstein Abbey located on an island off the Norwegian coast and the 2<sup>nd</sup> in Surrey, England – of the American Heart Association, the European Resuscitation Council, the Heart and Stroke Foundation of Canada and the Australian Resuscitation Council. In response to the lack of uniform terminology and reporting standards for Out Of Hospital Cardiac Arrests, the above groups agreed on a glossary of terms, a template for reporting data (next page), definitions for time points and intervals, definitions of clinical terms and outcomes as well as recommendations for the description of EMS systems when reporting Out Of Hospital Cardiac Arrest research.

In reporting our provincial Out Of Hospital Cardiac Arrest data and outcomes we have attempted to follow the Utstein style.

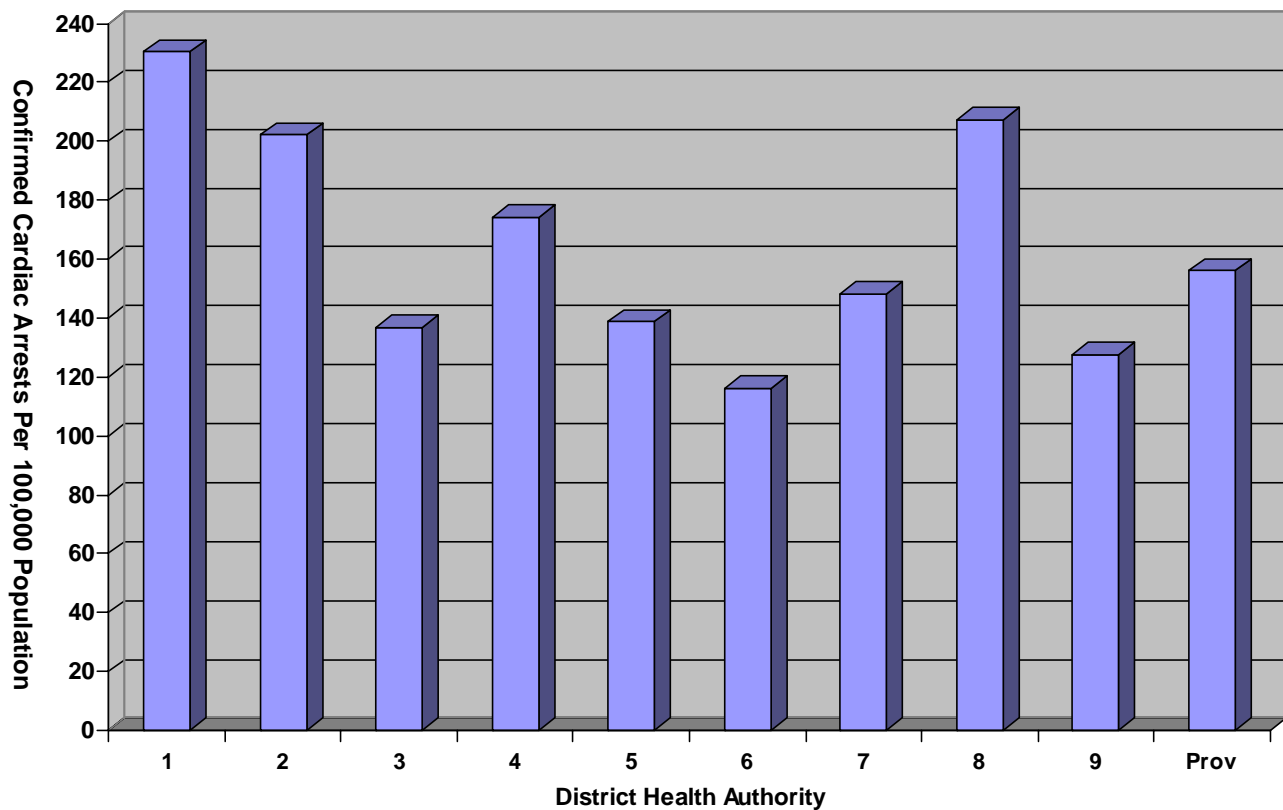
# Utstein Style Report

## Provincial Summary Year to Date 12/31/03



# Cardiac Arrests with Resuscitation Attempted per 100,000

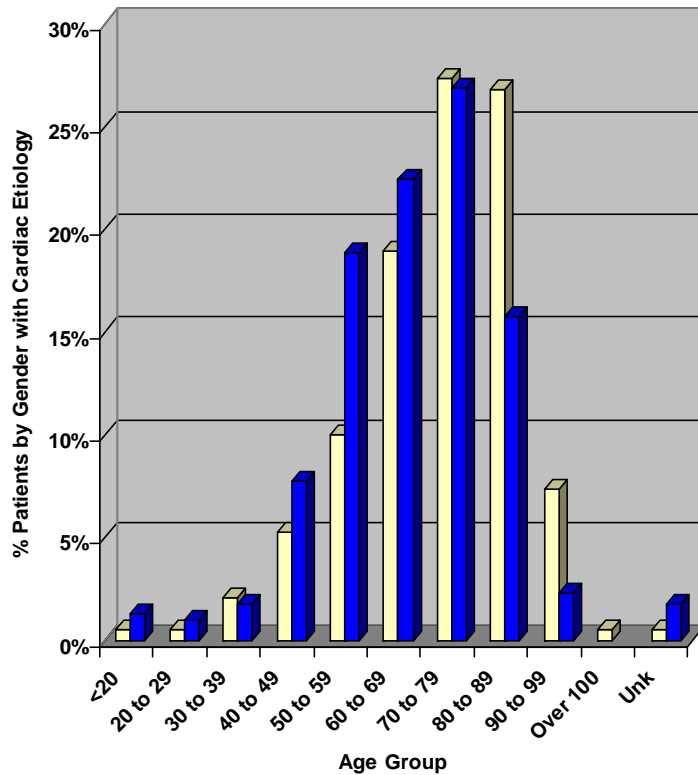
01/01/2003 to 12/31/2003



DHA	Cardiac Arrests	Adult Population	Cardiac Arrests Per 100,000
1	118	51241	230.3
2	107	52926	202.2
3	96	70159	136.8
4	103	59080	174.3
5	38	27404	138.7
6	47	40463	116.2
7	59	39844	148.1
8	226	108957	207.4
9	412	322666	127.7
Prov	1206	772740	156.1

# Age & Gender of Patients with Resuscitation Attempted

Year to Date 12/31/03



## Age & Gender Statistics

Provincially out-of-hospital cardiac arrest patients ranged in age from 16 years old to over 100 years. 387 (67.1%) patients were male. In Dr. Vaillantcours's report of 5 EMS Systems in Canada males accounted for 62.6% to 70.4%.

The majority of males who had a cardiac arrest were between the age of 70-79 (26.9%) and the majority of females who had a cardiac arrest were between the age of 70-79 (27.4%).

Age	<20	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 89	90 to 99	100+	Unknown	Total
Male	5 (1.3%)	4 (1.0%)	7 (1.8%)	30 (7.8%)	73 (18.9%)	87 (22.5%)	104 (26.9%)	61 (15.8%)	9 (2.3%)	0 (0%)	7 (1.8%)	387 (67.1%)
Female	1 (0.5%)	1 (0.5%)	4 (2.1%)	10 (5.3%)	19 (10.0%)	36 (18.9%)	52 (27.4%)	51 (26.8%)	14 (7.4%)	1 (0.5%)	1 (0.5%)	190 (32.9%)
Total	6 (1.0%)	5 (0.9%)	11 (1.9%)	40 (6.9%)	92 (15.9%)	123 (21.3%)	156 (27.0%)	112 (19.4%)	23 (4.0%)	1 (0.2%)	8 (1.4%)	577

# Locations

Year to Date 12/31/03

Location	Arrests	% of Total (1206)
Home/Cottage	946	78.4%
Highway	92	7.6%
Other	59	4.9%
Nursing Home/LTC Facility	32	2.7%
Public Street	29	2.4%
Public Building	16	1.3%
Group Home	6	0.5%
Hospital	6	0.5%
Recreational Facility	6	0.5%
Ambulance/Helicopter Landing Zone	4	0.3%
Drs Office	4	0.3%
Industrial	2	0.2%
School/Day Care	2	0.2%
Hockey Arena	1	0.1%
Penitentiary	1	0.1%
Total	1206	100%

Most cardiac arrests occur outside of a hospital. In our system, 78.4% of out-of-hospital cardiac arrests occurred at the patient's home. Over the past 5 years this % has ranged from 73.8% to 80.1%.

# Survivors vs Non Survivors

Year to Date 12/31/03

Total Patients Recorded	1206
Resuscitations Attempted	687
Cardiac Etiology	577
Median Response Interval (min)	7
Survived to Discharge (%Cardiac Etiology)	21 (3.6%)

It has been clearly established that the 2 major determinants of survival of out of hospital cardiac arrests are bystander CPR and early defibrillation.

	Non Survivors	Survivors
Arrest Witnessed	317 (57.0%)	17 (81.0%)
Bystander CPR	188 (37.8%)	4 (33.3%)
Initial Rhythm -Asystole	346 (62.2%)	2 (9.5%)
-PEA	87 (15.6%)	2 (9.5%)
-VF/VT	123 (22.1%)	17 (81.0%)

# Public vs Private

Year to Date 12/31/03

	Public	Private	Total
Total Patients Recorded	222	984	1206
Resuscitations Attempted	131	556	687
Cardiac Etiology	95	482	577
Median Call to Arrive Scene (min)	7	7	7

## n (%) Patients Cardiac Etiology

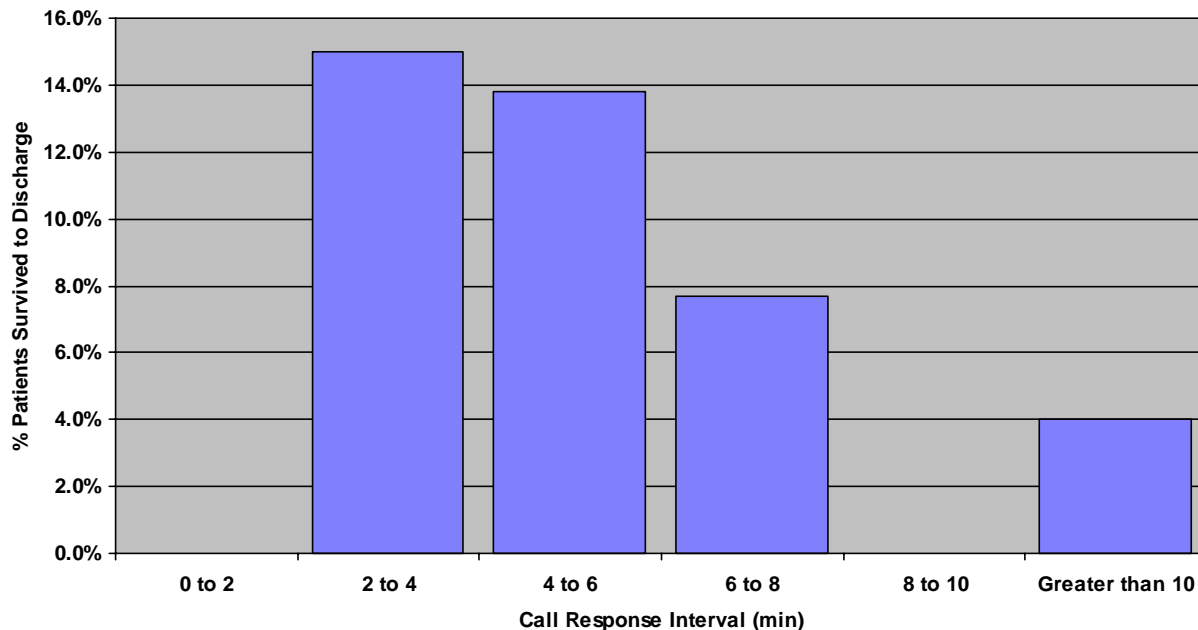
Arrest Witnessed	68 (71.6%)	266 (55.2%)	334 (57.9%)
Bystander CPR	43 (51.2%)	149 (30.9%)	192 (37.6%)
Initial Rhythm -Asystole	46 (48.4%)	302 (62.7%)	348 (60.3%)
-PEA	16 (16.8%)	73 (15.1%)	89 (15.4%)
-VF/VT	33 (34.7%)	107 (22.2%)	140 (24.3%)
Survived to Discharge	5 (5.3%)	16 (3.3%)	21 (3.6%)

Though more patients suffering a cardiac arrest in public versus in a private dwelling survived, our numbers were not enough to have the power to demonstrate a statistically significant difference. (p=0.18).

The denominator for bystander CPR is non EMS witnessed, resuscitation attempted & cardiac etiology while all others use resuscitation attempted & cardiac etiology.

# Call Response Interval for Presenting Rhythm of VF/VT, Non-EMS Witnessed

Year to Date 12/31/03



0 to 2 min Survived to Discharge	2 to 4 min Survived to Discharge	4 to 6 min Survived to Discharge	6 to 8 min Survived to Discharge	8 to 10 min Survived to Discharge	>10 min Survived to Discharge
0 of 7 ( 0.0%)	3 of 20 (15.0%)	4 of 29 (13.8%)	1 of 13 (7.7%)	0 of 11 (0.0%)	1 of 25 (4.0%)

Rapid defibrillation is the single most important determinant of patient outcomes. Successful resuscitation depends primarily on the time interval between cardiac arrest and first defibrillation. The goal of any emergency medical system is to provide prompt defibrillation.

Recent literature appears to show a benefit of performing CPR for at least 90 seconds before defibrillating a patient in cases where the Call Response Interval exceeds 4 minutes. This presumes bystander CPR is not being performed.

Presently, the interval from arrive at scene to first shock is not reliably recorded. Therefore, we substituted the Call Response Interval.

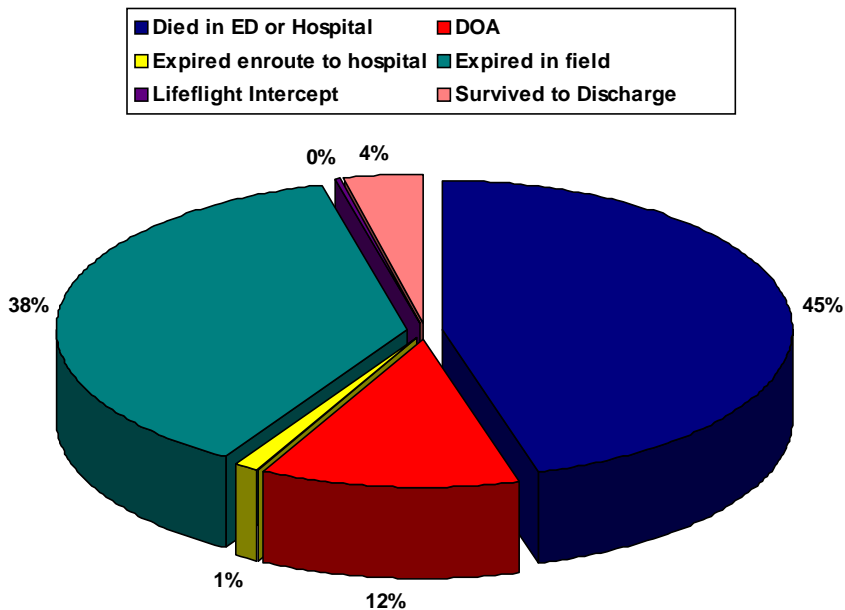
# Outcomes

Year to Date 12/31/03

Total Patients: 1206

Resuscitation Attempted: 687

Cardiac Etiology: 577



In our system resuscitation efforts can be terminated in the field, after full advanced life support measures (defibrillation, endotracheal intubation, IV medication) and consultation with an On-line Medical Oversight Physician. Resuscitation is not attempted on patients with obvious lividity or rigor mortis and those patients that have a DNR order. 20% of patients who had resuscitations attempted were not transported to a hospital.

# Cardiac Arrest Report by DHA

Year to Date 12/31/03

DHA	Total Out of Hospital Cardiac Arrest	Resuscitation Attempted	Cardiac Etiology	Arrest Witnessed	Bystander CPR	Shockable Rhythm VFVT	Asystole	PEA	Survival to Discharge
1	118	75	62	36 (58.1%)	12 (22.6%)	18 (29.0%)	34 (54.8%)	10 (16.1%)	3 (4.8%)
2	107	67	57	35 (61.4%)	37 (69.8%)	9 (15.8%)	42 (73.7%)	6 (10.5%)	1 (1.8%)
3	96	50	39	21 (53.8%)	12 (33.3%)	8 (20.5%)	26 (66.7%)	5 (12.8%)	0
4	103	62	53	29 (54.7%)	15 (34.1%)	7 (13.2%)	37 (69.8%)	9 (17.0%)	1 (1.9%)
5	38	22	20	11 (55.0%)	5 (29.4%)	2 (10.0%)	14 (70.0%)	4 (20.0%)	0
6	47	23	19	8 (42.1%)	5 (29.4%)	5 (26.3%)	12 (63.2%)	2 (10.5%)	0
7	59	34	31	14 (45.2%)	8 (30.8%)	6 (19.4%)	20 (64.5%)	5 (16.1%)	2 (6.5%)
8	226	129	110	59 (53.6%)	35 (35.7%)	27 (24.5%)	70 (63.6%)	13 (11.8%)	6 (5.5%)
9	412	225	186	121 (65.1%)	63 (38.0%)	58 (31.2%)	93 (50.0%)	35 (18.8%)	8 (4.3%)
NS	1206	687	577	334 (57.9%)	192 (37.6%)	140 (24.3%)	348 (60.3%)	89 (15.4%)	21 (3.6%)

# MOP Cardiac Arrest Statistics

Year to Date 12/31/03

MOP	Cardiac Etiology	% Arrest Witnessed	% Bystander CPR	% Initial Rhythm VF/VT	Median (Minutes)		Survived to Discharge	% Survived to Discharge
					Call Response Interval	Call Shock Interval *		
Bennett	20	45.0%	33.3%	20.0%	8	4	0	0.0%
Buchholz	27	63.0%	45.8%	22.2%	9	12	0	0.0%
Buffett	6	100.0%	16.7%	50.0%	19	2	0	0.0%
Chaloner	15	60.0%	69.2%	13.3%	11	2	0	0.0%
Dow	17	47.1%	58.8%	17.6%	10	5.5	0	0.0%
Holmes	3	33.3%	33.3%		16		0	0.0%
Howlett	53	54.7%	34.1%	13.2%	10	19	1	1.9%
Legere	12	66.7%	83.3%	33.3%	9	3	1	8.3%
Loveridge	1	100.0%	100.0%		12		0	0.0%
MacDonald	17	64.7%	56.3%	11.8%	9	11	0	0.0%
McLennan	20	55.0%	29.4%	10.0%	6	10	0	0.0%
McLeod	42	50.0%	33.3%	9.5%	7.5	11	0	0.0%
Morash	74	62.2%	24.2%	31.1%	7	5	4	5.4%
Sutherland	13	46.2%	36.4%	15.4%	9	3.5	2	15.4%
Sutton / Allen	19	42.1%	29.4%	26.3%	7	4	0	0.0%
Travers	141	66.0%	36.8%	34.8%	6	5.5	7	5.0%
Wawer	97	51.5%	36.5%	24.7%	5	4	6	6.2%
Summary	577	57.9%	37.6%	24.3%	7	5	21	3.6%

\* Filtered on resuscitation attempted / cardiac etiology / initial rhythm- VF/VT prior to hospital transport. There is concern about the accuracy of this measurement as the time of first shock is not always taken from a time piece synchronized with the CAD which marks arrival at scene. Blank spaces mean no patients were defibrillated.

# Provincial Comparison of 1998 - 2003 Cardiac Arrest Statistics

Year	Resuscitation Attempted	Cardiac Etiology	Arrest Witnessed	Bystander CPR	VF/VT	Survived to Discharge
1998	492	438 (89.0%)	207 (47.3%)	139 (31.7%)	128 (29.2%)	12 (2.7%)
1999	558	495 (88.7%)	270 (54.5%)	176 (35.6%)	159 (32.1%)	27 (5.5%)
2000	574	506 (88.2%)	274 (54.2%)	177 (35.0%)	165 (32.6%)	35 (6.9%)
2001	697	591 (84.8%)	293 (49.6%)	210 (35.5%)	158 (26.7%)	31 (5.2%)
2002	589	476 (80.8%)	260 (54.6%)	152 (31.9%)	135 (28.4%)	30 (6.3%)
2003	687	577 (84.0%)	334 (57.9%)	192 (37.6%)	140 (24.3%)	21 (3.6%)

A comparison of cardiac arrest statistics is provided in order for EHS to be able to identify any trends in the data. Any changes can have an impact on EHS policy development.

This year we changed the denominator for bystander CPR from resuscitation attempted, cardiac etiology to non EMS witnessed, resuscitation attempted, cardiac etiology.

Next year, we will separate the under 16 years of age population from the over 16 age group.

A comparison between 1998 and 2003 cardiac arrest statistics indicates there was no significant change in the percentage of cardiac arrests that were of cardiac etiology, that were witnessed, received bystander CPR or had an initial rhythm of VF/VT. The survive to discharge percentage is higher this year than last year, but is within the normal statistical variation seen year to year.

In order to affect an appreciable change in survival there needs to be an increase in bystander CPR and improvement of the call shock interval. To achieve the former there needs to be a co-operative effort between the Department of Health, the Nova Scotia Heart and Stroke Foundation and the various CPR training organizations to increase the percentage of Nova Scotians who know what to do when they witness a cardiac arrest.

To statistically improve the call shock interval more emphasis needs to be put on first response defibrillation and perhaps public access defibrillation (PAD). The lack, at large numbers of cardiac arrests at any one venue, makes it difficult to target PAD programs to a specific location. As well, a prospective, multicentre, randomized clinical study (The Public Access Defibrillation Trial) will not be completed until September 2003. This study is testing whether volunteer, nonmedical responders can improve survival from out of hospital cardiac arrest. It will also look at cost effectiveness.